Model documentation: Update models & guidance for DCP 328 (Request C11-1)

DCUSA/ElectraLink

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1. INTRODUCTION

This document describes charging models and supporting documentation developed for DCUSA to support DCUSA Change Proposal (DCP) 328. The following sections set out the:

- specification for the new files, including the identity of the reference files for the revisions noted here within and the new file names;
- revisions to the models; and
- the impact of those changes.

2. SPECIFICATION

2.1. OVERVIEW

The models and supporting documentation described herein were developed in response to a request to produce versions of the CDCM, ARP and EDCM (LRIC & FCP) models that implement DCP 328 – *"Use of system charging for private networks with competition in supply"*.

The intent of DCP 328 is to create DUoS charges which permit customers within licence exempt systems (LES) to request competition in supply.

The reference files noted below were developed in line with draft DCUSA text shared with the modelling team on 3rd March 2021. This text set out the changes required to implement DCP 328 against a baseline legal text which reflects the 2022/23 charging model, incorporating DCP 379 – *"Amend Table 1 of Schedule 15 to maintain alignment with the distribution licence"*.

The legal text includes two options – A and B. Both options involve calculating charges which exclude costs relating to network levels within the LES and a portion of the residual charge. Option A applies these charges with respect to EHV boundary levels, but converts them to rebates for HV/LV boundary levels which private network operators can claim back. Option B applies charges with respect to all boundary levels.

Options A and B also differ with respect to whether revenue matching in the CDCM model takes into account the difference in expected net revenue arising from offering bespoke charges and / or rebates to private network operators. Option A makes no attempt to resolve under-recovery within the charging year, which would be recovered by the prior year correction term in the following charging year instead. Option B includes adjustments the revenue-matching step for LES volumes and charges.

2.2. REFERENCE FILES

The following table sets out the reference versions of the charging models and user guides used as the starting point for the revisions described in this document.

Table 2.1: Reference files

Model	Model file name	Date sent
CDCM	CDCM_v8_20210223	23/02/2021
EDCM (LRIC)	EDCM-LRIC_v10_20210223	23/02/2021
EDCM (FCP)	EDCM-FCP_v10_20210223	23/02/2021

2.3. New files

The following table sets out the versions of the charging models and impact assessment provided to the DCP 328 Working Group in response to the request described above.

Table 2.2: New files

Model		Model file name	Date sent
CDCM	Option A	CDCM_v8_DCP328-A_20210429	29/04/2021
	Option B	CDCM_v8_DCP328-B_20210429	29/04/2021
EDCM (LRIC)		EDCM-LRIC_v10_DCP328_20210429	29/04/2021
EDCM (FCP)		EDCM-FCP_v10_DCP328_20210429	29/04/2021
Impact assessment		ImpactAssessment_DCP328-A&B_20210429	29/04/2021

We understand that the new files listed in Table 2.2 will be considered by the DCP 328 Working Group and may be shared for consultation.

2.4. Assumptions and clarifications

This section lists assumptions that we have made in our interpretation of the draft legal text. Some of these assumptions were informed by clarifications given by the DCP 328 working group. Others are our own interpretation of the intent of the DCP where the meaning of the text is vague.

2.4.1. CDCM

Input volumes

Some DNOs have volumes without MPANs for certain tariffs in published 2022/23 CDCM models. In these cases, it is not possible to convert charge elements to a fixed charge based on that customer group's average volumes per MPAN, so LES charges default to zero and LES rebates default to the opposite of all-the-way charges.

We assume that it should be DNOs' responsibility to resolve this issue by entering MPANs for all tariffs with positive volumes. We have therefore added a check on the "LES revenue" sheet to flag when this condition has been broken.

This issue applies for all of WPD's 2022/23 CDCM models, for the following tariffs:

- "Domestic Aggregated (Related MPANs)"
- "Non-Domestic Aggregated (Related MPANs)"
- "LV Generation Aggregated"

Populating the post-DCP328 CDCM models with WPD's 2022/23 inputs therefore triggers an issues flag on the "LES revenue" sheet, which is summarised on the "Version control" sheet.

