



PRICE CONTROL DISAGGREGATION MODEL (PCDM)

MODEL USER GUIDE

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GLOSSARY

Term	Meaning
Allowed revenue	The DNO Party's Allowed Distribution Network Revenue
All-the-way tariff	A tariff applicable to an end user of a DNO Party's network
Annual Review Pack (ARP)	A model completed by each DNO Party that calculates forecast CDCM use of system tariffs for the next five years
Authority	The Gas and Electricity Markets Authority
Common Distribution Charging Methodology (CDCM)	The methodology used for calculating charges to Designated Properties as required by standard licence condition 13A of the Electricity Distribution Licence.
CDCM model	The model used in the calculation of CDCM use of system charges
Distribution and Connection Use of System Agreement (DCUSA)	A multi-party contract between licensed electricity distributors, suppliers and generators in Great Britain concerned with the use of the electricity distribution system
DCUSA text	The text of the DCUSA
DCUSA Ltd	The company established, owned, and funded by parties to the DCUSA. The main activity of DCUSA Ltd is to administer the governance of the DCUSA.
DCUSA Change Proposal (DCP)	A proposal to change the DCUSA text
Customer contribution	Capital charges payable by customers under the DNO Party's connection charging policy
Distribution losses	Units lost while being transported through the Distribution System
Distribution services area (DSA)	The specified area within which a DNO Party must provide specified distribution services
Distribution system	The system consisting (wholly or mainly) of electric lines owned or operated by a distributor
Distribution network operator (DNO)	A company licensed to distribute electricity in Great Britain by the Authority
DNO party	An electricity distributor who operates one of the 14 DSAs and in whose Electricity Distribution Licence the requirements of Section B of the standard conditions of that licence have effect
EHV	Nominal voltages of at least 22kV and less than 132kV
EHV Distribution Charging Methodology (EDCM)	The methodology used for calculating charges to Designated EHV Properties as required by standard licence condition 13B of the Electricity Distribution Licence
EDCM model	The model used in the calculation of EDCM use of system charges
Embedded network	An electricity distribution system operated by an LDNO and embedded within the DNO Party's network

Term	Meaning
End user	A user of the network that is not a LDNO
Extended Method M	The name for a model previously used to calculate LDNO discounts for application in the EDCM
Forecast Business Plan Questionnaire (FBPQ)	The questionnaire that the DNO Party is required to submit in line with Regulatory Instructions and Guidance issued by the Authority
Forward cost pricing (FCP) methodology	A methodology used in the EDCM to set locational charges based on annual incremental charges for EDCM connectees. A fundamental principle of the FCP model is that the revenue recovery generated from its incremental charges is equal to the expected cost of reinforcement.
GWh	A gigawatt hour of electricity
HV	Nominal voltages of at least 1kV and less than 22kV
IDNO Party	A Party that holds a Distribution Licence in which Section B of the standard distribution licence conditions does not have effect
Licensed distribution network operator (LDNO)	An IDNO Party or DNO Party operating an electricity distribution system outside of its DSA
LDNO boundary	The point at which electric lines or electrical plant that form part of the DNO Party's network are connected to an embedded network that is not owned or operated by the DNO party
LDNO discount	Percentage discounts calculated in the PCDM applied to a DNO Party's all-the-way tariffs
Long-run incremental cost (LRIC) methodology	A methodology used in the EDCM to set locational charges based on nodal incremental costs. These costs represent the brought forward (or deferred) reinforcement costs caused by the addition of an increment of demand or generation at each network Node.
LV	Nominal voltages of less than 1kV
LV Mains	LV distributing mains where: <ul style="list-style-type: none"> a) the upper boundary is at the secondary side (LV) of a distributor transformer; and b) the lower boundary is the point of connection associated with the LV service
LV Services	The service line from the LV main to the DNO's protection device situated upon the customer's premises, including the joint and associated components connecting the service line to the distributing main
Method M	The name for a model previously used to calculate LDNO discounts for application in the CDCM
Modern equivalent asset value (MEAV)	An estimate of replacement cost
Network	The DNO Party's Distribution System within the DNO Party's Distribution Services Area

Term	Meaning
Network level	A circuit or transformation level between supplies at LV and the transmission network
Nominated Calculation Agent	The provider of specified input values under the DCUSA text, currently ElectraLink
PCDM	The Price Control Disaggregation Model used to calculate LDNO discounts for application in the EDCM and CDCM
Regulatory reporting pack (RRP)	A dataset produced each year by each DNO Party for the Authority
Unit	A kilowatt hour of electricity
Use of system (UoS) charges	Demand Use of System Charges and Generation Use of System Charges
User	Customers (whether demand customers or generators) and (where relevant) LDNOs

1. INTRODUCTION

This section explains the background to this model user guide, sets out important notes regarding the specification assumed for the model, presents a change control log and sets out the structure of the document.

1.1. Background and purpose of this document

CEPA and TNEI have been appointed as service providers to DCUSA Ltd to re-develop and maintain the charging models used to set electricity distribution use of system tariffs, in line with the Distribution and Connection Use of System Agreement (DCUSA). This encompasses the following methodologies and corresponding models:

- the Common Distribution Charging Methodology (CDCM) model;
- two EHV Distribution Charging Methodologies (EDCM) models;
- the Price Control Disaggregation Model (PCDM); and
- the Annual Review Pack (ARP) model.

This document is a user guide to accompany the PCDM model version recorded in the bottom row of Table 1.1 (see below).

The purpose of this document is to provide additional information to users with regards to the PCDM. This includes operating instructions, interpretations of the DCUSA text, and explanations of the implementation of the DCUSA text in the model.

This document also provides some background on concepts used in the model to aid in the understanding of the charging methodologies. However, the scope of this guide is limited to the implementation of the DCUSA methodologies in the model. Therefore, it does not, for example, include any guidance to companies on assumptions that should be used when developing input data for the PCDM.

1.2. Important notice

This user guide, and the model referenced above, have been developed in line with:

- Schedule 29 of the “01 April 2020 DCUSA Charging Methodologies Pre-Release” version of the DCUSA text;
- the following (if any) DCUSA change proposals (DCPs), where not yet reflected in the abovementioned DCUSA text specification: DCP 266; and
- any additional assumptions specified in Annex A to this user guide.

The content of this user guide should in no way be interpreted to take precedent over the DCUSA text. However, in preparing this user guide and the model referenced above, we have assumed, with approval from DCUSA Ltd, that any assumptions set out in Annex A take

precedence over the abovementioned DCPs and DCUSA legal text. We have also assumed that any abovementioned DCPs take precedence over the abovementioned DCUSA text. Revisions to this document over time are summarised in the change control table in the next section.

This document is applicable only to the version of the model, DCUSA text and DCPs referenced herein and should not be used as a guide to any other models or versions of the DCUSA legal text or DCPs.

1.3. Change control

Table 1.1 records which version of the DCUSA text and charging models this document was written for, and how it differs from previous user guide versions. This document corresponds to the most recent publication referred to in the end row of Table 1.1.

