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User Manual

for

Crossrail Construction Carbon Model

Author:
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Introduction
Crossrail Carbon Model is a excel based tool that has been developed to forecast and monitor the ongoing construction carbon footprint (Scopes 1 & 2) to enable the project to determine if it is on target to achieve its target reduction. This guide aims to provide users of Crossrail Carbon Model with a clear instruction on how to enter the required information in the model.

Structure of the model
The excel file contains a series of tabs with various functionalities. Some of the tabs are mainly informative which gives instruction to the user and reports the results of the calculations and some other tabs are associated with different initiatives for reducing carbon emissions. There are also some hidden tabs which are used to do the background calculations and must only be accessed by the model maintainer and not users. Following sections will introduce all of the tabs. They include:

- Instructions
- Report
- Saving Calculator
- Fuel Equipment
- Efficient Site Office
- Lighting
- Behaviours
- Additional Initiatives
- Scope 3 Transport
- Scope 3 Embodied
- Data Entry Fuel
- Data Entry Electricity
- Reference Evidence

**NOTE:** This model is designed to be flexible and can be customised to accommodate all of the project specific requirements. Therefore, it is not protected and can be edited by anyone. To prevent accidental damage to the model the user **must always** follow the following rules:

- Only GREY cells should be edited by the user.
- Never deleted or insert any column or row.
- Never edit any formula from the background tabs.
- When pasting data, always use “PASTE VALUE” option.
- For any changes contact the admin or maintainer of the model.

The following sections will explain each tab in detail.
The purpose of the Instruction tab is to provide a quick reference guide on using the model. It consists of 3 main sections as shown above.

1. This is a quick checklist for the user to make sure all of the required data is provided.
2. A more detailed explanation of each tab and the required data.
3. This section asks for the name of the authors of the model. Remember these are grey cells which means data should be provided in them.
This tab takes generic information about the project.

1- In Part 1 the duration of the project is defined. Crossrail reports the carbon footprint every quarter. However the data is collected and calculated on a periodic basis. Therefore the following 4 items are required in this section. (All of the following must be selected from the dropdown menu provided.)
   a. The quarter that this report is generated for.
   b. Start date of the project
   c. Current period
   d. End date of the project

2- This is where the carbon emission saving from the beginning of the project up to the current period is displayed. This section is populated automatically when all of the required information provided in the model. (Remember only grey areas need to be filled by the user)

3- This is where an estimation of carbon saving up to the end of the project is displayed.

4- In this section user should write a few sentences on the progress of their work and provide details of any changes since last report.

5- These are the yearly carbon values obtained from DEFRA database. Each year the conversion factors are published on 31st of May and therefore the relevant figures must be updated by the admin of the model. Black figures are from statistical data, Red figures are estimations and green numbers are grid specific carbon intensity for companies who provide green tariffs to their customers.

At the bottom of this tab, as the project is progressed, some graphs are generated to show the trend of carbon emissions during the lifespan of the project.
This tab is mainly used for verification purposes to make sure the model is correctly set up. It also provides a breakdown of the saving percentages from each initiative.

1. This graph develops through the lifespan of the project and shows the trend of carbon footprint per period.
2. This table shows the breakdown of the initiatives and if the relevant sections are complete.
3. This column is used to specify what sections of the model are applicable to the project. If there is a type of initiative that is not used on the project, please select “Not Required” from the dropdown menu otherwise, leave it blank.
4. Looking at these columns it can be confirmed if all of the necessary fields are complete. It shows how many fields was attempted to be filled and how many of which is completed. These two should be equal.
5. All of the items on this column should be green upon completion of the model. Any red cell indicates an error in the data entry process.
Fuel Equipment tab

This tab is used to introduce fuel equipment used on site which are more efficient than the baseline or the average similar equipment on the market. In this way the amount of carbon saved as a result of using a more efficient equipment can be calculated. There are a number of columns that can be used for introducing different equipment.

NOTE: Only efficient equipment must be listed NOT all of the equipment used on site.
NOTE: Each column should be assigned for one equipment.
NOTE: If there are two identical equipment with similar working conditions, instead of using two columns, adjust the quantity of one column.

1. This area will be repeated on top of each section and is used for general information about the tab. Author and Referee names should be selected from dropdown menus. The items shown in the dropdown menu are captured form the AUTHOR section in the Report tab as was explained above.

2. This area is used to enter the working condition and characteristics of the fuel equipment. Most of the cells are populated using dropdown menus. There are 5 options for calculating the savings from the equipment. As soon as data entered for one option the rest of them will be blacked out. Start and end dates of using the equipment and the fuel type are essential for making the calculations.

3. This area shows the overall saving percentage for each equipment. This forms a part of the end of contract saving percentage.

NOTE: The “Start Period” and “End Period” refer to the first period and the last period that the specific equipment has been used on site.
Efficient site office tab is used when there are temporary site offices used on site which are more efficient than the baseline.

1. EPC rating of the site office is important for understanding the efficiency of it. The EPC certificate should be provided by the contractor. If the site office is connected to a green tariff electricity supply, it needs to be specified here.

2. There are 2 options for registering the energy consumption of the office in this section. The percentage of total electricity consumed on site is one way of doing this or alternatively, if the site is metered separately, the periodic electricity consumption of the office in kWh can be entered.
In this tab savings from efficient lighting solutions will be captured.

1- If any efficient light bulb is used on site or office then the savings from them would be captured in this section. These lights should be compared to the conventional baseline light bulbs with similar light outputs. E.g. a 6W LED light bulb with 400 lumens output is comparable to a 40W normal light bulb with the same 300 Lumens output.