Revenue matching

We understand that the working group's intention for Option B is that LES tariffs should not prevent the DNO from recovering its target allowed revenue in the charging year. The legal text provided by the working group did not specify how to acheive that goal, however, so we sought to identify a further methodological step to address this issue.

We identified a solution that could almost entirely address this issue,[3] achieved by adjusting the discounted volumes used to calculate the DNO's net revenue estimate before matching (paragraphs 89 to 90A). Further work would be needed to identify a solution that perfectly addresses the issue.

The solution we have applied is to assume that the discounted volumes used to calculate net revenue before matching need to be multiplied by the proportion derived in paragraph 92 (a). This adjustment more closely achieves full revenue matching because it takes into account that a share of the discounted volumes relate to LES-connected customers where the DNO will not recover the full pre-matching charges assumed to apply in that stage.

We also assumed that the LES-discounted volumes should be used for the purpose of allocating the residual between customer categories, but that undiscounted volumes should be used for the purpose of determining whether a residual band should be grouped due to having too few MPANs.

Average volumes

The options require conversion of elements of LES charges into either fixed charges or rebates, based on typical volumes ("for an equivalent customer" or "for the equivalent half-hourly metered tariff"). The DCP 328 working group has confirmed that this should be done based on the typical volumes for the 32 post-matching tariffs, rather than the 16 pre-matching tariffs. This is important because the average volumes for each residual band are quite different, and therefore, the converted fixed charges or rebates for individual residual bands will be quite different for the averages across all bands.

The working group also confirmed that the LDNO-discounted volumes should be used for this conversion. This is consistent with the existing approach taken to convert capacity charges to fixed charges for non-half-hourly metered customers.

Unmetered supplies

The working group confirmed that the Unmetered Supply tariff's unit rates should not be converted to a fixed charge, since this tariff does not have a fixed charge component.

132kV/HV LES boundary

The working group confirmed that tariffs should be calculated for 132kV/HV LES boundaries. This case was not included in the version of the legal text that was shared with us, but we understand that it has since been updated.

Adder for allocated pass-through costs

The working group confirmed that LES customers should contribute to allocated pass-through costs to the same extent as all-the-way customers (i.e., Supplier of Last Resort costs and Eligible Bad Debt).

Structure of rebates

The working group confirmed that the calculation of final £/customer/year rebates will be done off-model, with the CDCM providing outputs (rebates or charges) in the usual tariff format.

Net revenue summary

We assume that the "Net revenue summary" sheet should remain unchanged under Option A because LES customers are assumed to have no volumes.

[3] For the values used in the impact assessment, the size of the remaining mismatch is comparable to or less than that already seen in the tariff models due to the rounding of charges to two or three decimal places.

We assume that the "Net revenue summary" sheet should be changed under Option B because the share of CDCM customers which are LES-connected affects the calculation of net revenue from all-the-way customers and LDNO and LES boundaries.

2.4.2. EDCM

Definition of boundary and embedded tariffs

The legal text states that, for Fully Settled and Shared Metering, power flows at the boundary should be determined to set import and export charges, with these charges then allocated to embedded customers within each LES. We have assumed that the calculation of these boundary charges follows the approach set out for all other customers within the EDCM, with each LES boundary represented by a single tariff within the tariff inputs sheets and the subsequent calculations. The allocation of these boundary charges to the embedded customers is done subsequently, based on defining those embedded customers (their capacities, and which LES they are embedded within) on a separate input sheet.

HV and LV embedded customers with EHV boundaries

The approach for determining CDCM boundary tariffs for HV and LV customers with an EHV LES boundary is detailed within Schedule 17 and Schedule 18 of the legal text, implying that this ought to be carried out within the EDCM. However, all of the relevant information for carrying out these calculations currently sits solely within the CDCM (e.g., typical LDNO discounted volumes, charge elements by voltage level etc). Rather than duplicate all of this information within the EDCM, we have assumed that it is sufficient just to include these outputs within the EDCM, based on calculations done within the CDCM (with these provided as inputs to the EDCM model).