Table 1.1: Change control

Document version	Date delivered to DCUSA Ltd.	Corresponding version of DCUSA text and DCPs	Corresponding charging models	Updates from previous version
1.0	30/05/2018	1 April 2019 pre-release (received 05/03/2018)	PCDM_v1_20180529.xlsx (provided 30/05/2018)	Original version
2.0	20/07/2018	DCUSA v10.3 (released 28/06/2018)	PCDM_v2_20180720.xlsx (provided 20/07/2018)	References to DCUSA text updated to comply with version 10.3 (released 28/06/2018)
3.0	29/08/2018	DCUSA v10.3 (released 28/06/2018) + DCP 306	PCDM_v3_20180824.xlsx (provided 29/08/2018)	Updated to reflect DCP 306
3.0	16/10/2018	01 April 2020 DCUSA Charging Methodologies Pre-Release (released 09/10/2018)	PCDM_v3_20181016.xlsx (provided 16/10/2018)	Updated references to legal text version
3.0	07/12/2018	01 April 2020 DCUSA Charging Methodologies Pre-Release (released 09/10/2018) + DCP 266	PCDM_v3(266)_20181207.xlsx (provided 07/12/2018)	Updated to reflect DCP 266
3.0	05/04/2019	01 April 2020 DCUSA Charging Methodologies Pre-Release (released 09/10/2018) + DCP 266	PCDM_v3(266)_20190405.xlsx (provided 05/04/2019)	Updated to reflect DCP 266, and to remove division by “(S + U)” from EDCM discounts

1.4. Structure of the user guide

The remainder of this document is set out as follows:

- Section 2 explains some of the **background to the PCDM model** - including an explanation of the DCUSA charging methodologies, and how the PCDM model relates to the other models used to produce distribution use of system charges;
- Section 3 summarises the **structure of the PCDM model**;
- Section 4 issues instructions on **how to operate the PCDM model**;
- Sections 5-8 each correspond to part of the PCDM model:
 - Section 5 explains the purpose of the **information sheets**;
 - Section 6 provides a commentary on the **model input sheets**;
 - Section 7 walks through each of the **calculation sheets** - explaining their purpose, how they correspond to the DCUSA text, what further assumptions are made in the way the model implements the text, and providing further explanation on the economic and/or engineering rationale, where necessary;
 - Section 8 explains the contents of the **output sheets**; and
- Annex A contains a **log of assumptions** used to clarify or amend the DCUSA legal text.

2. BACKGROUND TO THE CHARGING MODELS

This section sets out some background on the DCUSA charging methodologies before providing a high-level overview of the PCDM, the subject of this user guide.

2.1. The DCUSA charging models

A key part of the DCUSA is the common framework it sets out for calculating use of system charges for users of DNO Parties' networks. The objectives of the charging methodologies, set out in the Schedules of the DCUSA text, include the promotion of competition in the generation and supply of electricity, and the cost-reflectivity of tariffs.

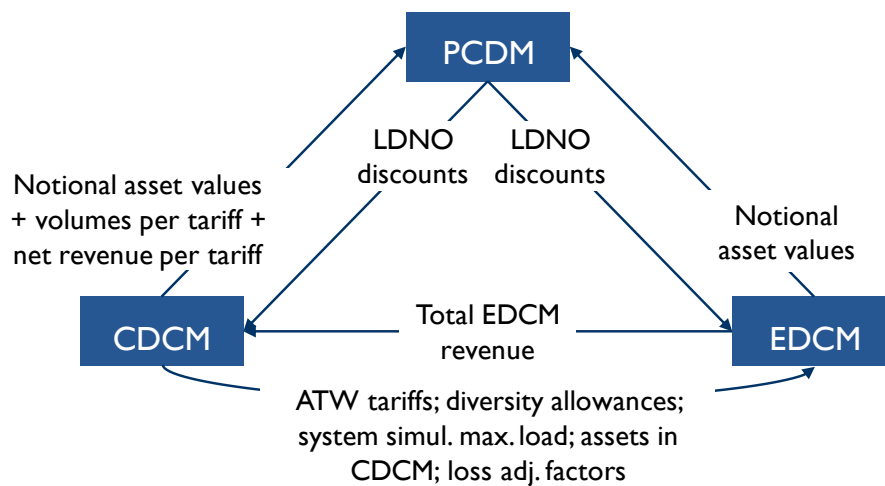
The charging methodologies are split by voltage level and are implemented by DNO Parties through a set of standardised charging models published by DCUSA Ltd. In total there are four models that are used to produce distribution tariffs. These models cover the following methodologies:

- **Common Distribution Charging Methodology (CDCM)**, set out in DCUSA Schedule 16, covers the calculation of tariffs for users connected to high voltage (1-22kV) and low voltage (sub-1kV) networks.
- **Extra high voltage Charging Methodology (EDCM)** covering the calculation of site-specific charges for users connected to the distribution network above 22kV or within the boundary of an HV primary substation. The EDCM is further separated into two methodologies and corresponding models:
 - the forward cost pricing (FCP) method, set out in DCUSA Schedule 17; and
 - the long-run incremental cost (LRIC) method, set out in DCUSA Schedule 18.
- **Price Control Disaggregation Model (PCDM)**, the specification of which is set out in DCUSA Schedule 29, calculates discounts applied to tariffs for LDNOs in the CDCM and EDCM models.

In addition to the four core charging models above, DNO Parties also produce an **Annual Review Pack (ARP)** which forecasts CDCM tariffs over a five-year period. The requirements of the ARP are set out in DCUSA Schedule 21.

The four core charging models are used by DNO Parties to produce distribution tariffs each year, with each using either the FCP or the LRIC version of the EDCM. Tariffs produced by the models are calibrated to allow DNOs to recover their allowed revenue for the charging year, as set by Ofgem. In order to achieve this, there are interactions between the models, as shown in Figure 2.1 below.

Figure 2.1: Interactions between models



The PCDM requires notional asset values from the EDCM and CDCM, and volumes and revenues per all-the-way tariff from the CDCM to calculate discounts applied to LDNO tariffs. In turn, the EDCM and CDCM require the LDNO discounts from the PCDM to calculate LDNO tariffs. The EDCM and CDCM interact by exchanging information on network characteristics and revenues recovered through tariffs.

