

Cap and Floor Financial Model 2 Handbook (CFFM2H)

The CFFM2H is the handbook to the Cap and Floor Financial Model 2 (CFFM2).

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1. CFFM2H version control log

Handbook version	Model version	Prepared by	Reviewed by
20190705	1.1	Martin Namor, Senior Manager, Regulatory Finance	Nick Clitheroe & Tadeos Shahbazia, GAD
20190902	1.2	Martin Namor, Senior Manager, Regulatory Finance	Nick Clitheroe & Tadeos Shahbazia, GAD; Svitlana Voronkova, Senior Analyst, ORE

2. Purpose of the CFFM2H

The purpose of the CFFM2H is to provide an overview of the aim, structure and functioning of the CFFM2, and the content of each worksheet within the model (in terms of its inputs, calculations and outputs).

Section 3, “Introduction to the CFFM2”, provides a high level overview of the purpose of the CFFM2; it sets out at what stages in the lifetime of a cap and floor project the CFFM2 is used, and at what stage the outputs of the Cap and Floor Financial Model 1 (CFFM1) are imported into the CFFM2.

Section 4, “Building blocks of the CFFM2”, explains the rationale for any adjustments to the cap and floor levels that are implemented through the CFFM2, and how these adjustments interact with each other to determine the overall required revenue adjustment and level of payment to or from GB consumers; this is also illustrated through the flowchart in Figure 1.

Section 5, “Relevant documents and inputs data to the CFFM2”, provides a brief overview of the policy documents that are relevant to the CFFM2 and of the type and source of inputs data that are used in the model.

Section 6, “High-level overview of the CFFM2 worksheets”, provides a brief overview of the content of each worksheet within the CFFM2:

- Cover;
- Version Control;
- Inputs;
- Data Sources;
- Costs;
- Revenue;
- ORA Adjustment;
- DC Adjustment;
- Indexation;
- Availability;
- Assessment; and
- Revenue Adjustment.

Appendix I provides a detailed overview of the purpose and structure of each worksheet within the CFFM2; of the inputs and calculations used within each worksheet; of the outputs produced by each worksheet; and of the links between different worksheets.

3. Introduction to the CFFM2

The CFFM2 is a Microsoft Excel based financial model that, for any electricity interconnector granted the cap and floor regime, is used during the 25-year operational period to:

1. Determine, if required, an adjustment to the baseline level of controllable operating expenditure (Opex) underpinning the cap and floor levels set at the Post Construction Review (PCR) stage using the CFFM1;
2. Determine any adjustment required during operations to the baseline level of decommissioning costs underpinning the cap and floor levels set at PCR stage;
3. Index cap and floor levels to account for inflation, by converting the real cap and floor levels set at PCR (and any subsequent adjustments required to reflect changes to baseline levels of controllable Opex and decommissioning costs) into nominal cap and floor levels for the purpose of assessing actual revenue against these levels;
4. Adjust cap and floor levels depending on whether predetermined availability targets are met and associated incentives apply (+/-2% incentive at the cap; binary application of the floor, i.e. either full floor or no floor depending on whether minimum availability is achieved);
5. Assess actual revenue against cap and floor levels (including any adjustments required to reflect changes to baseline controllable Opex and decommissioning costs, inflation indexation and availability incentives) on an NPV-neutral basis and at predetermined intervals (every five years, unless more frequent assessments are required);
6. Assess actual non-controllable Opex against the baseline level determined at PCR stage (non-controllable Opex is excluded from the building blocks used in the CFFM1 to set cap and floor levels and treated separately from the other operational costs by applying a pass-through mechanism);
7. Determine whether, in any relevant period of time, there is a revenue excess (above the cap) or shortfall (below the floor) and, therefore, whether any payments need to be made, respectively, to or from GB consumers; and determine the amount of any required payments; and
8. Determine the amount of any pass-through payments required to reconcile different levels of actual and baseline non-controllable Opex.

The cap and floor levels used as an opening input into the CFFM2 are the closing output of the CFFM1; they are determined as real-terms annuities aimed to limit the upward and downward exposure to merchant risk of the revenue earned by the interconnector developer during the operational period.

The cap level represents the maximum amount of annual revenue that the developer is allowed to retain; revenue above this level has to be transferred to consumers.

The floor level represents the minimum amount of annual revenue that the developer is guaranteed to earn (provided it meets a minimum availability requirement); revenue below this level has to be topped up by consumers.

During operations, the CFFM2 is used to determine any required adjustments to the cap and floor levels determined at PCR stage (using the CFFM1); to assess actual revenue against these adjusted levels; and to assess actual non-controllable Opex against the baseline level.

Key points:

- The CFFM2 covers the period of 25 years from the start date of the regime (i.e. the operational period), with the preceding development and construction period covered by the CFFM1.
- The CFFM2 is used to adjust cap and floor levels during operations to reflect changes in controllable Opex and decommissioning costs, inflation and availability; to assess actual revenue against adjusted cap and floor levels; and to assess actual non-controllable Opex against baseline level.
- The CFFM2 is to be run annually once actual figures (revenue, costs, inflation and availability) from the previous operational year have become available.
- By default, any payments due to or from GB consumers are settled every five years on an NPV-neutral basis, unless more frequent settlements are required (the CFFM2 is designed to accommodate within-period settlements, if these are required).

4. Building blocks of the CFFM2

As explained in section 3, the main purpose of the CFFM2 is to adjust cap and floor levels during operations and to compare actual revenue against adjusted cap and floor levels, to determine whether any payments are due to or from GB consumers.

The CFFM2 is also used to assess actual non-controllable Opex against the baseline levels identified at PCR stage. Any difference between actual and baseline non-controllable Opex is treated separately from changes to other operational costs, by applying a pass-through mechanism – i.e. if actual costs exceed the baseline, the developer is allowed to recover the difference from consumers; if actual costs are below the baseline, the developer is required to transfer the difference to consumers.

There are four building blocks which concur to determine the overall adjustment to the cap and floor levels during operations:

1. Changes in controllable Opex;
2. Changes in decommissioning costs;
3. Inflation; and
4. Availability incentives.

Controllable Opex

Cap and floor levels set through the CFFM1 ahead of the regime start date (preliminary levels at FPA stage and final levels at PCR stage) include a baseline allowance to recover controllable Opex that will be incurred during operations.

At any point during the last 15 years of the 25-year operational period (but not during the first 10 years), the interconnector can request, through an ORA¹ submission, one adjustment (but no more than one) to this baseline level of controllable Opex, to rectify a misalignment between revised cost forecasts for the remainder of the period and original baseline levels assumed at PCR stage.

