

This guidance is provided by the SSN Secretariat to help organisations use the Carbon Footprint and Project Register (CFPR) tool. The guidance has been updated to reflect changes introduced in Version 2.00 of the tool, issued to registered users July 2018.

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## 1. Introduction

The Carbon Footprint and Project Register Tool (CFPR), developed by the Sustainable Scotland Network, Resource Efficient Scotland (Zero Waste Scotland) and partners, supports public sector organisations implement effective carbon management. The CFPR tool helps with:

- Calculating your organisation's annual carbon footprint;
- Collating and managing a list of carbon reduction projects and forecasting savings;

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- Documenting estate changes and other impacts on your footprint to create a Business as Usual forecast;
- Producing accurate and auditable outputs to help complete Public Bodies Climate Change Duties (PBCCD) annual reporting; and
- Tracking progress towards targets and providing management information to other parts of the organisation.

## 2. Using the CFPR tool

The CFPR is an Excel spreadsheet with multiple tabs and macros. The tool **works best with Excel 2010 onwards**. If using an earlier version please be aware that functionality may be compromised

On opening the file you should receive a prompt to 'enable macros'. **Macros must be enabled** for the tool to function normally. If you do not see a prompt or are unsure whether macros are already enabled, please contact [SSN](#).

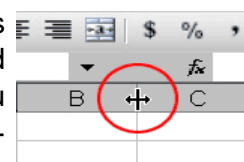
The tool requires minimal data entry. It is **password protected** to ensure functionality is maintained and should not require unlocking. If you need to unlock it (not recommended) please contact SSN. Please be aware that SSN cannot take responsibility for loss of data or corruption of functionality once the tool is unlocked.

Tables and charts in the '**Outputs**' tab can be edited for use in carbon management plans and for populating questions in PBCCD reports, Part 3 on emissions and projects.

The tool is **updated annually with the most recent carbon emission factors** published by the UK government. Changes made since earlier versions include improving alignment with data input needs for PBCCD reports and taking account of the reporting year type – annual, calendar or financial within relevant auto-calculations.

Avoid copying and pasting data from previous versions of the tool to prevent corrupting data validation and other functionalities. **Manual data entry is advised** to retain tool integrity, however, copying and pasting should not be a problem provided cells with drop-down lists or numeric data are avoided.

If a row of hashtags (#####) appears within a cell, the column width is too narrow. Adjust column width by moving the cursor to the right-hand side of the affected column until it changes (see figure to the right). You can then either click-and-drag the column to the desired width or double-click and the column will auto adjust.



It is good practice to **save copies regularly** to serve as back-up and as an audit trail. Click 'HELP' at the top left-hand corner of the worksheet to go to the guidance ('READ THIS FIRST') page.

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### 3. Key to colour coding

	Data entry (only numeric data to be entered in these cells)
	Descriptive text only
	Calculations/formulae output
	Columns that must be completed for calculations to work

### 4. Populating the tool

#### 4.1 Historic CFs

Select the year type that applies to the organisation (Cell B6). Options are financial, academic or calendar. Historic carbon footprint data (Table 1), historic cost information (Table 2) and historic emissions split by scope (Table 3) are entered here for all years prior to the current carbon footprint year.

#### IMPORTANT

- Ensure that the rows displaying 'Total' are completed.
- Table 3 must be completed to enable population of the "Outputs for PBDR" tab.
- Ensure total emissions for Table 1 and Table 3 are consistent.

Values should be calculated prior to using the tool, but this is not critical.

	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Type of Source - Footprint	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)
Stationary						
Waste						
Transport						
<b>TOTAL</b>	-	-	-	-	-	-

	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Type of Source - Costs	Cost (£)	Cost (£)	Cost (£)	Cost (£)	Cost (£)	Cost (£)
Stationary						
Waste						
Transport						
<b>TOTAL</b>	-	-	-	-	-	-

	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10
Scopes	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)	Carbon Footprint (tCO <sub>2</sub> e)
Scope 1						
Scope 2						
Scope 3						
<b>TOTAL</b>	-	-	-	-	-	-

#### 4.2 Current & Future CFs

Enter data in this tab for all emission sources falling within the corporate boundary for the current carbon footprint year to generate tables and graphs in the 'Outputs' tab. Ideally, each

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site/operation should have an individual row for each emission source. Columns B to L enable data input for each site/operation and filters for analysis by site/operation.

Enter electricity consumption for each site in the 'Current and Future CF' tab. Select "scope 2&3" to automatically assign a small portion to scope 3 and the majority to scope 2. Use the 'Outputs for PBDR' tab to see how this should be entered when completing PBCCD report online.

Due to different emission conversion factors a separate row is needed for water supply and for water treatment.