2.2. The PCDM

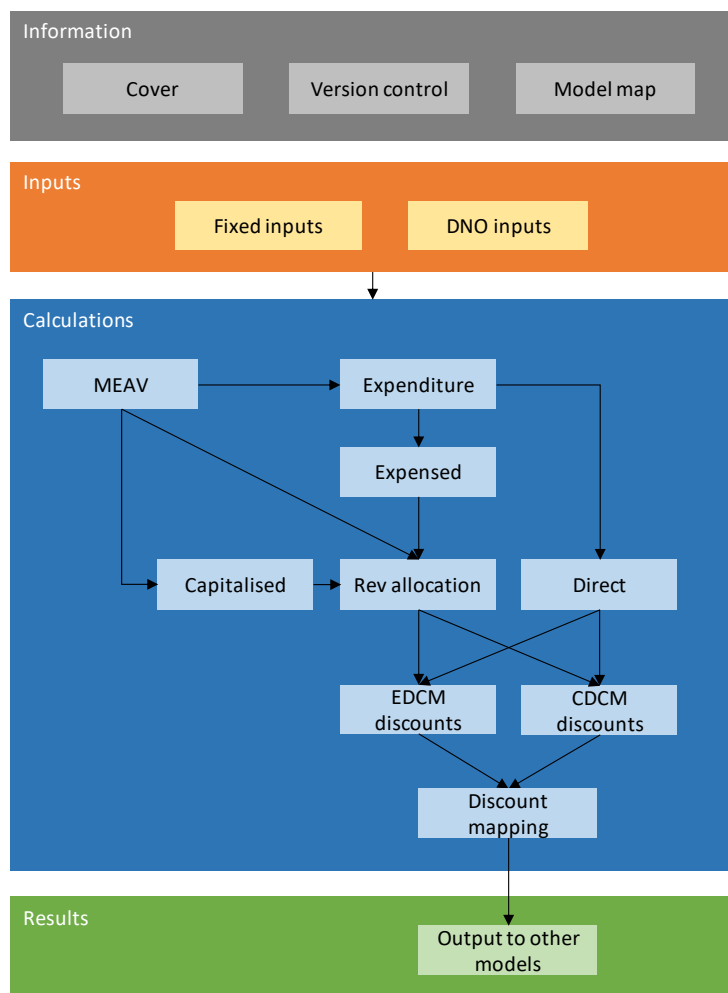
The PCDM derives the LDNO discount factors applied to the “all-the-way” tariffs calculated in the CDCM and the EDCM.

At its core, the PCDM is a revenue allocation model that determines a share of allowed revenues for different network levels. It uses those allocations to estimate the revenue per unit in p/kWh covered by network levels provided by the LDNO up to the LDNO boundary, and expresses these as a percentage of average all-the-way tariffs derived in the CDCM. The PCDM uses data from specific historic years to allocate revenue and units between network levels, so a revenue / unit scalar is applied to make revenue per unit consistent with charging year data used to calculate average tariffs.

3. MODEL STRUCTURE

As shown in Figure 3.1 below, sheets in the PCDM are grouped into four main sections: (i) information sheets; (ii) inputs; (iii) calculations; and (iv) outputs.

Figure 3.1: PCDM model map



The information sheet section contains the cover sheet, version control sheet, a clickable model map similar to that shown above and an index sheet with links to the main sections of each sheet and to each of the model's inputs and outputs.

The inputs section has two sheets: the "Fixed inputs" sheet, which contains inputs that should not be altered by model users, as they are universal or set in the DCUSA text; and the "DNO inputs" sheet, which contain tables for DNO Parties to input values provided by the Nominated Calculation Agent, from their EDCM and CDCM models, and other DNO-specific values.

The calculations section contains eight sheets. All calculation sheets draw on at least one of the two input sheets and the linkages between the calculation sheets are shown in Figure 3.1 above. Five of the calculation sheets contain calculations to allocate revenue to different network levels and another contains calculations used to allocate revenue within a network

level in certain cases. Those six sheets then flow through to separate sheets where the EDCM discounts and CDCM discounts are calculated.

The results section contains a single output sheet presenting the discounts calculated in the model in the format used in the DNO Party's EDCM and CDCM models.

Within the sheets of the charging models, input, calculation and output sections are labelled following a consistent convention, summarised as follows:

- Separate labels are generated for inputs, calculations (labelled as "Section") and outputs.
- The first number represents the model number, set out in Table 3.1 below.
- The second and third numbers represent the order of sheets within the model. The first input, calculation or output sheet will have a value of 01, and so on.
- The letter (separated from the numbers with a hyphen) represents the order within a sheet, from top to bottom.

For example, a section with the label of "Input 402-E" would represent the fifth input section, on the second input sheet in the PCDM; a label of "Section 104-B" would represent the second calculation section on the fourth calculation sheet of the CDCM.

Table 3.1: Model numbers

Model	Number
CDCM	1
EDCM (LRIC)	2
EDCM (FCP)	3
PCDM	4
ARP	5

A list with clickable hyperlinks to each labelled section is provided on the "Index" sheet.

4. OPERATING INSTRUCTIONS

The charging models use a consistent set of cell formats to help with operating and understanding of the model. These are reproduced in Figure 4.1 below.

Figure 4.1: PCDM cell formats

Format	Description
	Cell intentionally blank
Value	Hardcoded input
Value	User input
Value	Model output
Value	Calculation
Value	Value from another worksheet
Value	Value used on another worksheet
Value	Issue identified in a check
Text	Label
Text	Annotation
Text	Column heading
Text	Level 1 heading
Text	Level 2 heading
Text	Level 3 and 4 heading
Sheet tab colour	Information sheet
Sheet tab colour	Input sheet
Sheet tab colour	Calculation sheet
Sheet tab colour	Output sheet

To operate the PCDM model, DNO Parties should ensure they have filled in all user input cells (shaded yellow) in the “DNO inputs” sheet. Input values that are zero (e.g. if the asset count is zero for an asset category) should be entered as such and not left blank.

Where appropriate, inputs include data validation and input messages to help guide users how to input values into the model (an example is shown in Figure 4.2 below).

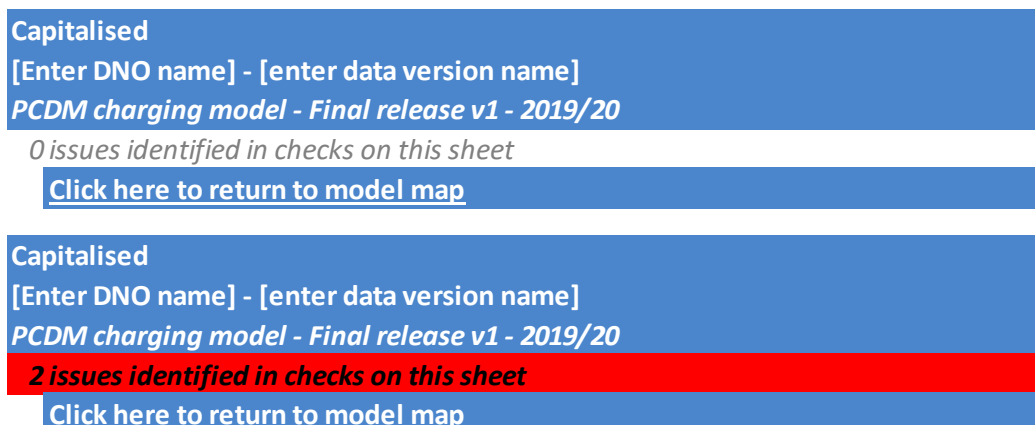
Figure 4.2: Example of validation and input messages

The screenshot shows a spreadsheet titled "Nominated Calculation Agent inputs". It contains two input sections: "Input 402-A: LV mains split" and "Input 402-B: HV split". Each section has a description, a label, a unit, and a value field. The "LV mains split" value is 25.68%, and the "HV split" value is 65.00%. A validation message box is shown next to the "LV mains split" value, stating "Validation requires the value to be greater than 0%". Another message box is shown next to the "HV split" value, stating "Input messages provide information on how inputs should be specified.".