Misalignments between actual costs already incurred in the years preceding the ORA submission and baseline levels for those years are not reflected in the adjustment to cap and floor levels.

If, following Ofgem's assessment of the revised cost forecast submitted by the developer, an adjustment to the baseline level of controllable Opex is allowed, cap and floor levels are then adjusted to reflect the difference between baseline and revised controllable Opex in the remainder of the period on an NPV-neutral basis.

Note: the licence for the Nemo Link project does not prescribe the specific approach to be used to calculate and apply the adjustments to the cap and floor levels that are required to reflect a misalignment between revised and baseline controllable Opex; the approach to be used is therefore specified in this handbook (CFFM2H).

Decommissioning costs

¹ Opex Reassessment Adjustment

Cap and floor levels set through the CFFM1 ahead of the regime start date (preliminary levels at FPA stage and then final levels at PCR stage) include a baseline allowance to recover decommissioning costs that will be incurred during operations.

At any point during the 25-year operational period (and, if required, more than once), the interconnector can request an adjustment to this baseline level of decommissioning costs to rectify a misalignment between revised cost forecasts for the remainder of the period and original baseline levels assumed at PCR stage.

If, following Ofgem's assessment of the revised cost forecast submitted by the developer, an adjustment to the baseline level of decommissioning costs is allowed, cap and floor levels are then adjusted (if required, multiple times) to reflect the difference between revised and baseline decommissioning costs in the remainder of the period on an NPV-neutral basis.

Note: the licence for the Nemo Link project does not prescribe the specific approach to be used to calculate and apply the adjustments to the cap and floor levels that are required to reflect a misalignment between revised and baseline decommissioning costs; the approach to be used is therefore specified in this handbook.

Inflation

Cap and floor levels set at PCR stage (as well as any subsequent adjustments required during operations to reflect changes in controllable Opex and decommissioning costs) are expressed in real terms.

During the operational period, these levels are adjusted to reflect outturn inflation since the base year and converted from real to nominal.

Inflation indexation is required to assess whether the actual revenue earned by the interconnector developer, which is expressed in nominal terms, exceeds the cap or falls short of the floor in any given year.

Availability incentives

The interconnector developer is required to meet a minimum availability threshold (currently 80.00%) as well as incentivised to exceed a target availability level (e.g. 97.05% for Nemo Link).

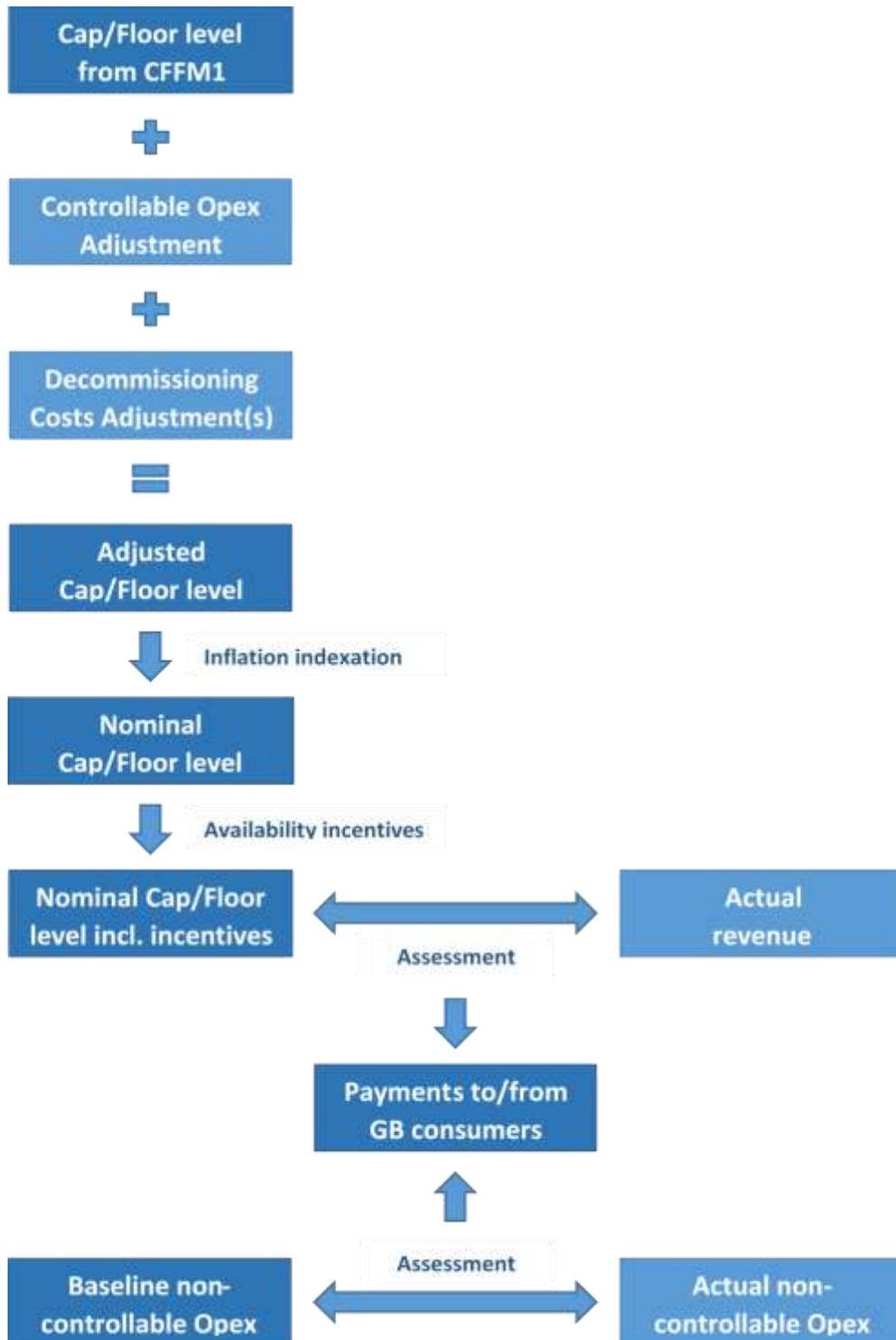
The minimum availability threshold is used to determine whether the revenue floor is available to the developer. If actual revenue falls short of the floor level, the developer receives a top-up from consumers of an amount equal to the difference between floor level and actual revenue, but only if the minimum availability threshold is met; if actual availability is below this threshold, the developer receives no revenue top-up.

The target availability level is used to determine to what extent the cap level should be increased or reduced to reward or penalised the developer for performing above or below this target availability level. The maximum range of this adjustment is a 2% increase or decrease to the cap level.