Note that we have not calculated any revenue associated with HV and LV embedded customers with EHV boundaries.

Allocation of fixed charges within a LES

We have assumed that import fixed charges are to be allocated to the group of customers within a LES based-on import capacity, whereas export fixed charges are to be allocated based on the export capacity. The proposed legal text (Schedule 17/18 Paragraph 28.4) is somewhat ambiguous here, as it only describes a "fixed charge" without specifying import or export, and the numerator in the apportionment is defined to consider import *or* export capacity whereas the denominator is defined to consider both import *and* export capacity summed over all embedded tariffs. We have essentially assumed that this denominator should also consider import *or* export capacity, depending on whether it is being applied to the import fixed charge or export fixed charge.

HV and LV capacity for EHV boundary tariffs

When scaling and allocating LES boundary tariffs for LES embedded customers, the legal text says to consider the "total installed capacity of all embedded customers". We have assumed that this may need to consider import and export capacity of HV and LV customers, as well as EHV customers, although the former would not have tariffs calculated within the EDCM. We have included an input where, for LES boundary tariffs, the DNO can specify a total capacity for import and export of HV and LV customers.

2.4.3. Common clarifications

Capacity charge elements

Where the draft legal text refers to "capacity charge elements", we interpret this as including capacity charges and exceeded capacity charges.

2.5. Outstanding legal text issues

The clarifications and assumptions noted above would benefit from being reflected within the legal text (where they are not already) to avoid the need for assumptions being made within the models' assumptions logs.

In particular, we recommend that the treatment of revenue matching in the CDCM under Option B needs to be stated in the legal text. We would also suggest that the assumptions noted with respect to the EDCM should be checked and, where appropriate, reflected within the legal text in some way.

3. MODEL REVISIONS

3.1. STRUCTURAL CHANGES

There are no structural changes in the CDCM or EDCM other than the addition of new sheets.

3.2. ADDITIONAL OR MODIFIED INFORMATION SECTIONS

In the CDCM and EDCM, changes were made in the following sheets:

- **'Version control'**.
- **'Model map'**.
- **'Index**.

3.3. ADDITIONAL OR MODIFIED INPUT SECTIONS

In the CDCM, changes were made in the following input sheets:

- **'Fixed inputs'. "**Input 101-J: Flags and mappings for LES customers" added for both options.
- **'Inputs by customer type'.** "Input 102-D: Proportion of users which are LES customers" added for Option B only. This allows the DNO to specify a percentage of the MPANs by tariff type that are LES customers, by LES boundary.

In the EDCM, the following input sheets were added:

- **'LES inputs'.** On this sheet, inputs for EHV customers embedded within LES groups are defined. This includes their import and export capacities, and the unique number of the LES group within which they are embedded.

In the EDCM, changes were made in the following input sheets:

- **'Tariff inputs'.** A new section was added to this sheet, "Input 205-H: LES group boundary inputs". This allows a DNO to specify which of the tariffs within the model are LES boundary tariffs (indicated with a unique integer) and to specify the volume of import and export capacity of embedded HV and LV tariffs for this group.
- **'LDNO inputs'.** This sheet was renamed to 'HV&LV inputs'. In addition to the LDNO inputs that were already on this sheet, a section was added ("Input 207-H: Embedded LES tariffs for EDCM boundaries") for inputting the charges calculated within the CDCM for those Embedded LES tariffs that have a boundary in the EDCM.

3.4. ADDITIONAL OR MODIFIED CALCULATION SECTIONS

In the CDCM, the following calculation sheet was modified:

- **'Revenue matching'.** The preparation of pre-matching charges by residual band – which was previously done on this sheet – was moved to another sheet called "Pre-matching charges". For Option B only, a new section (Section 120-B: LES volume discounts) was added, which enables LES volumes to be accounted for within revenue matching (the allocation of revenue to residual bands). Later sections of the sheet then pick up those adjusted discounted volumes instead of the normal discounted volumes.
- **'Net revenue summary".** Option B changes the split of volumes between all-the-way, LDNO and LES tariffs, so requires revisions to the net revenue summary sheet to incorporate the new LES tariffs and to

reallocate volumes between each tariff type. No changes were made for Option A, as LES tariffs are assumed to have no associated volumes.