Section	Description	Label	Unit	Value
Input 402-A: LV mains split	A LV mains split value should be provided by the Nominated Calculation Agent each year. This value may vary by DNO.	LV mains split	%	25.68%
Input 402-B: HV split	A HV split value should be provided by the Nominated Calculation Agent each year. This value should be the same for all DNOs.	HV split	%	65.00%

If any checks flag an issue, then Row 4 of the relevant sheet will display with a red background, and the total number of issues will be given. This is illustrated in Figure 4.3.

Figure 4.3: Example of highlighting Row 4 for warning messages



The calculation sheets of the PCDM model contains a variety of in-built checks, summarised at the end of each sheet. All model checks are summarised on the “Version control” tab, near the bottom of the sheet (an example is shown in Figure 4.4 below). Once all relevant data has been input to the model, users should check the summary of in-built model checks to ensure that no issues have been identified.

Figure 4.4: Summary of in-built model checks

Issues identified by in-built model checks, by sheet		
MEAV	number of issues	0
Expenditure	number of issues	0
Expensed	number of issues	0
Capitalised	number of issues	0
Rev allocation	number of issues	2
Direct	number of issues	0
EDCM discounts	number of issues	0
CDCM discounts	number of issues	0

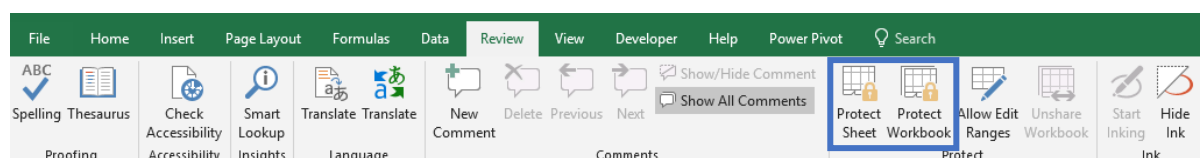
Two errors identified on
“Rev allocation”

Users should ensure that these checks do not flag any issues.

Given the input data specified, the PCDM will produce a set of EDCM and CDCM user discounts on the “Discount mapping” sheet. To facilitate running the full suite of charging models, these values, which feed into the EDCM and CDCM models respectively, are summarised on the “Outputs” sheet.

By default, the structure of the workbook and all the sheets within it are protected, so that users can only change inputs cells, fixed inputs cells, filters and cell formats. The model can easily be ‘unlocked’ by unprotecting the sheets and unprotecting the workbook through Excel’s “Review” tab. By default, there is no password for this protection.

Figure 4.5: Protecting and unprotecting the workbook



5. INFORMATION SHEETS

The PCDM contains four information sheets that provide information and aid with model navigation, but which do not affect the calculations or results of the model.¹ These are:

- **Cover**, which sets out the DNO Party and charging year to which the model applies, as well as model data version. Cover also provides space to indicate the model publication date and version of DCUSA text to which the model corresponds.
- **Version control**, setting out the version of the model published by DCUSA Ltd, and any changes from the previous model version. This sheet also provides a summary of in-built model checks.
- **Model map**, providing an interactive schematic of the model.
- **Index**, providing a list of and hyperlinks to all major section headings throughout the model, as well as to input and output tables.

No content on these sheets should affect the calculations of the model.

In addition to the information sheets, each tab in the workbook contains a description of the worksheet and annotations to tables and section headings where appropriate. References to the DCUSA text are also provided throughout the model in the right-hand most column (and indicated with a chevron ">" in column I). All references to paragraphs and tables in that column are made with reference to the Schedule and version of the DCUSA text noted in Section 1 of this document.

¹ The other DCUSA charging models contain one further sheet: "Named ranges." No such sheet is included in the PCDM as it does not currently contain any named ranges.

6. INPUTS

The PCDM contains two input sheets as summarised in the following subsections.

Fixed inputs

The “Fixed inputs” sheet contains pre-populated inputs that should not be altered by the DNO Party. These inputs are constant across DNO Parties and are either universal values (e.g. the value one million) or specified explicitly in the DCUSA text (e.g. the mapping of MEAV asset categories to network levels).

DNO inputs

The “DNO inputs” sheet contains inputs organised in three sections:

1. Nominated Calculation Agent inputs;
2. inputs from other charging models; and
3. other DNO-specific inputs.

The Nominated Calculation Agent values section contains two input values provided to the DNO Party by the Nominated Calculation Agent. The “LV mains split” value is specific to each DNO Party. The “HV split” value is the same for all DNO Parties.

The section covering inputs from other charging models contains notional asset values from the CDCM and EDCM. These values are used for the calculation of the “EHV reduction rate,” which is applied in the calculation of CDCM discounts. DNO Parties should populate these values to match the values in their respective EDCM and CDCM models. The relevant values are summarised in the “Output to other models” sheet of each model.

Figure 6.1 below shows a screenshot of part of the “DNO Inputs” sheet, highlighting the sections with values provided by the Nominated Calculation Agent and values that come from the other charging models.

Note that the cost input for Ofgem licence fees should be added in Input 402-G, rather than Input in 402-H (e.g. as a total rather than by network levels). The allocation of the entire cost to the LV Services level happens in the “Expenditure” tab in the model.

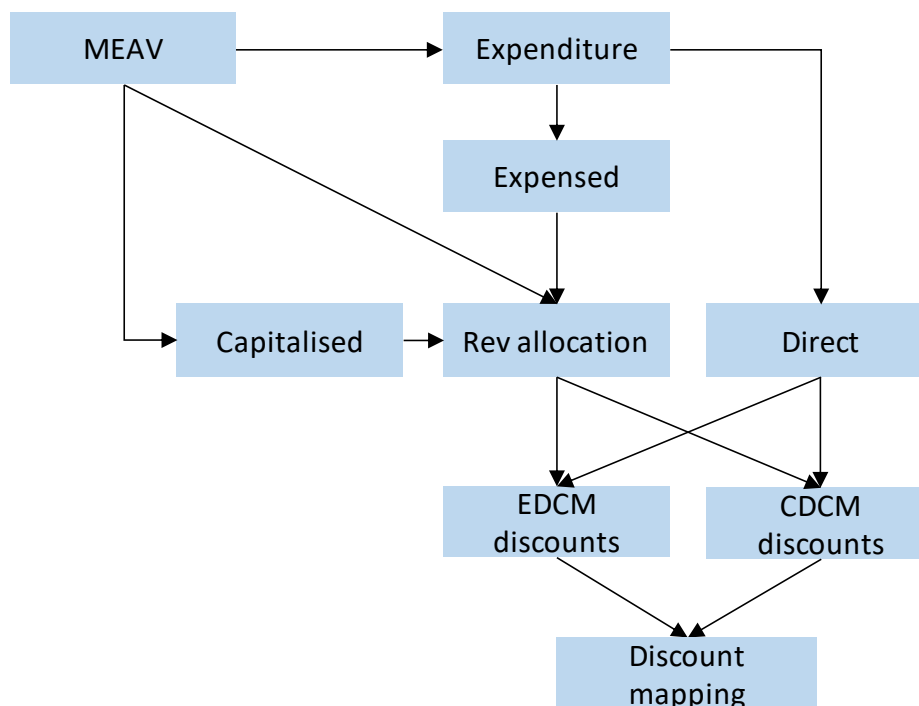
Figure 6.1: Example of part of the “DNO Inputs” sheet