Once the four adjustments described above are applied to the cap and floor levels, the actual revenue earned by the developer is assessed against these levels at regular intervals (by default, every five years; but more frequent assessments can be undertaken, if required) and on NPV-neutral basis, to determine whether any payments are due from the developer to GB consumers, or from GB consumers to the developer.

Non-controllable Opex is subject to a parallel assessment to determine whether actual costs exceed or fall short of the baseline level; the developer is then, respectively, allowed to recover or required to transfer the difference from/to consumers via a pass-through mechanism.

Figure 1. Building blocks of the CFFM2



5. Relevant documents and data inputs to the CFFM2

The CFFM2 is structured to comply with the licence conditions to which the developer granted the cap and floor regime is subject. Similarly, this handbook (CFFM2H) is written to comply with the relevant licence conditions and, where stated, integrate these conditions where the licence does not prescribe a specific approach or calculation.

In addition to the project's licence, the CFFM2 and its handbook aim to reflect any relevant policy decision taken during the operational phase of the project, for example in relation to:

- a revision of the controllable Opex allowance (following an ORA submission); or
- a revision of the decommissioning costs allowance (following a DC² submission).

Licence conditions, decision documents and other relevant documents (e.g. technical availability models) concur to determine the structure of the CFFM2, the content of this handbook and the value of some of the data inputs used within the model.

Overall, the CFFM2 uses inputs from a variety of sources, including submissions from the developer and Ofgem's subsequent assessment of these submissions (e.g. in relation to revenue and availability); determinations made by Ofgem in relation to the appropriate value of certain parameters (e.g. ORA and DC adjustments); and a number of independent external data sources (e.g. inflation and exchange rate).

The inputs used throughout the model are populated in the 'Inputs' sheet; the sources of these inputs are listed in the 'Data Sources' sheet.

² Decommissioning Costs

6. High-level overview of the CFFM2 worksheets

This section provides a brief overview of the content of each worksheet within the CFFM2; for a detailed overview of the purpose and functioning of each worksheet, please refer to Appendix I.

The CFFM2 comprises 12 sheets:

Cover

The 'Cover' sheet includes a key to interpret the formatting used throughout the model and a description of the content of each sheet in the model.

Version Control

The 'Version Control' sheet contains a log listing all versions of the CFFM2 and detailing the changes introduced within each version relative to the previous version.

Inputs

The 'Inputs' sheet contains all the inputs used throughout the model to determine the amount of any payments due to or from GB consumers during the operational period.

All values exported from this sheet into the rest of the model are either inserted manually into the sheet or calculated in the sheet using manually inserted inputs.

Data Sources

The 'Data Sources' sheet details the sources of all the inputs in the 'Inputs' sheet and provides links to these sources.

Costs

The 'Costs' sheet summarises the baseline levels of controllable and non-controllable Opex and decommissioning costs assumed for the operational period.

It also converts the currency of actual non-controllable Opex costs and adjustments (e.g. from EUR to GBP), where required.

Revenue

The 'Revenue' sheet converts the currency of actual revenue to be assessed against cap and floor levels (e.g. from EUR to GBP), where required.

ORA Adjustment

The 'ORA Adjustment' sheet compares the revised controllable Opex profile determined following an ORA submission against the original baseline level used to set cap and floor levels at PCR stage, and determines the adjustment to the cap and floor levels that is required to reflect the revised controllable Opex profile.

Note: an ORA adjustment to controllable Opex can only be requested after the first 10 years of operations, and only one adjustment can be requested during the 25-year operational period.

DC Adjustment

The 'DC Adjustment' sheet compares any revised decommissioning cost profiles against the original baseline level used to set cap and floor levels at PCR stage, or any subsequent revision, and determines the adjustment to the cap and floor levels that is required to reflect each revised decommissioning costs profile.

Note: an adjustment to decommissioning costs can be requested at any time during the 25-year operational period, and multiple adjustments can be requested.

Indexation

The 'Indexation' sheet summarises the original cap and floor levels set at FPA stage (using the CFFM1), the PCA adjustments required to set final cap and floor levels at PCR stage (also determined using the CFFM1), the controllable Opex adjustments determined in the 'ORA Adjustment' sheet and the decommissioning cost adjustments determined in the 'DC Adjustment' sheet.

These profiles are then aggregated and inflated to determine nominal cap and floor levels before any availability incentive is applied.

Availability

The 'Availability' sheet contains an assessment of actual availability against a minimum threshold (currently 80.00%) and a target level (e.g. 97.05% for Nemo Link) to determine if the floor applies (depending on whether the minimum availability threshold is met) and the magnitude of any adjustment required at the cap (within a +/-2% range, depending on the level of actual availability relative to the target level).

Assessment

The 'Assessment' sheet contains an assessment of actual revenue against cap and floor levels as adjusted in the previous sheets; it also contains an assessment of actual non-controllable Opex against the baseline level underpinning the cap and floor levels set at PCR stage.

These two assessments (both undertaken on an NPV-neutral basis and at regular intervals to cover 5-year assessment periods, unless more frequent assessments are required) return, respectively, a cap and floor revenue adjustment and a pass-through revenue adjustment.

Revenue Adjustment

The 'Revenue adjustment' sheet combines the two adjustments determined in the 'Assessment' sheet to determine the amount of any payment due:

- from the developer to GB consumers, if actual revenue exceeds the adjusted cap and/or non-controllable Opex is below baseline level; or
- from GB consumers to the developer, if actual revenue falls short of the adjusted floor (and the minimum availability threshold is met) and/or non-controllable Opex is above baseline level.

Appendix I – Detailed overview of the CFFM2 worksheets

The purpose of Appendix I is to provide a detailed overview of the purpose and structure of each worksheet within the CFFM2; of the inputs and calculations used within each worksheet; of the outputs produced by each worksheets; and of the links between different worksheets.

The CFFM2 comprises 12 sheets:

- a. Cover;
- b. Version Control;
- c. Inputs;
- d. Data Sources;
- e. Costs;
- f. Revenue;
- g. ORA Adjustment;
- h. DC Adjustment;
- i. Indexation;
- j. Availability;
- k. Assessment; and
- l. Revenue Adjustment.

a. Cover

The 'Cover' sheet contains two sections:

- **Model key:** a key to interpret the font and fill colours used throughout the model; and
- **Contents:** a brief description of the content of each sheet in the model (with hyperlinks to the sheets to aid navigation), with colour coding used to group the sheets depending on whether they contain inputs (yellow sheets), calculations (purple sheets) or final outputs of the model (green sheet).

b. Version Control

The 'Version Control' sheet contains a log listing, for each relevant version of the CFFM2:

- Version number, with any major changes to the model being identified through an increase in integer (e.g. from 1.0 to 2.0) and minor change through an increase in decimal (e.g. from 1.0 to 1.1);
- File pathname;
- Previous version of the model on which the relevant version is based;
- Name of the model author or editor responsible for implementing the changes in the relevant version;
- Date on which the relevant version is finalised;
- High-level description of the changes implemented;
- Rationale for implementing the changes;
- Location of the changes within the model;
- Impact of the changes on the outputs of the model (if any);
- Indication of whether quality assurance (QA) was performed and by whom; and
- Any relevant comments relating to QA.

c. Inputs

The 'Inputs' sheet contains all the inputs used throughout the model; all values exported from this sheet to the rest of the model are either inserted manually in the sheet or calculated in the sheet using manually inserted inputs.