In the CDCM, the following calculation sheets were added:

- **'Pre-matching charges'.** This sheet maps charges for the 16 pre-matching tariffs to the 32 post-matching tariffs. This was previously done within the revenue matching sheet.
- **'LES boundaries'.** This sheet assembles the individual elements of each charge by voltage level, and then calculates the total charge for each LES boundary (based on excluding certain voltage levels, as specified in the legal text).
- **'LES revenue'.** This sheet calculates the typical pre-matching bill for each tariff by LES boundary, and expresses this as a proportion of the typical bill for the equivalent non-LES boundary tariff (after accounting for discounted LDNO charges).
- **'LES charges'.** This sheet calculates the LES charges to be applied for each tariff and boundary. This takes the initial charges by boundary from the "LES boundaries" sheet and converts elements of these into fixed charges.
- **'LES rebates'.** For Option B only, this sheet compares the all-the-way and LES charges to come up with a series of rebates to be applied to LES customers.

In the EDCM, the following calculation sheet was added:

- **'EHV LES calculations'.** This sheet is used to scale the boundary tariffs calculated within the rest of the EDCM for applying them to those tariffs embedded within LES group.

3.5. Additional or modified output sections

In the CDCM, the following calculation sheet was modified:

- **'Tariff summary'.** The LES tariffs (under Option B) and LES rebates (under Option A) were transposed into this sheet for HV and LV LES boundary.
- **'Outputs to other models'.** The LES charges for the higher voltage level boundaries were inserted into this sheet in "Output 102-C: Charges for LES-connected customers", so that they can be inserted into the EDCM.

In the EDCM, the following output sheets were added:

- **'LES embedded tariffs'.** This collects EHV embedded tariffs from the "EHV LES calculations" sheet, and the HV and LV embedded tariffs from the HV&LV inputs sheet.
- **'LES embedded tariffs transposed'.** This transposes the previous sheet, for ease of interpretation.

Section numbering was updated on the following sheets in the EDCM:

- **'Revenue summary'**, **'Revenue summary transposed'** and **'Outputs to other models.**

4. IMPACT STATEMENT

4.1. SUMMARY

The impact assessment submitted under this service request sets out the impact of DCP 328 on all outputs of the CDCM for the 2022/23 charging year.

The impact assessment does not include EDCM outputs because we do not have access to actual EDCM data. Likewise, all impacts are presented before resolution of inter-model circularities, as we do not have access to the actual EDCM data needed to do that.

4.2. INPUTS

Inputs were taken from:

- published ARP models for the 2022/23 charging year; and
- a working group assumption that 0.5% of customers are LES-connected for the sake of the impact assessment, and that the breakdown across different LES boundaries should be a third LV, a third HV/LV and a third HV.

4.3. VALIDATION

The following steps were used to check and validate post-DCP 328 models:

- expected net revenue is reduced under Option A, and returns approximately[4] to baseline levels under Option B;
- workbook review software used to demonstrate model changes and highlight inconsistent formulae;
- impact assessment results sense-checked and explained; and
- impact assessment can be replicated manually.

4.4. IMPACTS

Impact on revenue recovered

Options A and B lead to changes in expected revenue recovered from the CDCM.

Option A explicitly ignores the impact of giving LES rebates on revenue recovery – leaving the remainder to be resolved by a balancing term in the following charging year. Expected net revenue is therefore always lower than the baseline under Option A. The scale of this under-recovery ranges between -0.05% and -0.12% of baseline revenue under the volume assumptions provided by the working group (c. £5 million in total across all fourteen DNOs).