DNO inputs		
[Enter DNO name] - [enter data version name]		
PCDM charging model - Final release v1 - 2019/20		
Click here to return to model map	Units	Constant
Description		
This sheet contains inputs specific to each DNO or updated each year.		
Nominated Calculation Agent inputs		
This section contains inputs provided by the Nominated Calculation Agent each year.		
Input 402-A: LV mains split		
A LV mains split value should be provided by the Nominated Calculation Agent each year. This value may vary by DNO.		
LV mains split	%	>
Input 402-B: HV split		
A HV split value should be provided by the Nominated Calculation Agent each year. This value should be the same for all DNOs.		
HV split	%	>
Inputs from other charging models		
This section contains input values from the DNO's CDCM and EDCM models.		
Input 402-C: CDCM notional asset values		
Notional asset values should be imported each year from the latest CDCM model. The CDCM output reference is Output 102-A.		
CDCM notional EHV asset values		>
132kV	£	
132kV/EHV	£	
EHV	£	
EHV/HV	£	
132kV/HV	£	
Input 402-D: EDCM notional asset value		
This notional asset value should be imported each year from the latest EDCM model. The output reference for the EDCM (LRIC) model is Output 207-B; it is Output 307-B for the EDCM (FCP) model.		
EDCM notional asset value, total	£	>

7. CALCULATIONS

The PCDM contains eight calculation sheets, six of the sheets contain calculations for steps used to calculate both CDCM and EDCM discounts before flowing into one final sheet for the discounts applied in each methodology.

Figure 7.1: CDCM model calculations, high-level flow



The “MEAV” sheet contains analysis of asset values used to allocate expenditure to network levels in the “Expenditure” and “Rev allocation” sheets. It also calculates the EHV reduction rate used to adjust CDCM discount calculations for assets remunerated through EDCM charges.

The “Expenditure” sheet combines the analysis of MEAV with historic data to calculate allocations of expenditure by network level. Those allocations are used on the “Expensed” sheet and combined with DCUSA text assumptions of the share of expenditure capitalised to calculate network-level shares of an operating expenditure portion of allowed revenue on the “Rev allocation” sheet. The “Capitalised” sheet similarly calculates values used to allocate a depreciation and return portion of allowed revenue to network levels on the “Rev allocation” sheet.

Percentage allocations to network levels from the “Rev allocation” sheet flow through to the “EDCM discounts” and “CDCM discounts” sheets to produce p/kWh discounts by LDNO boundary / end-user connection level. The “Discount mapping” sheet maps these values to the relevant customer categories and expresses them as percentages of average all-the-way tariffs imported from the CDCM. Values from the “Direct” sheet are used to split the allocation between the LDNO and DNO in cases where the LDNO boundary is at a network circuits level, rather than a transformation level.

The subsections below provide more detail on the calculations and assumptions used in each calculation sheet.

7.1. MEAV

The MEAV sheet contains calculations used to allocate expenditure based on modern equivalent asset values (MEAV), including an adjustment applied to EHV and 132kV assets, which is used in the CDCM user discounts: the “EHV reduction rate.”

The MEAV sheet calculates the MEAV for each network level using the following inputs:

- asset counts (or km as appropriate) for 85 asset categories;
- per asset (or km as appropriate) MEAV values for each asset category; and
- a mapping from the DCUSA text for each asset category to one of five network levels: (i) LV services; (ii) LV mains; (iii) HV/LV; (iv) HV; or (v) EHV and 132kV.

Network level-specific MEAV values are divided by the MEAV for all network levels to produce MEAV shares used as part of allocation of expenditure to network levels.

For the calculation of EDCM discounts only, MEAV values and shares are also calculated for the following more granular breakdown of network levels, using a separate mapping from the DCUSA text: (i) EHV/HV; (ii) EHV; (iii) 132kV/EHV; and (iv) 132kV.

In calculating the MEAV asset values for the CDCM discounts, an adjustment is calculated and applied to the MEAV value for the EHV and 132kV level by multiplying it by a “EHV reduction rate.” The same adjustment is made to the net capex allocation on the “Capitalised” sheet. This adjustment was introduced as part of DCP 118, which sought to avoid double counting of EHV assets already covered by EDCM user charges. The adjustment factor is calculated based on notional asset values for the EHV and 132kV network levels in the CDCM and the total value of assets charged to users in the EDCM.²

Table 7.1: Summary of values exported from the “MEAV” sheet

Destination sheet	Values exported
Capitalised	EHV reduction rate
Expenditure	MEAV shares (LV services, LV mains, HV/LV, HV, and EHV and 132kV) LV services share of LV MEAV
Rev allocation	MEAV shares (EHV/HV, EHV, 132kV/EHV and 132kV)

7.2. Expenditure

The “Expenditure” sheet contains calculations to allocate expenditure (primarily drawn from the DNO Parties’ 2008/9 regulatory reporting pack (RRP)) to different network levels.

² The value of assets charged to EDCM users includes: (i) shared network assets allocated to demand; and (ii) sole use assets for both demand and generation. No shared network assets are allocated to generation.

Some expenditure values are already allocated to the following four network levels: (i) LV; (ii) HV/LV; (iii) HV; and (iv) EHV and 132kV. Values allocated to the LV level are split between the LV services and LV mains levels based on the treatment of costs indicated in the “Allocation rules” table in DCUSA Schedule 29.

Where the allocation key column of the table notes “MEAV,” values are split between LV services and LV mains based on the relative shares of LV services and LV mains compared to the total LV MEAV value, as calculated on the “MEAV” sheet. Where the allocation key does not indicate “MEAV,” the full value is allocated to LV mains. This step is not set out in the DCUSA text but is needed for the calculation of CDCM discounts and is noted in Annex A of this user guide. The only exception to this is the “Non-activity costs and reconciling amounts – Ofgem licence fees” expenditure category, which is directly allocated to the LV Services network level. Where expenditure allocated to a network level does not reach the total for that expenditure category (or exceeds it), the difference is allocated based upon the Allocation key in the “Allocation rules” table in DCUSA Schedule 29. Where “MEAV” is indicated in the allocation rules column of that table, values are allocated to network levels based upon its MEAV share calculated on the MEAV sheet. Given the application of the EHV reduction rate to the allocation of assets to the “132kV and EHV” level MEAV for the CDCM discounts, the expenditure allocations for EDCM and CDCM discounts are slightly different. Figure 7.2 below shows a worked example of this from the “Expenditure” sheet using published DNO data.