Section **Items transferred from CFFM1** contains all relevant items that are transferred from the CFFM1 into the CFFM2, grouped in six sub-sections:

- **Base year and currency:** base year price term (cell I11) and currency of revenue and cost inputs (cell I13);
- **Model operation:** regime start date (cell I17), other relevant dates (cells I18 to I20), and number of operational years (cell I21);
- **Cap and Floor levels:** preliminary cap and floor levels set at FPA stage (cells I26-27) and PCA adjustment to these levels determined at PCR stage (cells I29-30);
- **Baseline cost inputs during operations:** baseline levels of controllable and non-controllable Opex and decommissioning costs underpinning cap and floor levels set at PCR stage (rows 34 to 36);
- **Financial returns:** allowed rates of return at the cap and floor (cells I40 and I41) and operational discount rate (cell I42), calculated as the average of the cap and floor return rates; and
- **Base year indices:** average inflation index during the base year for the GB portion of the interconnector (cell I46) and (if applicable) the non-GB portion (cell I47), and average exchange rate during the base year (cell I48).

Section **Regime timings and design – Model operation** contains a number of relevant dates, flags and information regarding the number of days or years within relevant time periods.

Cells I55 to I57 import values the previous section; row 158 calculates the number of days within each financial year.

The regime end date in cell I61 is calculated relative to the regime start date in cell I55; the regime start date flags and end date flags in rows 60 and 62 are calculated based on the relevant regime start and end dates.

Cell I63 calculates the number of cap days within the first financial year; the flag in row 64 calculates the proportion of days within each financial year to which the cap applies.

The floor start date is input in cell I67, with the start and end date of the year in which the floor start date occurs calculated in cells I68 and I69.

The floor start date flag is calculated in row 70 based on the relevant floor start date; cell I71 calculates the number of floor days within the first financial year; the flag in row 72 calculates the proportion of days within each financial year to which the floor applies.

The length of the assessment period is input in cell I75 (currently, five years by default) and the percentage indicating the GB portion of the interconnector in cell I77.

Section **Variables to be updated** contains two subsections: 'Cost items to be updated up to and beyond PCA stage (actual)' and 'Revenue items to be updated (actual)'.

In sub-section **Cost items to be updated up to and beyond PCA stage (actual)**, actual non-controllable Opex costs are input in row 83 and actual non-controllable Opex adjustments post NRA review are input in row 84.

In sub-section **Revenue items to be updated (actual)**, actual gross congestion revenues are calculated in row 96 as the sum of the values input in relation to each revenue component in rows 88 to 95.

Market related costs in row 101 are calculated as the sum of the values input in relation to each market cost item input in rows 98 to 100.

The value associated with any income adjusting event is input in row 103.

The notional assessed revenue in row 105 is calculated by deducting market related costs in row 101 and income adjusting events in row 103 from gross congestion revenues in row 96.

In row 107, the assessed revenue is set equal to the higher of notional assessed revenue in row 105 and zero.

Any within period payments to or from consumers, reflecting revenue assessments undertaken more frequently than the default 5-year period, are input in row 109.

Section **Adjustment to Cap and Floor levels** contains five subsections:

- Availability incentive;
- Inflation and exchange rate;
- PCA adjustment;
- ORA adjustment; and
- DC adjustments.

In sub-section **Availability incentive**, the values required to calculate the reward or penalty for outperformance or underperformance of the availability target level (e.g. 97.05% for Nemo Link) are input in cells I115 to I118.

The interconnector rated capacity is input in cell I120, while cell I121 calculates the number of hours per year.

The values input in rows 123 and 124 reflect, respectively, the total and allowed amount of outages in the relevant cap period within each year, with the difference between the two calculated in row 125.

Similarly, the values input in rows 126 and 127 reflect, respectively, the total and allowed amount of outages in the relevant floor period within each year, with the difference between the two calculated in row 128.

The amount of outages associated with exceptional events is input in row 129.

The minimum availability threshold (currently 80%), which is used to determine whether the floor applies, is input in cell I131.

In sub-section **Inflation and exchange rate**, the base year index values in cells I135 to I137 are imported from section 'Items transferred from CFFM1', sub-section 'Base year indices'.

The actual annual average values of these indices during the operational period (and the year before the start of operations) are input in rows 139 to 141.

The purchasing power parity index (PPPI) that is used to convert base year on a PPP basis (i.e. reflecting different inflation levels between two countries) is calculated in row 144 using values from cells I135 to I137 and rows 139 to 141 in the same section, and cell I77 in section 'Regime timings and design', sub-section 'Model operation'.

In sub-section **PCA adjustment**, a number of relevant dates (cells I148 to I150) and flags (rows 152 and 153) are input or calculated to accommodate the application of the PCA adjustments required to adjust preliminary cap and floor levels at PCR stage.

The switch in cell I151 indicates whether the PCA adjustments to the cap and floor levels are to be applied ('Yes') or not ('No').

In sub-section **ORA adjustment**, the switch in cell I157 indicates whether an ORA adjustment to cap and floor levels to reflect a revised controllable Opex profile is to be applied or not.

The ORA start date is input in cell I159 and associated flags are calculated in rows 160 and 161.

The revised controllable Opex profile from the ORA submission is input in row 163.

The value of the required adjustments to cap and floor levels to reflect revised non-controllable Opex are calculated in the 'ORA Adjustment' sheet and imported into the 'Inputs' sheet, cells I165 and I166, for presentational purposes.

In sub-section **DC adjustment**, the switch in cell I170 indicates whether DC adjustments to cap and floor levels to reflect revised decommissioning costs are to be applied or not.

In **Current DC adjustment**, the start date associated with the latest DC adjustment is input in cell I174 and the associated flag calculated in row 175.

The revised decommissioning costs profile from the latest DC submission is input in row 177.

The value of the required adjustments to cap and floor levels to reflect latest revised decommissioning costs are calculated in the 'DC Adjustment' sheet and imported into the 'Inputs' sheet, cells I179 and I180, for presentational purposes.