Option B adjusts the volumes used in revenue matching downwards to account for the share of the residual for which LES customers are not chargeable. Expected net revenue returns to levels approximately, but not exactly, equal to the baseline. For example, the difference in net revenue between Option B and the baseline ranges between +/- 0.01% under the volume assumptions provided by the working group (c. £0.15 million in total across all

[4] We discuss in section 2 above why expected net revenue under Option B is not exactly equal to baseline levels.

fourteen DNOs). The remaining mismatch appears to be caused by an interaction between LES and LDNO discounting, as well as rounding. Although the mismatch is very small, the working group may wish to investigate this further to avoid larger mismatches arising in future. Resolving this issue would require further assumptions not specified in the draft legal text.

Figure 4.1 illustrates the expected net revenue by DNO under each option. At this scale, the difference is barely visible, even under Option A. Figure 4.2 shows the percentage change in expected net revenue – illustrating a drop for all DNOs under Option A, and little change for Option B.

Figure 4.1: Expected net revenue by option & DNO

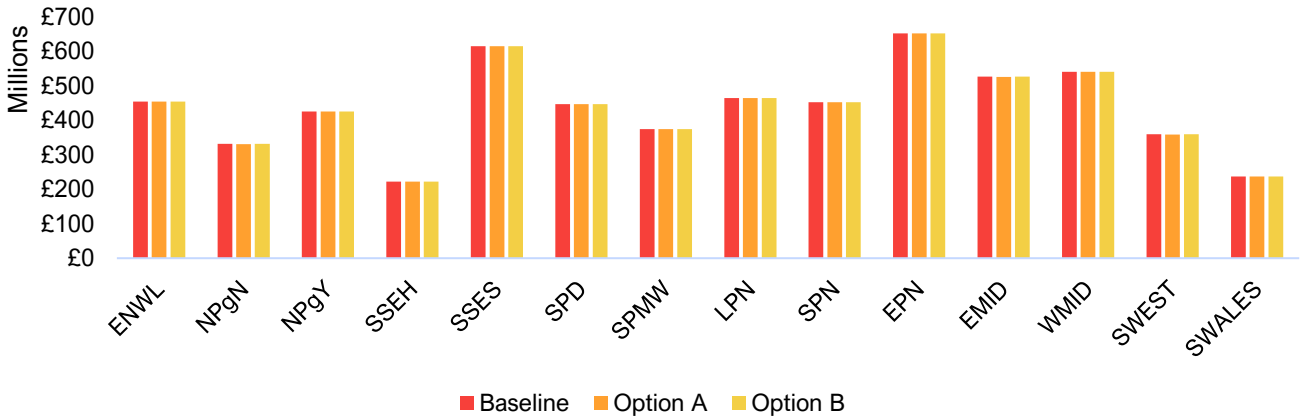
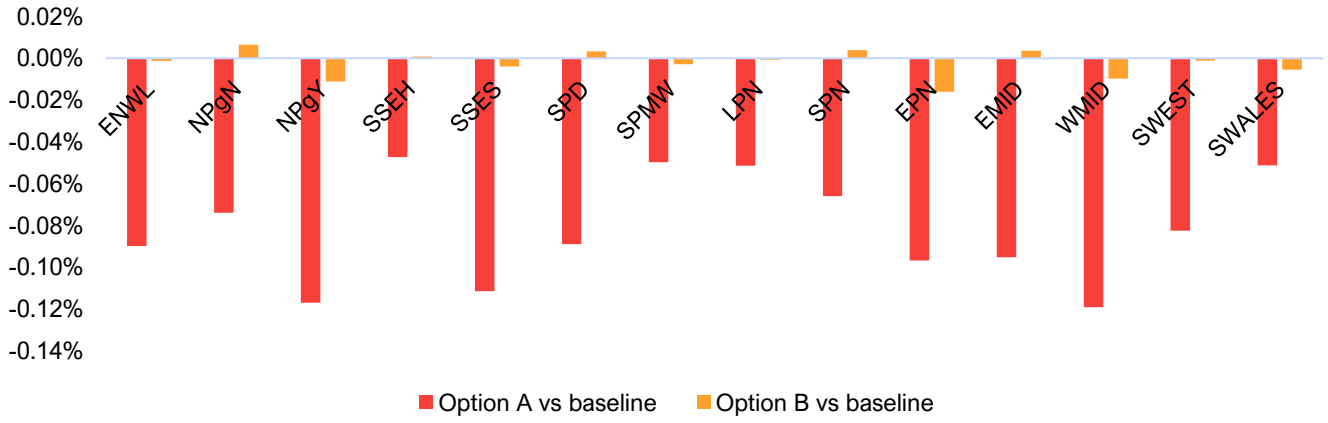