Figure 7.2: Example of allocation of LV expenditure to LV services

Click here to return to model map	Units	Constant	Load related new connections & reinforcement (net of contributions)	Non-load new & replacement assets (net of contributions)	Non-operational capex
Expenditure allocated to cost category based on RRP, by network level					
LV	£ per year		610,000.00	5,200,000.00	-
HV/LV	£ per year		-	4,200,000.00	-
HV	£ per year		1,020,000.00	14,300,000.00	-
EHV and 132kV	£ per year		2,655,000.00	8,500,000.00	-
Section 402-B: Expenditure allocated to cost category based on RRP (with LV split)					
Services share of LV MEAV	%	37.11%			
Load related new connections & reinforcement (net of contributions)	option			MEAV	MEAV
MEAV allocation option name	option				
MEAV allocation flag	flag				
			0	1	1
Expenditure allocated to cost category based on RRP (with LV split), by network level					
LV services	£ per year		-	1,929,602.96	-
LV mains	£ per year		610,000.00	3,270,397.04	-
HV/LV	£ per year		-	4,200,000.00	-
HV	£ per year		1,020,000.00	14,300,000.00	-
EHV and 132kV	£ per year		2,655,000.00	8,500,000.00	-
Total expenditure allocated to a network level			4,285,000.00		

Allocation options from DCUSA text

100% allocated of LV expenditure allocated to LV mains

Services share of LV MEAV used to make allocation to LV services

The PCDM allows DNO Parties to input expenditure allocations in each of the 34 expenditure categories in the PCDM but in practice this is only relevant for five categories:

- “Load related new connections & reinforcement (net of contributions);”
- “Non-load new & replacement assets (net of contributions);”

- “Faults;”
- “Inspections, & Maintenance;” and
- “Tree Cutting.”

Other than allocating the balance of RRP expenditure by MEAV and allocating Ofgem licence fees to LV services, there is no mechanism for the difference between allocated expenditure and the category total to be allocated to a network level. As such, only some of the 34 total expenditure categories can have positive values and the total expenditure allocation to network levels is unlikely to reconcile with the total in the RRP. The implication of the above is that any surplus/deficit is assumed to be spread across network levels based on the relative size of their total expenditure allocations.

Table 7.2: Summary of values exported from the “Expenditure” sheet

Destination sheet	Values exported
Expensed	Total expenditure allocated, by network level and cost category (for EDCM discounts and for CDCM discounts)
Direct	Total expenditure allocated by cost category for EDCM discounts for the EHV and 132 kV levels Total expenditure allocated by cost category for CDCM discounts for the LV services, LV mains and HV levels

7.3. Expensed

The “Expensed” sheet contains calculations of the “expensed portions,” which are used on the “Rev allocation” sheet to allocate an assumed operating expenditure portion of allowed revenue to network levels.

The expensed portions are calculated based on the total expenditure allocated by category and network level from the “Expenditure” sheet and a “percentage capitalised” value (specified in the Allocation rules table of DCUSA Schedule 29), which varies by cost category. The percentage capitalised is used to remove the “capitalised” portion of expenditure (approximating capital expenditure). The remaining values (approximating operating expenditure) are then summed for each network level and across all network levels. The expensed portion per network level is calculated as the network level value divided by the value across all network levels. As such, the expensed portions can be seen to approximate the share of operating expenditure at each network level.

Two expenditure categories have a 100% capitalisation rate specified in the legal text: “Load related new connections & reinforcement (net of contributions)” and “Non-load new & replacement assets (net of contributions).” As such, expenditure values in those categories do not flow through to the expensed portions values. Other expenditure categories have capitalisation rates between 0% and 100%, meaning only a portion of the value calculated on the “Expenditure” sheet is used.

Table 7.3: Summary of values exported from the “Expensed” sheet

Destination sheet	Values exported
Rev allocation	Expensed portions (for EDCM discounts)
	Expensed portions (for CDCM discounts)

7.4. Capitalised

The “Capitalised” sheet contains calculations of “capitalised portions,” which are used on the “Rev allocation” sheet to allocate an assumed depreciation and return on regulatory asset value elements portion of allowed revenue to network levels.

DNO net capex values (calculated outside the PCDM) are mapped to the network levels used to calculate user discounts. This mapping is required to split net capex input values for LV between LV mains and LV services (using a percentage split provided by the DNO) and to combine EHV and 132kV values. EHV and 132kV values used for the CDCM discounts are also multiplied by the EHV reduction rate calculated on the “MEAV” sheet. As such, like the “expensed portions” values calculated on the “Expensed” sheet, the shares of net capex allocated to different network levels differ slightly between the EDCM discounts and the CDCM discounts.

Following mapping to the appropriate network levels, capitalised portions are calculated as the value for each network level divided by the total for each network level.

Table 7.4: Summary of values exported from the “Capitalised” sheet

Destination sheet	Values exported
Rev allocation	Capitalised portions (for EDCM discounts)
	Capitalised portions (for CDCM discounts)

7.5. Rev allocation

The “Rev allocation” sheet contains calculations of revenue allocations to each network level. This is done in five main steps:

1. **Calculate shares of allowed revenue by network level:** Expensed and capitalised portions are combined based on the relative size of aggregate operating allowances compared to aggregate depreciation and return allowances over a five-year period (2005/06 to 2009/10).
2. **Calculate 2007/08 revenues by network level:** Shares of allowed revenue calculated in step 1 are applied to 2007/08 allowed revenue after removing elements not allocated to specific network levels. The elements not allocated to specific network levels (transmission exit charges and net incentive revenue) are referred to as “Revenue not to share.” Additional revenues (relating to customer contributions) are also allocated to network levels based on expensed portions.

3. **Calculate units flowing by network level:** Units flowing (loss-adjusted to LV) are calculated for each network level in line with an approach set out in the DCUSA text – both for 2007/08 and the charging year.
4. **Calculate scaled revenue per unit:** Revenue to share per unit is calculated for each network level & charging model, using volumes loss-adjusted to LV – making values more representative of contributions to an all-the-way tariff. Revenue to share per unit is then scaled for consistency with total revenue and units flowing in the charging year. EDCM revenue to share per unit is split out further within EHV network levels according to MEAV shares.

Table 7.5: Summary of values exported from the “Revenue allocation” sheet

Destination sheet	Values exported
EDCM discounts	Allocation by network level for EDCM discounts (132kV, 132kV/EHV, EHV EHV/HV, HV, HV/LV and LV)
CDCM discounts	Revenue to share per unit by network level for CDCM discounts (LV services, LV mains, HV/LV and HV)

7.6. Direct

This sheet includes calculations of “Direct proportions.” Values for HV and LV are used for CDCM discounts. The value for EHV and 132kV is used for EDCM discounts.

Direct proportions are calculated for the network circuits levels where LDNOs might have their boundaries, as shown in Table 7.6 below.