Previous DC adjustments summarises key information (date, values and flags) of any previous decommissioning adjustments (up to four). At any time when a DC adjustment is calculated through the CFFM2, the associated information has to be hard-coded in 'Previous DC adjustments' in order to keep a record of the DC adjustments determined before the latest one.

d. Data Sources

The 'Data Sources' sheet details the sources to all the inputs in the 'Inputs' sheet (yellow cells) and, where relevant, provides hyperlinks to these sources.

The structure of the sheet is the same as the structure of the 'Inputs' sheet, with the same sections and sub-sections, but a reduced number of rows, as only the rows of the 'Inputs' sheet in which values are input directly (rather than being calculated or imported from other rows) are covered in the 'Data Sources' sheet.

For each parameter in the 'Data Sources' sheet, column I shows the relevant row in which the parameter is input in the 'Inputs' sheet; column K is to be populated with a text string describing the source of the data; and column L with a hyperlink to the source of the data (if the data was sourced from an online source).

e. Costs

Section **Costs** contains two sub-section, 'Baseline costs' and 'Costs items to be updated up to and beyond PCA stage (actual)'.

Sub-section **Baseline costs** imports baseline levels of decommissioning costs, controllable and non-controllable Opex from the 'Inputs' sheet into rows 11 to 13.

In sub-section **Costs items to be updated up to and beyond PCA stage (actual)**, actual levels of non-controllable Opex and non-controllable Opex adjustments following NRA review are imported from the 'Inputs' sheet into rows 17 and 23 respectively.

Where required (e.g. in case of dual currency project), the average annual exchange rate is imported from the 'Inputs' sheet into row 19 and, indirectly, row 25.

Values in rows 17 and 19 are then use to convert actual non-controllable Opex from the currency in which costs are incurred (e.g. EUR) into the one in which cap and floor levels are set (GBP).

In the same way, where required, values in rows 23 and 25 are used to convert actual non-controllable Opex adjustments following NRA review from one currency (e.g. EUR) into another (GBP).

f. Revenue

Section **Revenue** imports actual revenue and, where required (e.g. in case of dual currency project), annual average exchange rate from the 'Inputs' into rows 9 and 11 and then, in case of dual currency project, uses these values to convert revenue from the currency in which revenue is earned (e.g. EUR) into the currency in which cap and floor levels are set (GBP).

g. ORA Adjustment

Section **Controllable Opex** contains three sub-sections:

- Original controllable Opex allowance from PCR stage;
- Revised controllable Opex allowance in ORA submission; and
- NPV comparison.

In sub-section **Original controllable Opex allowance from PCR stage**, the original baseline controllable Opex profile that was used to set cap and floor levels at PCR stage is imported from the 'Inputs' sheet into row 11.

In sub-section **Revised controllable Opex allowance from ORA submission**, the revised controllable Opex profile determined following an ORA submission is imported from the 'Inputs' sheet into row 15.

Sub-section **NPV comparisons** calculates the difference between the NPV of the revised allowance and the NPV of the original allowance to determine the value of the required adjustments to the cap and floor levels. These NPVs are calculated only in relation to future years, i.e. not including any differences between actual and baseline Opex incurred in the years preceding the ORA submission.

The NPVs required to determine the value of the cap adjustment are calculated using the cap return rate as the discount factor; the NPVs required to determine the value of the floor adjustment are calculated using the floor return rate as the discount factor.

The cap and floor return rates are imported from the 'Inputs' sheet into cells I20 and I30 respectively, and used to calculate the discount factors in rows 21 and 31 (for cap and floor NPV calculations respectively).

The flags associated to the calculation of the ORA adjustments and their application to the cap and the floor are imported from the 'Inputs' sheet into rows 19 and 29 respectively.

Cells I23 and I24 calculate, respectively, the NPV of the original allowance and the NPV of the revised allowance using the cost profiles in rows 11 and 15, the cap effective flags in row 19 and the cap discount factors in row 21; cell I25 calculates the difference between these two NPVs.

Cell I27 calculates the forward-looking ORA adjustment to the annual cap level (ORAC) that is required to reflect this difference.

Cells I33 and I34 calculate, respectively, the NPV of the original allowance and the NPV of the revised allowance using the cost profiles in rows 11 and 15, the floor effective flags in row 19 and the floor discount factors in row 21; cell I35 calculates the difference between these two NPVs.

Cell I37 calculates the forward-looking ORA adjustment to the annual floor level (ORAF) that is required to reflect this difference.

Note that the ORAC and ORAF adjustments are calculated and applied to amend cap and floor levels from the ORA start date onwards; cap and floor levels before this date are not restated and, therefore, neither are any past payments to or from GB consumers.

h. DC Adjustment

Section **Decommissioning costs** contains five sub-sections:

- Original decommissioning costs allowance from PCR stage;
- Revised decommissioning costs allowance from latest DC submission;
- All DCC adjustments (Cap);
- All DCF adjustments (Floor); and
- NPV comparisons.

In sub-section **Original decommissioning costs allowance from PCR stage**, the original baseline decommissioning costs profile that was used to set cap and floor levels at PCR stage is imported from the 'Inputs' sheet into row 11.

In sub-section **Revised decommissioning costs allowance from latest DC submission**, the revised decommissioning costs profile requested through the latest DC submission is imported from the 'Inputs' sheet into row 15.

Sub-section **Previous DCC adjustments (Cap)** imports from the 'Inputs' sheet the decommissioning costs adjustments to the cap level determined at any previous DC submissions (up to four) and activity flags associated with each adjustment.

Cells I20, I24, I28 and I32 contain, respectively, the value of the first, second, third and fourth DCC adjustment to the cap (if these adjustments were requested); rows 21, 25, 29 and 33 contain the associated activity flags.

Sub-section **Previous DCF adjustments (Floor)** imports from the 'Inputs' sheet decommissioning costs adjustments to the floor level determined at any previous DC submissions (up to four) and activity flags associated with each adjustment.

Cells I38, I42, I46 and I50 contain, respectively, the value of the first, second, third and fourth DCF adjustment to the floor (if these adjustments were requested); rows 39, 43, 47 and 51 contain the associated activity flags.

Sub-section **NPV comparisons** calculates the difference between the NPV of the latest revised allowance, the NPV of the original baseline allowance, and the NPVs of any previous DC adjustments to determine the value of the adjustment to the cap and floor levels that is required to reflect the latest DC submission. At each DC adjustment, NPVs are calculated only in relation to future years, i.e. not including differences between actual and baseline decommissioning costs incurred in the years preceding the relevant DC submission.

The NPVs required to determine the value of the cap adjustment are calculated using the cap return rate as the discount factor; the NPVs required to determine the value of the floor adjustment are calculated using the floor return rate as the discount factor.