Complete a row for each building/operation and emission source by entering appropriate info in all 'Data Entry' cells ONLY. Some cells require making a selection from a dropdown lists.

### KEY DATA ENTRY CELLS

**Name and Date** – complete for future reference and version control.

**Existing building/operation** – determines the carbon footprint and cost in the current reporting (and future) years.

**Future new build/operation** - select the first year that proposed/planned building/operation is expected to be fully functional. Select 'N/a' if the building/operation already exists.

**Subject to CRC EES?** - select 'Yes' if the emissions associated with the building are subject to the Carbon Reduction Commitment Energy Efficiency Scheme, otherwise enter 'No'. Selecting 'Yes' will add the cost of CRC EES carbon to the cost calculations. If this cell is left blank, the tool assumes the emission sources are not subject to CRC.

**Emission Type** - select the building/operation emission type. Ensure that data entered under **Amount** (see below) is in the correct units for each emission type (e.g. grid electricity is in kWh). Use the 'Conversion Factors' tab to convert data to correct units.

Report water treatment as 95% of water supply if only consumption data is available.

Select 'Renewable heat purchased' and 'Renewable electricity purchased' only when buying from a third party (i.e. not from the grid). See below for on-site renewable energy generation.

**Scope** - enter the related emission scope for the selected emission type. There are four options (1, 2, 3 and 2&3). Option '2&3' should only be selected for 'Grid Electricity'.

**Amount** - enter figure in units corresponding to the units for the selected source and emission type. This figure is used to calculate the current (and future) carbon footprint and costs where applicable.

**Year of Change** - if the building/operation is due to change (e.g. - reduced occupancy, bigger fleet) select the first full year that changes will apply. Ensure that ALL estate changes are entered here (not in the 'Project List' tab).

**% Change (at Year of Change)** - select the percentage increase or decrease (from dropdown list) which will apply to the figure entered under Amount above. This percentage change will apply for the 'Year of Change' selected and for future years.

**Final Year of Full Operation** - enter the final full year before the asset/operation ceases to be part of the business (the associated future carbon footprint are no longer relevant)

### Existing owned/operated renewables table

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This part of the tab is for organisations currently generating renewable energy on-site.

**Type of Renewable Technology** – select accordingly from the drop-down list. Enter any renewables currently owned or operated by the organisation in the second table (see below). Select the 'Type of Renewable Technology' from the drop-down list.

**IMPORTANT:** separate entries are required for electricity and heat outputs from renewable generation. See example 1 in the Appendix for further information.

**The next section is split into 'Inputs' and 'Outputs'.**

### Inputs

**Emission Type** – select the energy input/feedstock (such as biomass) from the drop-down list. Enter the related Scope and Fuel input amount in kWh. If no feedstock is required (i.e. wind turbines) select '**renewable electricity - no input**'.

### Outputs

Enter the renewable output (electricity or heat) consumed in kWh and the amount exported in kWh. The total output generated will be auto-calculated.

Enter any income (£/pa) generated from the export.

Select whether the renewable heat incentive (RHI) or feed in tariff (FIT) applies from the drop-down list and enter the income (£/pa). The associated tCO<sub>2</sub>e and cost of renewable energy is auto-calculated. If changes are proposed to the installation (e.g. increase/decrease generation capacity) complete the 'Year of Change', '% Change' and 'Final Year of Full Operation' using the drop-down lists, as explained previously.

For exported electricity and heat, the tool estimates emissions savings to be 'netted off' from the gross carbon footprint. The methodology is as follows;

**For electricity** - the total amount exported to the grid (kWh) is converted into carbon emissions by multiplying by the average electricity grid factor (not including T&D losses)

**Example:** Company A exports 300,000 kWh of renewable generated electricity back to the grid and receives £20,000 in FiT. This is equivalent to  $300,000 * [0.375/1000] = 112 \text{ tCO}_2\text{e}$ , where 0.375 is the average electricity grid factor (generation only – not including T&D). Company A's carbon footprint is netted off (reduced by) 112 tCO<sub>2</sub>e and energy costs are reduced by £20,000.

**For heat** - the total amount exported (kWh) is converted into carbon emissions by assuming a system efficiency factor (85%) multiplied by the emission factor for natural gas.

**Example:** Company B exports 100,000 kWh of renewable generated heat to another organisation and receives £10,000 through the RHI scheme. This is equivalent to  $[100,000/85\%] * [0.184/1000] = 21.6 \text{ tCO}_2\text{e}$ , where 0.184 is the emission factor for natural gas and 85% is the assumed efficiency of the renewable heat system.

Company B's carbon footprint is netted off (reduced by) 21.6 tCO<sub>2</sub>e and energy costs are reduced by £10,000.