Table 7.6: Charging methodologies used based on voltage of customer connection

Voltage of customer connection	132kV	132kV/EHV	EHV	EHV/HV	HV	HV/LV	LV
Circuits level	Yes		Yes		Yes		Yes
Charging methodology used	EDCM				CDCM		

Direct proportions are calculated for a given network circuits level and represent the share of total expenditure allocated in the “Expenditure” sheet that is classified as “Direct cost” in the “Allocation rules” table of DCUSA Schedule 29, relative to all expenditure allocated to that network level.

For LDNOs with a boundary that is at a transformation level, the percentage allocation for that level calculated on the “Rev allocation” sheet is excluded from the calculation of discounts. Where the boundary, however, is at a circuits level, part of the allocation is included in discounts based on a split of network length between the LDNO and the DNO Party. The direct proportions values calculated on this sheet are used to add to the discounts some of the DNO Party’s share: the part of expenditure that is not “direct.”

As noted above, only up some of the 34 expenditure categories have positive values allocated to them on the “Expenditure” sheet. 18 expenditure categories are marked as “Direct” but only six of those should be expected to have a positive value included in this calculation: the five noted above where values are allocated to specific network levels plus Non-operational capex.

Table 7.7: Summary of values exported from the “Direct” sheet

Destination sheet	Values exported
EDCM discounts	EHV and 132kV direct proportion
CDCM discounts	HV direct proportion LV direct proportion

7.7. EDCM discounts

This sheet calculates EDCM user discounts in p/kWh for each user connection level and LDNO:DNO boundary level.

This sheet calculates EDCM user discounts in p/kWh for each user connection level and LDNO:DNO boundary level. Discounts for generation users are assumed to be equal to demand at one level below the point they are connected to the LDNO’s embedded network.

EDCM user discounts have up to two main components:

1. “P” is the sum of the allocations for networks levels between the DNO-LDNO boundary and the end user, excluding the level of the LDNO boundary.
2. “P adder” is an additional term in the case of the 132kV and EHV network boundary levels to include a discount for all costs at the boundary level except the assumed “Direct proportion” of costs provided by the DNO.

EDCM discounts are calculated in p/kWh using the parameters set out above as follows:

$$EDCM\ discount = P + P\ adder$$

EDCM discounts are lower for LDNOs with boundaries at a lower network level (reflecting a greater share of costs being covered by the DNO) and higher for LDNO users with boundaries at a higher network level.

Table 7.8: Summary of values exported from the “EDCM discounts” sheet

Destination sheet	Values exported
Discount mapping	EDCM user discount (before cap), by boundary: user connection level

7.8. CDCM discounts

This sheet calculates CDCM user discounts in p/kWh for each user connection level and LDNO:DNO boundary level, as per Schedule 29 paragraphs 40-44.

The intuition behind the calculations on this sheet is the same as for the EDCM discounts. The formulae set out in the legal text are effectively condensed versions of the more generalisable approach implemented on the “EDCM discounts” sheet.

While the intuition behind the calculations on the “CDCM discounts” sheet is like that on the “EDCM discounts” sheet there are two main points of difference:

1. Network split values are not set to 100% in the legal text.
2. There is no differentiation in discounts between demand users and generation users.

7.8.1. Network split values

CDCM discounts use “HV split” and “LV mains split” values provided by the Nominated Calculation Agent. The equivalent values used for the EDCM discounts (a network length split for 132 kV and a network length split for EHV) are simply set to 100% by the legal text.

This approach means that for the LDNO boundary level, CDCM discounts include:

- a full discount of costs for the share of the network assumed to be provided by the LDNO; and
- a discount for non-direct costs for the share of the network assumed to be provided by the DNO.

This is illustrated in the following table.

Table 7.9: Summary of discounts applied at the LDNO boundary levels that are circuit levels

	Share provided by DNO (split %)	Share provided by LDNO (1 – split %)
Direct share (direct proportion %)	Not discounted	Discounted
Non-direct share (1 – direct proportion %)	Discounted	Discounted

In addition to the above, the calculation of the HV split and LV mains split values specified in the legal text are different, with HV using the length of network up to the LDNO boundary and LV mains using the length of network after the LDNO boundary. These two approaches are equivalent under the assumption that the total length of network to LDNO-connected users is the same as for DNO-connected users.

7.8.2. Differentiation between demand and generation

Unlike the EDCM discounts calculated in the PCDM, the CDCM discounts do not differentiate between demand and generation users. Instead, Schedule 16 specifies explicit discounts to be applied for generation users.

Table 7.10: Summary of values exported from the “CDCM discounts” sheet

Destination sheet	Values exported
Discount mapping	User discounts for CDCM, by boundary: user connection level

7.9. Discount mapping

This sheet calculates LDNO user discounts as a percentage of average all-the-way tariffs by customer category, as per Schedule 29 paragraphs 46A-B.

Calculations are set out in two steps:

1. **Map LDNO discounts to customer categories** according to the sections of the network covered by each type of customer; and
2. **Calculate LDNO discounts as a percentage of average all-the-way tariffs**, as per Schedule 29, paragraphs 46A & 46B. Average all-the-way tariffs are calculated for each customer category using volumes and net revenues imported from the CDCM – which are aggregated for two-rate tariffs such that they share the same percentage discount as the “Off Peak” tariff for their related MPAN. Discount percentages are capped at 100%.

Table 7.11: Summary of values exported from the “EDCM discounts” sheet

Destination sheet	Values exported
Outputs	EDCM LDNO discounts
Outputs	CDCM LDNO discounts

8. OUTPUTS

The PCDM contains one output sheet, called “Output to other models,” which simply contains two outputs:

1. PCDM user discounts for the EDCM; and
2. PCDM user discounts for the CDCM.

Figure 8.1 below shows a screenshot of the sheet from an unpopulated model.

Figure 8.1: Example “Output to other models” sheet

Click here to return to model map		Units	Constant		
Description					
This sheet presents the final outputs of the PCDM.					
DCUSA text outputs					
The outputs set out below are used as inputs to the DNO's CDCM and EDCM models in line with the DCUSA text.					
Output 401-A: PCDM user discount for CDCM					
These user discounts are used as Input 102-E on the "Inputs by customer type" sheet of the CDCM.					
PCDM user discount for CDCM			Domestic Unrestricted	Domestic Two Rate	Domestic Off Peak (related MPAN)
LV discount	%		0.00%	0.00%	0.00%
HV discount	%		0.00%	0.00%	0.00%
Output 401-B: PCDM user discount for EDCM					
These user discounts are used on the "LDNO inputs" sheet of the EDCM (LRIC) and EDCM (FCP) models. The EDCM (LRIC) input reference is Input 207-G; the EDCM (FCP) input reference is Input 307-G.					
PCDM user discount for EDCM			Domestic Unrestricted	Domestic Two Rate	Domestic Off Peak (related MPAN)
Boundary 0000 discount	%		0.00%	0.00%	0.00%
Boundary 132kV discount	%		0.00%	0.00%	0.00%
Boundary 132kV/EHV discount	%		0.00%	0.00%	0.00%
Boundary EHV discount	%		0.00%	0.00%	0.00%
Boundary HVplus discount	%		0.00%	0.00%	0.00%
End of sheet					

EDCM user discounts should be inputted to the DNO’s EDCM model on the “LDNO inputs” sheet, and CDCM user discounts should be inputted to the DNO’s CDCM model on the “Inputs by customer type” sheet.