The cap and floor return rates are imported from the 'Inputs' sheet into cells I56 and I69 respectively, and used to calculate the discount factors in rows 57 and 70 (for cap and floor NPV calculations respectively).

The flag associated to the calculation of the latest DC adjustments and its application to the cap and the floor is imported from the 'Inputs' sheet into row 55.

Cell I59 calculates the NPV of the original allowance at the cap using the baseline cost profile in row 11 and the cap discount factors in row 57.

Cells I60 to I63 calculate the NPV of any previous DCC adjustment at the cap (up to four) from previous DC submissions using the four DCC adjustments in cells I20, I24, I28 and I32; the activity flags in rows 21, 25, 29 and 33; and the cap discount factors in row 57.

Cell I64 calculates the NPV of the latest revised allowance using the revised cost profile in row 15 and the cap discount factors in row 57.

Cell I65 calculates the difference between the NPV of the latest revised allowance at the cap, any previous DCC adjustments (up to four) and the NPV of the original baseline allowance at the cap.

Cell I67 calculates the forward-looking DCC adjustment to the annual cap level that is required to reflect this difference.

Cell I72 calculates the NPV of the original allowance at the floor using the baseline cost profile in row 11 and the floor discount factors in row 70.

Cells I73 to I76 calculate the NPV of any previous DCF adjustment at the floor (up to four) from previous DC submissions using the four DCF adjustments in cells I38, I42, I46 and I50; the activity flags in rows 39, 43, 47 and 51; and the floor discount factors in row 70.

Cell I77 calculates the NPV of the latest revised allowance at the floor using the revised cost profile in row 15 and the floor discount factors in row 70.

Cell I78 calculates the difference between the NPV of the latest revised allowance at the floor, any previous DCF adjustments (up to four) and the NPV of the original baseline allowance at the floor.

Cell I80 calculates the forward-looking DCF adjustment to the annual floor level that is required to reflect this difference.

Note that any DCC and DCF adjustments are calculated and applied to amend cap and floor levels from the relevant DC start date onwards; cap and floor levels before this date are not restated and, therefore, neither are any past payments to or from GB consumers.

i. Indexation

Section **Indexation** contains two sub-sections: 'PPPI indexation' and 'Indexed annuity (pre-availability incentive)'.

Sub-section **PPPI indexation** imports RPI inflation indexation factors from the 'Inputs' sheet into row 11.

Sub-section **Indexed annuity (pre-availability incentive)** imports:

- Preliminary cap and floor levels set at FPA stage from the 'Inputs' sheet into cells I15 and I16;
- PCA adjustments used to set final cap and floor levels at PCR stage from the 'Inputs' sheet into cells I17 and I18;
- ORA adjustments to cap and floor levels (following ORA submission) from the 'Inputs' sheet (where they have to be hardcoded after having been calculated in the 'ORA Adjustment' sheet) into cells I19 and I20; and
- DC adjustments to cap and floor levels (following DC submissions) from the 'Inputs' sheet (where they have to be hardcoded after having been calculated in the 'DC Adjustment' sheet) into cells I21 to I30.

Preliminary cap and floor levels are converted from real to nominal in rows 24 and 25 respectively, by applying the inflation indexation factors in row 11 to the real terms annuity in cells I15 and I16.

The flags in cells I35, I39 and I43 are imported from the 'Inputs' sheet and determine, respectively, whether the PCA, ORA and DC adjustments are applied to the preliminary cap and floor levels.

The PCA adjustment factors to be applied to preliminary cap and floor levels (PCAC and PCAF) to reflect changes required at PCR stage are imported from the 'Inputs' sheet into rows 36 and 37 respectively.

Any ORA adjustment factors to be applied to preliminary cap and floor levels (ORAC and ORAF) to reflect changes following an ORA submission are imported from the 'Inputs' sheet into rows 40 and 41 respectively.

Any DC adjustment factors to be applied to preliminary cap and floor levels (DCC and DCF adjustments use the same adjusting factor) to reflect changes following a DC submission are imported from the 'Inputs' sheet into row 44 and, if required, 45 to 48.

Any partial year adjustment factors to be applied to preliminary cap and floor levels (PYC and PYF) to reflect cap and floor start dates potentially occurring after the start of the first operational year are imported from the 'Inputs' sheet into rows 50 and 51 respectively.

Rows 53 and 54 calculate, respectively, nominal pre-availability incentive cap and floor levels, by applying partial year adjustment factors (in rows 50 and 51) to the nominal preliminary cap and floor levels (in rows 32 and 33) and then adding nominal PCA, ORA and DC adjustments.

Each of these adjustments is calculated by applying to the relevant real terms adjustment (cells I17 to I22 and, if required, I23 to I30) the associated flag (I35, I39 and I43) and adjustment factors (rows 36-37, 40-41 and 44-48), and then the inflation indexation factors in row 11.

In summary, the pre-availability incentive cap and floor levels calculated in rows 53 and 54 are nominal (i.e. include RPI inflation indexation) and include all adjustments applied to the preliminary cap and floor levels set at FPA stage:

- The PCA adjustments to cap and floor levels (PCAC and PCAF) set at PCR stage;
- Any ORA adjustments to the cap and floor levels (ORAC and ORAF) set following an ORA submission; and
- Any DC adjustments to the cap and floor levels (DCC and DCF) set following a DC submission (up to five).

j. Availability

Section **Availability incentives** contains four sub-sections:

- Cap and Floor (post-availability incentive);
- Availability parameters;
- Cap incentive rate; and
- Floor incentive rate.

Sub-section **Cap and Floor (post-availability incentive)** imports nominal pre-availability incentive cap and floor levels from the 'Inputs' sheet into rows 11 and 12.

Rows 14 and 15 are populated with annual cap and floor incentive rates calculated, respectively, in sub-sections 'Cap incentive rate' and 'Floor incentive rate'.

Rows 17 and 18 calculate post-availability incentive cap and floor levels by multiplying pre-availability incentive levels in rows 11 and 12 by, respectively, cap and floor availability incentive rates in rows 14 and 15.

Sub-section **Availability parameters** imports the number of operational years, the interconnector rated capacity and the number of hours in the relevant years from the 'Inputs' sheet into, respectively, cells I22, I25 and I26.

Row 23 calculates a flag used to determine what years fall within the relevant 25-year operational period.

Sub-section **Cap incentive rate** imports the cap availability incentive target and partial year cap adjustment factors from the 'Inputs' sheet into, respectively, cell I30 and row 31.

The maximum possible availability in row 32 is calculated by multiplying the interconnector rate capacity in cell I25 by the number of hours in cell I26 and partial year cap adjustment factors in row 31.