Figure 4.2: Change in expected net revenue by option & DNO



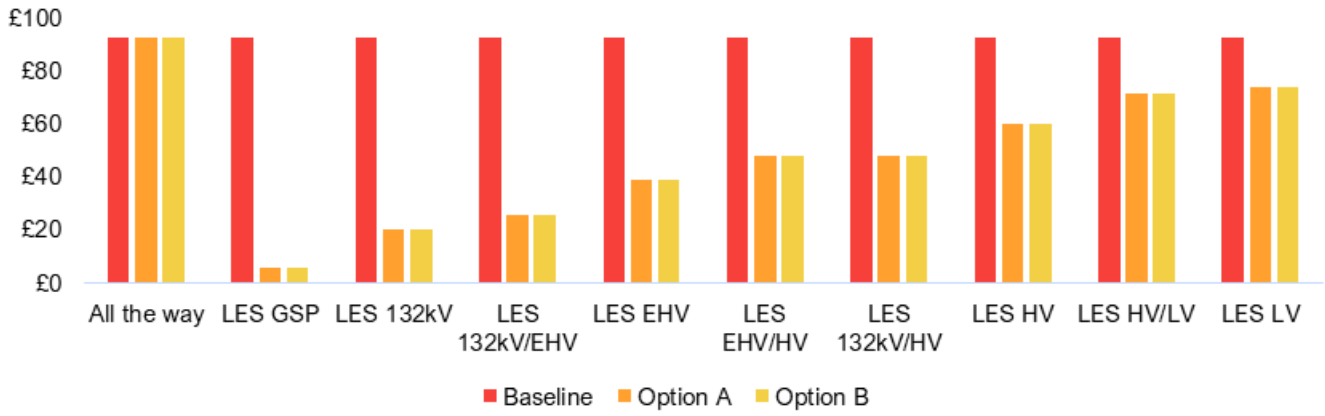
Comparison between LES and all-the-way bills

Figure 4.3 demonstrates that, for an example tariff and DNO, typical bills applied with respect to LES customers decrease for boundary points further up the network, as expected.

Typical bills under Options A and B are approximately the same for all tariffs – with only slight differences arising from revenue matching and rounding (especially for Option A).

The scale of the difference between LES and ATW tariffs can fluctuate significantly between different tariffs and / or DNOs due to the different costs which apply at network levels below the LES boundary.