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Data validation auto-checks in the tool for renewable inputs and outputs according to different emission sources are shown in the table below.

Emission Source	Input validation	Output validation
Biomass - wood chips (kWh)	Must be greater than zero	Must be less than input value (to account for inefficiencies in the system)
Biomass - wood pellets (kWh)		
Biogas (kWh)		
Landfill gas (kWh)		
Heat Pump - grid electricity input (kWh)	Must be greater than zero	No validation restrictions
Renewable heat - no input (kWh)	Must be zero	
Renewable electricity - no input (kWh)		

### Tips and suggestions

- To add extra rows, click 'Add row(s)...' and select the number of rows to add from the dropdown menu. It may take a few moments to complete, especially if adding several rows at once.
- An empty cell in a row can impact on calculations/formulae and may return #VALUE or similar error message.
- Existing data (from previous versions of the tool) can be copied and pasted into the live version to save time, but only into pale blue cells that do NOT contain drop down menus. Always use the 'paste special – values only' option.
- The 'User Notes' cell at the end of each row is for entering reference information.
- Hover the mouse over any heading in row 5 to show an explanation of what information is required.
- Row 6 contains filters for carrying out more detailed data analysis.

The above points apply to the **Project List** and **Project List (Renewables)** tabs also (see 4.3 and 4.4 below)

### 4.3 Project List

This tab is for entering data on emission reduction projects (excluding renewables) and generates tables and graphs in the 'Outputs' tab.

Complete a row for each project by entering appropriate information in all 'Data Entry' cells ONLY. Some cells have dropdown menus.

#### KEY CELLS

**Name and date** – complete for future reference and version control.

**Commissioning Year** – automatically establishes the first full year (always the subsequent year) of CO<sub>2</sub>e projects savings.

**Capital Costs** - calculates the simple payback and carbon cost effectiveness (further along in the row).

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**Project Status** - if a project is marked as 'Identified/More Info Req', 'Abandoned' or 'Superseded' associated savings are not calculated. Also, savings from completed projects are assumed to be captured in annual carbon footprint calculations unless stated otherwise (see **Annual savings for this project** below for further info).

**Estimate Confidence** - for information only. Can be used to record accuracy of capital costs, savings etc.

**Subject to CRC EES?** - select 'Yes' if the emissions associated with the building are subject to the Carbon Reduction Commitment Energy Efficiency Scheme, otherwise enter 'No'. Selecting 'Yes' will add CRC EES savings to the calculations. If this cell is left blank, the tool assumes emission are not subject to CRC.

**Type of Emission Saving** - select the emission type for the project. Data **must be in the same units** as for the selected emission type (e.g. grid electricity is in kWh). Use the factors in the 'Conversion Factors' tab to convert.

Where a project has multiple emission savings (e.g. a BEMs installation saving grid electricity and natural gas) enter each emission saving in a separate row. This also applies to projects with emissions savings and losses - e.g. combined heat and power plant (CHP) typically reduces grid electricity but increases natural gas consumption.

'Renewable heat purchased' and 'Renewable elec purchased' should only be selected when planning to buy from a third party (i.e. off-grid). Refer to the 'Project List (Renewables)' tab for planned/proposed renewables projects.

**Amount of Savings** - enter expected annual savings (in relevant units) when the project is fully operational.

Some renewable energy technologies require fossil fuel inputs, for example a gas-fired CHP consumes natural gas! Select emission type and source from the drop-down list and enter the related emission increase amount in relevant units.

**Annual savings for this project already captured in most recent carbon footprint?** - it is important to avoid double-counting by ensuring that project savings which reduce the most recent carbon footprint are not included in future forecasts also. By selecting 'yes', emissions and cost savings are excluded from future footprint year totals.

**Simple Payback** - automatic calculation of the capital costs divided by the first full year of cost savings plus operating and maintenance savings.

**Carbon Cost Effectiveness** - automatic calculation of the capital costs divided by the first full year of carbon savings. The lower the value, the more carbon cost effective the project.

### 4.4 Project List (Renewables)

This tab is for entering information on renewable energy generation projects and generates tables and graphs in the 'Outputs' tab.

Complete a row for each renewables project by entering appropriate info into all 'Data Entry' cells ONLY. Some cells require selecting from dropdown menus.

#### KEY DATA ENTRY CELLS

The first 14 cells are the same as in the previous tab ('Project List') and data entry is similar. The next section is split into three parts: 'Inputs', 'Outputs' and 'Savings from Displaced Fuels'.



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**Inputs:** Where the technology requires an energy input (such as biomass) select the correct 'Emission Type' from the drop-down list (where there is no fuel/feedstock, such as wind turbines, select 'renewable electricity - no input'). Select the emission scope (for emission type) and enter the related Input amount in kWh.