Table 8.1: Summary of values exported from the “Outputs” sheet

Destination sheet	Values exported
EDCM “LDNO inputs”	PCDM user discount for EDCM
CDCM “Inputs by customer type”	PCDM user discount for CDCM

ANNEX A ASSUMPTIONS LOG

The following table sets out a series of assumptions that have been made to produce the current version of the PCDM. The assumptions here help to clarify or serve to amend the version of DCUSA text and any DCPs noted in Section 1 of this user guide. Each assumption has been approved by DCUSA Ltd with the consent of DNOs.

Table A.1: Assumptions log

DCUSA text reference	Assumption	Worksheet reference	Description
Schedule 29, paragraphs 4 (a), 5 (a), 6, 7, 29, 30, 31, 32	Operating expenditure terminology	-	In these paragraphs, the DCUSA text refers to “operating expenditure” for values that would in fact be better described simply as “expenditure” as they contain both capex and opex. It has been assumed that in these cases, “operating expenditure” can be interpreted as “expenditure” with no further adjustment required to convert expenditure values to “operating expenditure.”
Schedule 29, paragraphs 6 and 9	Expenditure split between LV services and LV mains	“Expenditure” sheet	There is no legal text describing how expenditure values allocated to the LV level are split between LV services and LV mains. Consistent with the approach implemented in the charging models to date, it has been assumed that these values must be split based on the relative MEAV value for LV services and LV mains, where “MEAV” is indicated in the “Allocation rules” table. Where “MEAV” is not indicated in the “Allocation rules” table (such as for “Load related new connections & reinforcement (net of contributions”), values must be fully allocated to LV mains.
Schedule 29, paragraph 11A	Interaction of Paragraph 11A with earlier paragraphs in Schedule 29	“Expenditure” sheet	It has been assumed that the direct allocation to LV Services happens <i>after</i> the allocation to network levels within the RRP and after the allocation to network levels by MEAV. This assumes that the “Ofgem licence fees” input is a single value to be entered into Input 402-G, rather than values which vary across voltage level to be entered into Input 402-H.

DCUSA text reference	Assumption	Worksheet reference	Description
			It has therefore been assumed that Paragraph 11A is enacted within Paragraph 6, and that any subsequent mentions in Schedule 29 of allocated operating costs refer to those as allocated by Paragraph 6 <i>and</i> Paragraph 11A. This means that this part of the legal text is non-linear.
Schedule 29, paragraph 11A	Direct and Indirect costs within Paragraph 11A	“Direct” sheet	<p>It is assumed that the “direct cost indicators” for Ofgem licence fees is 0, but for all other non-activity costs it is 1. This means that the Ofgem licence fees are treated as an indirect cost, and the other non-activity costs are treated as direct costs.</p> <p>This assumes that, within this part of the legal text, references to expenditure being “directly allocated” refer to direct allocation to LV services in the context of Paragraph 6, rather than direct and indirect cost in the context of Paragraphs 29-32.</p> <p>Paragraph 11A explicitly specifies that Ofgem licence fees are treated as indirect costs and therefore the indicator is 0. As the legal text does not specify the direct cost indicator for the other costs, this has assumed to be 1, as this is consistent with the previous versions of the legal text.</p>

In addition to the above, the following table highlights areas of the DCUSA legal text relating to the PCDM that may benefit from clarification in the future or which may be of assistance when interpreting the DCUSA legal text.

Table A.2: Other points of interpretation

DCUSA text reference	Assumption	Worksheet reference	Description
Schedule 29, paragraph 2	List of network levels	-	A list of the levels into which the DNO's network is split does not acknowledge that the combined EHV and 132kV level is split into four levels for the calculation of EDCM discounts.
Schedule 29, paragraph 3	List of CDCM discount calculation steps	-	This paragraph sets out a list of steps that the calculation of CDCM discounts includes. This list is high-level and non-comprehensive and is not assumed to have any impact on the calculations.
Schedule 29, paragraph 4	List of CDCM discount inputs	-	This paragraph sets out a list of inputs for the calculation of CDCM discounts. The list, however, is high-level and non-comprehensive. As such, it has been assumed that omissions from the list or inputs referred to, but not used, can be ignored.
Schedule 29, paragraph 5	EDCM discount steps	-	This paragraph notes that the calculation of EDCM discounts is a two-part process but then only goes on to describe what it refers to as the first part of the process: allocating allowed revenue to network levels. It has been assumed that it is not an issue that this part of the legal text, which appears to be introductory in nature, does not appear to describe the second part of the process.
Schedule 29, Allocation rules table	Blank percentages capitalised	-	The table contains no value in the "Percentage capitalised" column for some cost categories. It has been assumed that no value is equivalent to specifying a rate of zero. Currently in each case where there is a blank, the value it would be applied to is equal to zero, so this assumption has no impact.
Schedule 29, Allocation rules table	Percentage capitalised for pension deficit payments	-	The table contains a value in the "Percentage capitalised" column for pension deficit payments but under the current methodology there are no cases where this value has an impact.

DCUSA text reference	Assumption	Worksheet reference	Description
			This result arises as no DNO Party allocates any pension deficit payments to specific network levels and the “Allocation key” column of the table indicates “Do not allocate,” meaning that the 2007/8 RRP value is not split across levels based on the relative MEAV value calculated for each network level.
Schedule 29, paragraph 14	LV/HV vs. HV/LV	-	The reference to “LV/HV” can be interpreted as equivalent to “HV/LV,” the terminology used elsewhere.
Schedule 29, paragraph 38	Allocations to the 132kV/EHV substations level in Scotland	-	<p>This paragraph notes that the percentage allocated to the EHV and 132kV level is split into four levels. In doing so, it notes in parentheses that the “132kV circuits” and “132kV/EHV substations” levels are “England and Wales only.”</p> <p>The two Scottish DNOs currently do have positive asset counts for assets that are mapped to the 132kV/EHV substations level: “33kV circuit breaker, indoors” and “33kV circuit breaker, outdoors.” The basis for this mapping is set out in the “MEAV EDCM mapping” table.</p> <p>If those two asset types would otherwise be mapped to the EHV level, no impact on PCDM discounts for the Scottish DNOs has been identified as the movement between those two categories would only affect “EDCM boundary 132kV/EHV” and “EDCM boundary 132kV/EHV” discounts, which are not applied in Scotland.</p> <p>Given the above, no restriction has been made to stop these values flowing through for Scottish DNOs.</p>
Schedule 29, multiple paragraphs	Price base of financial value inputs	“DNO inputs” sheet	The DCUSA text does not specify the price base in which DNO Parties must state financial values. It has been assumed, therefore, that the onus is on DNO Parties to ensure that their input values are consistent with appropriate use of inflation adjustments, where necessary.