Figure 4.3: Typical bills by LES boundary, ENWL, Domestic Aggregated

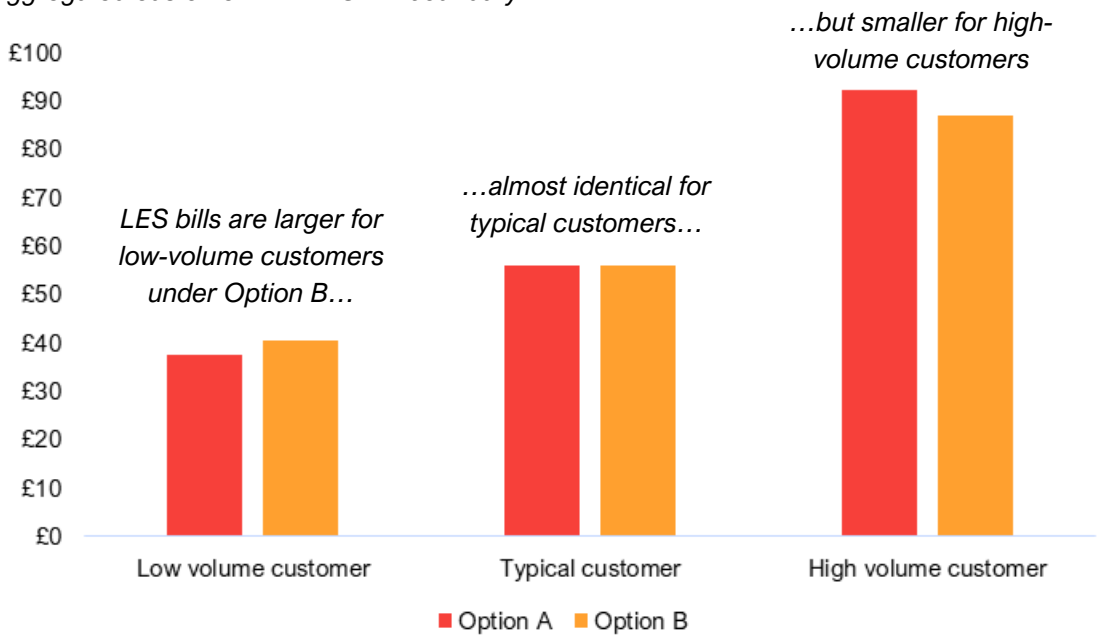


Impact on atypical LES customers

Although Options A and B give very similar bills for LES customers with typical volumes, their impacts diverge for HH Aggregated customers whose volumes are not equal to the average for their customer group. This only affects HH Aggregated tariffs because Option A expresses rebates for these customers as a constant £/customer/year regardless of their actual usage, whereas rebates for Site Specific tariffs are based on customers' own volumes.

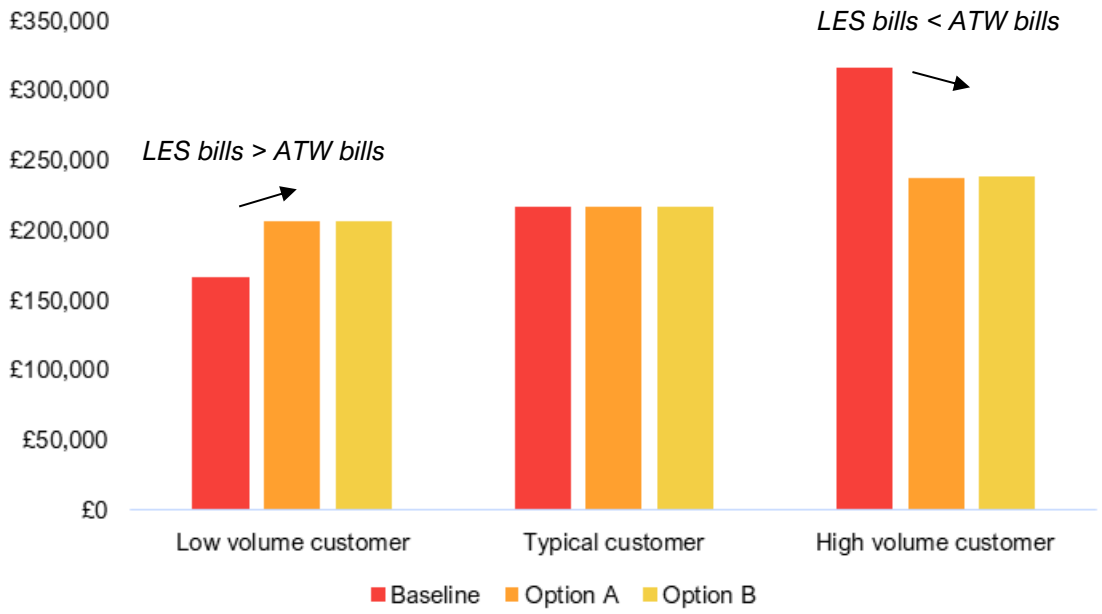
Figure 4.4 demonstrates that, although the value of the LES charges under Option B are almost identical to the value of an all-the-way bill plus a LES rebate under Option A, there are incidence effects for Non-Site Specific tariffs which do not have the average volumes for their customer category.