Row 33 imports the difference between total and allowed outages during active cap period from the 'Inputs' sheet.

Row 34 calculates the actual availability at the cap as the difference between the maximum possible availability in row 32 and the outages in row 33.

Row 35 calculates the availability target by multiplying the maximum possible availability in row 31 by the cap availability incentive target in cell I30.

Row 36 calculates the availability performance at the cap for the relevant years (i.e. those in which the availability target is greater than zero) by dividing the actual availability at the cap in row 34 by the availability target in row 35.

Cells I38 and I39 import, respectively, the upper and lower limit of the cap availability incentive from the 'Inputs' sheet (currently 1.02 and 0.98, to reflect a +/-2% incentive).

Row 41 determines the cap availability incentive rate that is then exported to section 'Cap and Floor (post-availability incentive)' for all years in which the flag in row 23 is 'TRUE', based on the availability performance at the cap in row 36:

- If performance is above the upper limit in cell I38, the incentive rate is set equal to the upper limit (currently 1.02);

- If performance is below the lower limit in cell I39, the incentive rate is set equal to the lower limit (currently 0.98); or
- If performance is between upper and lower limit, the incentive rate is set equal to this level of performance.

Sub-section **Floor incentive rate** imports the floor availability incentive target and partial year floor adjustment factors from the 'Inputs' sheet into, respectively, cell I45 and row 46.

The maximum possible availability in row 47 is calculated by multiplying the interconnector rate capacity in cell I25 by the number of hours in cell I26 and partial year floor adjustment factors in row 46.

Row 48 imports the difference between total and allowed outages during active floor period from the 'Inputs' sheet.

Row 49 imports outages associated with exceptional events from the 'Inputs' sheet.

Row 50 calculates the actual availability at the floor by subtracting the outages in row 48 from the maximum possible availability in row 47 and adding back the outages associated with exceptional events in row 49.

Row 51 calculates the minimum availability target by multiplying the maximum possible availability in row 47 by the floor availability incentive target in cell I45.

Row 52 calculates the availability performance at the floor for the relevant years (i.e. those in which the minimum availability target is greater than zero) by dividing the actual availability at the floor in row 50 by the minimum availability target in row 51.

Row 54 determines the floor availability incentive rate that is then exported to sub-section 'Cap and Floor (post-availability incentive)' for all years in which the flag in row 23 is 'TRUE', based on the availability performance at the floor in row 52:

- If performance is equal to or above one (i.e. if actual availability is equal to or above the minimum availability target), the incentive rate is set equal to one; or
- If performance is below one (i.e. if actual availability is equal to or above the minimum availability target), the incentive rate is set equal to zero.

k. Assessment

Section **Revenue assessment** determines the amount of any revenue adjustment required to address an excess above the cap or shortfall below the floor; it contains four sub-sections:

- NPV uplift factors;
- Revenue assessed for cap and floor;
- NPV of assessed revenue for cap and floor; and
- Assessed adjustment.

Sub-section **NPV uplift factors** imports the PPPI index and the real operational discount rate from the 'Inputs' sheet into row 11 and cell I13 respectively.

Row 12 calculates the year-on-year change in the PPPI index based on the index values in row 11.

Row 13 calculates annual nominal operational discount rates by applying the annual change in PPPI index on the top of the real operational discount rates, through the Fisher formula:

$$\text{Nominal discount rate} = (1 + \text{real discount rate}) * (1 + \text{PPPI index change}) - 1$$

Rows 16 to 20 calculate the annual uplift factors that are required to uplift cap and floor levels and revenue from the relevant year in which they occur to the year in which the revenue assessment against cap and floor takes place, so that this assessment can be carried out on an NPV-neutral basis.

These calculations are built to allow the revenue assessment to be carried out either at the end of each relevant assessment period (default length of 5 years) or more frequently, if needed.

The following table exemplifies how this NPV-neutral assessment is carried out.

	Year 1	Year 2	Year 3	Year 4	Year 5
Five-year uplift factor	0.00	0.00	0.00	0.00	1.29
Four-year uplift factor	0.00	0.00	0.00	1.21	1.21
Three-year uplift factor	0.00	0.00	1.13	1.13	1.13
Two-year uplift factor	0.00	1.06	1.06	1.06	1.06
One-year uplift factor	1.00	1.00	1.00	1.00	1.00

If the assessment is carried out at the end of year 1, there is only one year of revenue, which does not need to be uplifted; therefore:

- The one-year uplift factor applied to this revenue is equal to 1.00; and
- The other uplift factors are equal to zero.

If the assessment is carried out at the end on year 2, there are two years of revenue: the first needs to be uplifted from year 1 to year 2, while the second does not need to be uplifted; therefore:

- The two-year uplift factor applied to revenue earned in year 1 is equal to 1.06, which is calculated as 1 plus the discount rate in year 2;
- The one-year uplift factor applied to revenue earned in year 2 is equal to 1.00, and
- The other uplift factors are equal to zero.

The same approach is repeated if the assessment is carried out in year 3, 4 or 5.

If the assessment is carried out at the end of year 5 (default assessment period), there are five years of revenue, with each year needing to be uplifted from the year in which it occurs to year 5; therefore:

- The five-year uplift factor applied to revenue earned in year 1 is equal to 1.29, which is calculated as (1 plus the discount rate in year 2) multiplied by (1 plus the discount rate in year 3) multiplied by (1 plus the discount rate in year 4) multiplied by (1 plus the discount rate in year 5);
- The four-year uplift factor applied to revenue earned in year 2 is equal to 1.21, which is calculated using the approach described in the point above;
- The three-year uplift factor applied to revenue earned in year 3 is equal to 1.13;
- The four-year uplift factor applied to revenue earned in year 4 is equal to 1.06; and
- The one-year uplift factor applied to revenue earned in year 5 is equal to 1.00.

Sub-section **Revenue assessed for cap and floor** imports assessed revenue from the 'Revenue' sheet into row 24, floor pre-availability incentive (called notional floor for the purpose of the calculations in this sheet) and floor post-availability incentive from the 'Availability' sheet into rows 25 and 26.

Row 28 calculates notional surplus assessed revenue based on the floor post-availability incentive in row 26; if this is zero (because availability is below the minimum availability threshold), then the notional surplus is equal to assessed revenue minus the notional floor; if floor post-availability incentive is bigger than zero (because availability is at or above the minimum availability threshold), then the notional surplus is equal to zero.

Row 29 calculates surplus assessed revenue based on the notional surplus assessed revenue in row 28; if this is bigger than zero, then surplus assessed revenue equals notional surplus assessed revenue; otherwise, it is equal to zero.

Row 31 imports cap (post-availability incentive) from the 'Availability' sheet.