2- In this section details of PIR sensors that are used during construction should be entered.

3- If there are efficient lighting towers used on site then the savings can be calculated by entering the relevant data in this section. It is very important to select the right fuel type used by the light towers.
Behaviours tab
Promoting the culture of environment friendly living results in a reduction in carbon emissions. Examples of that are encouraging people to switch off unnecessary lights, switch off computers when not in use and printing double sided. Carbon Trust Group published estimated emission factors that can be used to calculate these types of savings. The “Behaviour” tab in Crossrail carbon model is designed to capture these savings.

The following information is required for calculating the savings:

1. Start date
2. End date
3. Number of people working on site.

For example if there have been 100 people working from period 1 to period 5 and then increased to 150 people from period 6 to 8 and then reduced to 70 people from period 9 to 11 then this tab should be completed as follows:
**Other Initiatives tab**

Since each project is different in nature, the carbon model should be as flexible as possible to accommodate all of the specific requirements of the projects. Therefore, this tab is provided to enable users calculate the carbon savings from any other initiative that were not covered in the previous tabs.

1- A title for the initiative should be typed in this area.
2- Please select scope 1 or scope 2 from the dropdown menu provided here.
3- A quick reference to the background calculations for the initiative.
4- Using this dropdown menu the type of information provided is specified. It is absolutely necessary to select the right option here. Information can generally be provided in the form of equivalent carbon dioxide, fuel or electricity. For example if a specific type of fuel is selected in the next section the amount of that fuel which has been saved should be entered.
5- This section will be populated automatically based on your selection in section 4. This will specifies the unit of the numbers that should be entered in section 6. For example if it shows “kWh” it means you the number of kWh’s saved by this initiative should be recorded below.
6- This is where the savings per period should be recorded. Make sure the unit of the numbers entered in this space matches the unit shown in section 5.
**Data Entry Fuel tab**

This tab is designed to capture the actual fuel consumption on site. It is the real amount of fuel that has been purchased and used on site. The fuel consumption should be recorded on a periodic basis. Therefore to fill in this section simply enter the amount of fuel consumed in the relevant period under the relevant fuel.

**NOTE:** For entering biodiesel consumption data, it is important to specify what percentage of biodiesel is in the blend used. This can be specified as a percentage in the space provided on top of the biodiesel column. Also shown on the photo below:

![Fuel Consumption Chart]

**Data Entry Electricity tab**

In this tab the actual electricity used on site should be recorded on a periodic basis. If a green tariff for electricity is used, then the data should be entered in the second column. Make sure that the provider company is selected in the space provided on top of the “Green Tariff” column.

![Electricity Consumption Chart]

1- Normal electricity consumption record to be entered in this column
2- The provider company to be selected here
3- Electricity consumptions to be entered here

**Reference tabs:**

These 2 tabs can freely be used for providing background information. This can include calculation methods, reference to external sources etc.
Appendix A

Additional administration information
Background calculation tabs

This section includes important information on the background calculation tabs:

Actual-CO2 Calculations

This sheet calculates all of the savings based on the green tariff energy usage (if applicable) and yearly carbon factor values.

- Columns marked in green are new columns relating to green calculations.
- Columns S to AD show a breakdown of savings per period
- Column AE shows the amount of savings associated with green tariff.
- Column AK to BC are the data ready to be extracted for reporting purposes.
- The Start of contract period will automatically turn Amber
- The current period will automatically turn Yellow
- The end of contract period will automatically turn Blue
- Column AG, AH & AI are purely used for Vlookups across the whole model to return the correct yearly carbon factor from the table in the Report tab.

How to enter carbon factor for energy providers other than EDF

A) The company is already included in the report tab:

All of the carbon factors for green companies (except EDF) are now equal to normal UK average value. If you have a grid mix specific value for one of them simply change the value to the correct figure in the Report tab. Make sure you change all of the cells from column C to L. The exception is made for EDF on the basis that it has a fully certified and suited green tariff with an attributed lower carbon factor.

B) The company is not included in the table:

NOTE: Please follow this procedure very carefully and precisely, otherwise you will get wrong output caused by broken formulas. i.e. when it says “Drag” you must only drag..! DO NOT cut or copy and paste..!

Data Entry Electricity tab

1) Select cells I4:I15 and change the text colour to black to unhide the text.

2) Select the last company before “Other” and a few more cell below that. i.e. cells I8:I16

3) Drag and move your selected cells one step down to make a gap for your new company.

4) Enter the new company’s name in the gap.

5) Change the text colour back to white to hide it.
### Report tab:

1) Right Click on the left hand side row number of the row 34 and click on Insert Row

2) The company name is populated by a formula. Therefore you need to select the company name above the gap you just created and then drag the formula down to fill the gap. (It must show then new company’s name if you have done everything right. If not STOP and check everything again)

3) Fill the relevant data in the new row added to the table.

### Additional Initiatives tab:

1) In additional initiative tab select K14:V49 and change the text colour from white to black to see the carbon factor table there

2) To open up a space for the new company Select the last row of the carbon factor table plus the rest of the unhidden table below that (currently K32:V49) and drag it one row down.

### Table Data

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### Scope 1

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</table>

1 Scope 1: Generator  Scope 2: wind
2 Scope 1: Hydrogen  Scope 2: solar
3 Scope 1: coal  Scope 2: iron
4 Scope 1: solar  Scope 2: hydrogen
5 Scope 2: wind  Scope 1: Generator

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15
3) Select the row above the blank one and copy all of the formulas down to fill the last TWO rows.

4) Make sure the data is correctly shown on the table.

5) Select the whole box again and change the text colour into white.