Figure 4.4: LES bills with respect to customers with 50%, 100% and 200% of typical volumes, WMID, Domestic Aggregated customer with LES HV boundary



We note that it is possible for HH Site Specific LES charges (or rebates) to give higher bills than the equivalent all-the-way tariff. This is because both options use average volumes to convert capacity charges and reactive power charges into a fixed charge. If a customer has much lower capacity or reactive power requirements than the average for its customer group, its private network operator could be worse off as a result of DCP 328. In practice, this may deter the private network operator from requesting a rebate.

Figure 4.5: LES bills with respect to customers with 50%, 100% and 200% of typical volumes, WMID, HV Site Specific Band 4 customer with LES HV boundary



Impact on non-LES customers

Option A doesn't explicitly affect revenue matching, so ATW and LDNO tariffs are unchanged within the charging year. However, residuals will rise in the following year to make up for LES rebates granted in this year.

Option B explicitly changes revenue matching, so ATW and LDNO tariffs must increase to offset the revenue lost with respect to costs below LES boundaries. Using volume assumptions suggested by the working group, the difference in ATW typical bills relative to the baseline ranges between 0% and 0.16%, depending on the DNO and tariff. Note that the assumed share of LES customers by tariff can also affect the allocation of the residual between tariffs as well as the overall amount.

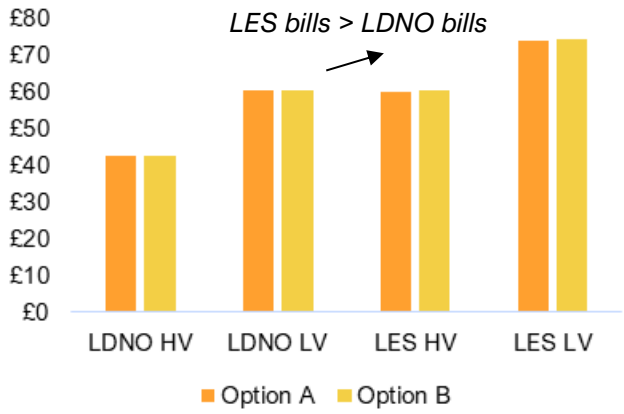
Comparison with LDNO tariffs

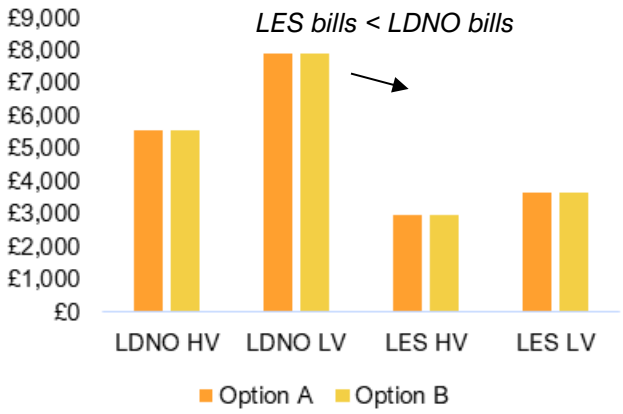
LES tariffs are similar in kind to LDNO tariffs, which also aim to exclude costs/assets associated with network levels below a boundary. LDNO tariffs are calculated in the PCDM as a percentage of ATW tariffs and are typically stable from year-to-year and apply equally to tariffs at the same network level.

By contrast, LES tariffs are highly dependent on the distribution of costs between network levels in the CDCM for each tariff. The share of the residual paid at a LES boundary is also determined by the ratio between LES and all-the-way pre-matching revenues, which are dependent on the ratio of average volumes recorded for that customer category. LES tariffs can therefore be greater or lesser than LDNO tariffs for the equivalent boundary level.

For example, Figure 4.6 compares LES and LDNO tariffs at the equivalent boundaries for two different tariffs. On the left, we see that LES bills are greater than LDNO bills for the typical Domestic Aggregated customer, but on the right we see that the opposite is true for the typical Unmetered Supplies customer.

Figure 4.6: Typical bills by LES / LDNO boundary, ENWL, Domestic Aggregated (left); Unmetered Supplies (right)





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