Row 32 sets revenue assessed for cap equal to assessed revenue in row 24.

Row 33 displays floor (post-availability incentive) previously imported from the 'Availability' sheet into row 26.

Row 34 sets revenue assessed for the floor based on floor post-availability incentive in row 26; if this is zero, then revenue assessed for the floor is equal to surplus assessed revenue in row 29; otherwise, revenue assessed for the floor is equal to assessed revenue in row 24.

Row 35 imports within-period adjustment (assessed) from the 'Inputs' sheet.

Sub-section **NPV of assessed revenue for cap and floor** calculates NPVs of:

- Cap (post-availability incentive) in row 39, based on the cap values in row 31 and uplift factors in rows 16 to 20;
- Revenue assessed for cap in row 40, based on revenue values in row 32 and uplift factors in rows 16 to 20;
- Floor (post-availability incentive) in row 41, based on floor value in row 33 and uplift factors in rows 16 to 20;
- Revenue assessed for floor in row 42, based on revenue values in row 34 and uplift factors in rows 16 to 20; and
- Within-period adjustment in row 43, based on adjustment values in row 35 and uplift factors in rows 16 to 20.

These NPVs are calculated using the NPV-neutral approach explained under sub-section 'NPV uplift factors' above.

Sub-section **Assessed adjustment** imports assessment period length from the 'Inputs' sheet into cell I47 and calculates assessment year flags in row 48 based on assessment period length in cell I47 and operational year numbers in row 5.

Row 50 calculates relevant revenue at cap as the difference between the NPV of revenue assessed for cap (in row 40) and the NPV of cap post-availability incentive (in row 39).

Row 51 sets revenue excess at cap equal to relevant revenue at cap in row 50 if this is greater than zero, or equal to zero otherwise; therefore, if there is revenue excess at the cap, this is indicated with a positive value in row 51.

Row 52 calculates relevant revenue at floor as the difference between the NPV of floor post-availability incentive (in row 41) and the NPV of revenue assessed for floor (in row 42).

Row 53 sets revenue shortfall at floor equal to relevant revenue at floor in row 52 if this is greater than zero, or equal to zero otherwise; therefore, if there is revenue shortfall at the floor, this is indicated with a positive value in row 53.

Row 56 displays the NPV of the within-period adjustments calculated in row 43; a positive value indicates that revenue is adjusted upwards; a negative value indicates that revenue is adjusted downward.

Row 58 calculates a cap and floor revenue adjustment that does not account for when the relevant year lies within the assessment period, i.e. it produces a revenue adjustment value for each year, irrespective of whether the year is the final year of the relevant assessment period (i.e. year 5, if the default 5-year assessment period is used).

The revenue adjustment in row 58 is calculated based on revenue excess at cap (in row 51), revenue shortfall at floor (in row 54), and NPV of within-period adjustment (in row 56), as follows:

- If revenue excess at cap is larger than zero, then the revenue adjustment is set equal to the negative of revenue excess at cap minus the NPV of the within-period adjustment;
- If revenue excess at cap is equal to zero and revenue shortfall at floor is larger than zero, then the revenue adjustment is set equal to revenue shortfall at floor minus the NPV of the within-period adjustment; or
- If both revenue excess at cap and revenue shortfall at floor are equal to zero, then the revenue adjustment is set equal to the negative of the NPV of the within-period adjustment.

A positive revenue adjustment indicates that revenue is adjusted upwards (i.e. revenue has to be topped up by consumers); a negative revenue adjustment indicates that revenue is adjusted downwards (i.e. excess revenue has to be transferred to consumers).

Row 60 determines the end of period cap and floor revenue adjustment by applying the revenue adjustment calculated in row 58 only to those years for which the assessment year flag in row 48 is 'TRUE', i.e. only for the final year of each assessment period (e.g. in the case of the default 5-year period, years 5, 10, 15, 20 and 25).

Section **Revenue adjustment for changes in non-controllable Opex** determines the amount of any revenue adjustment required to address a difference between baseline and actual non controllable Opex.

Row 64 displays the PPPI index values previously imported into row 11 from the 'Inputs' sheet.

Row 66 imports nominal actual non-controllable Opex from the 'Costs' sheet.

Row 67 imports real baseline non-controllable Opex from the 'Costs' sheet and multiplies it by the PPPI index in row 64 to inflate it from real to nominal.

Row 68 calculates the difference between actual and baseline non-controllable Opex, both expressed in nominal terms.

Row 70 imports adjustments to non-controllable Opex following NRA review from the 'Costs' sheet.

Row 72 calculates total non-controllable change from baseline as the sum of the difference between actual and baseline non-controllable Opex in row 68 and the adjustments following NRA review in row 70.

Row 74 calculates a pass-through revenue adjustment that does not account for when the relevant year lies within the assessment period, i.e. it produces a revenue adjustment value for each year, irrespective of whether the year is the final year of the relevant assessment period (i.e. year 5, if the default 5-year assessment period is used).

A positive revenue adjustment indicates that revenue is adjusted upwards (i.e. revenue has to be topped up by consumers); a negative revenue adjustment indicates that revenue is adjusted downwards (i.e. excess revenue has to be transferred to consumers).

Row 74 determines the end of period pass-through revenue adjustment by applying the revenue adjustment calculated in row 74 only to those years for which the assessment year flag in row 48 is 'TRUE', i.e. only for the final year of each assessment period (e.g. in the case of the default 5-year period, years 5, 10, 15, 20 and 25).

I. Revenue Adjustment

Section **Model outputs** has two sub-sections: 'Cap and Floor levels' and 'Amounts due to or from GB consumers'.

Sub-section **Cap and Floor levels** imports cap and floor levels post-availability incentive from the 'Availability' sheet into rows 11 and 12 respectively.

In sub-section **Amounts due to or from GB consumers**, cell I56 imports from the 'Inputs' sheet the percentage identifying the GB share of the interconnector (and therefore the share of any payments to the interconnector from GB consumers or payments from the interconnectors to GB consumers).

Rows 18 multiplies the sum of end of period cap and floor revenue adjustment and end of period pass-through revenue adjustment (both imported from the 'Assessment sheet') by the GB consumer share in cell I56 to determine the total amount due from the interconnector to GB consumers (if the value is negative) or to the interconnector from GB consumers (if the value is positive) at the end of each relevant assessment period (i.e. at 5-year intervals for the default assessment period).

Rows 20 multiplies the within-period revenue adjustment (imported from the 'Assessment sheet') by the GB consumer share in cell I56 to determine the amount due from the interconnector to GB consumers (if the value is negative) or to the interconnector from GB consumers (if the value is positive) in any year of the operational period (on the top of the end of period payment occurring at the end of each assessment period).