**Outputs:** Enter the renewable output amount (this can be electricity or heat) consumed by the organisation in kWh. Enter the amount exported in kWh. The tool will auto-calculate the total output generated. Enter any income (£/pa) generated from the export. Select whether the renewable technology attracts financial support in the form of RHI or FIT, from the drop-down menu. Enter the financial income (£/pa).

Data validation is in-built for renewable inputs and outputs to ensure that entries are correct and valid for this section. The table below shows validation according to emission source.

Emission Source	Input validation	Output validation
<b>Biomass - wood chips (kWh)</b>	Must be greater than zero	Must be less than input value (to account for inefficiencies in the system)
<b>Biomass - wood pellets (kWh)</b>		
<b>Biogas (kWh)</b>		
<b>Landfill gas (kWh)</b>		
<b>Heat Pump - grid electricity input (kWh)</b>	Must be greater than zero	No validation restrictions
<b>Renewable heat - no input (kWh)</b>	Must be zero	
<b>Renewable electricity - no input (kWh)</b>		

### Savings from Displaced Fuels

This section estimates emission savings resulting from fuel displaced as a result of proposed renewable energy generation, for example by a solar PV panel displacing grid electricity. Select the type of emission and source from the drop-down lists. Enter the amount of Savings for the chosen type of emission saving (in the relevant units).

**IMPORTANT:** Where the technology is renewable CHP, two separate line entries are required for electricity and for heat outputs. See example 2 in the Appendix.

## 4.5 Emission factors

This tab provides all current and future carbon emission factors based on [UK conversion factors](#). Factors for future years are pre-set set but can be changed. All factors are updated annually by SSN.

Enter the name and date of completion for future reference and version control.

This tab is locked, apart from 5 rows (in each section) which allow entry of additional fuel source, transport and waste stream descriptions, units and emission factors (in cases where the existing list is not sufficient). The tool will automatically update linked fields when data is entered. parts of the tool. If user-defined factors are added here, you must also remember to add equivalent cost information within the "Costs" tab.



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### 4.6 Costs

This tab contains all current and future unit costs. Future costs provided are indicative. This tab is unlocked to enable regular checks and updates.

Enter the name and date of completion for future reference and version control.

Where additional fuel source, transport and waste streams have been added in the Emission Factor tab, be sure to also add corresponding cost data for the additional factors.

### 4.7 Outputs

This tab automatically generates a series of data in the form of tables, pie charts and line/bar charts which can be used in your CMP.

There is a summary table provided upfront which lists the various Tables/Pie charts/Bar charts and allows hyperlinks to these below.

Click on the relevant item and 'copy and paste' into your CMP; you can make any changes as required but take care not to overwrite any formulae.

### 4.8 Outputs for PBCCD reporting

This tab automatically generates a series of tables that can be used to assist with completing questions 3a, 3b and 3c of annual reports. The tables in this worksheet are;

- Split by scope (historic and current) – to help populate Q3a of the PBCCD report
- Split by Emission Type for reporting year – to help populate Q3b of the PBCCD report
- Generation, consumption and export of renewable energy - to help populate Q3c of the PBCCD report.

**IMPORTANT:** Historic data in table a) will only show if table 3 is completed within the "Historic CFs" tab. All electricity generation sources and natural gas sources are combined here. All other emission sources are shown individually, as entered within the 'Current & Future CFs' tab.

### 4.9 Target Setting

This tab is for assessing the impact of business as usual (BAU) and projects on carbon management targets.

There are two options available depending on the stage of the CMP;

OPTION 1: generates a target figure based on achieving all project savings where there is no target (or a new target is being set).

OPTION 2: helps establish if an existing target against a baseline year will be met.

### 4.10 Conversion Factors

Provides common unit conversions to support correct entry of Amounts in 'Current & Future CFs' and Project List/'Project List (Renewables)' tabs.

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### 5. Appendix: Renewable Energy Worked Examples

#### Example 1 'Current & Future CFs' Tab Wood chip biomass boiler and biogas CHP

Category	Operation Name	Type of Renewable Technology	Renewable Inputs				Renewable Outputs						Most recent year		Future Changes		
			Source	Emission Type	Scope	Fuel input (kWh)	Output consumed by organisation (kWh)	Output exported by organisation (kWh)	Total Output (kWh)	Income from export (£)	Financial support	Income from Financial Support (£)	2016/17		Year of Change	% Change (at Year of Change)	Final Year of Full Operation
													Carbon Footprint (tCO <sub>2</sub> e)	Cost (£)			
BIO123	Building 1	Biomass	Stationary	Biomass - wood chips (kWh)	1	1,000,000	600,000	200,000	800,000	5,000	RHI	11,500	13	1,350	2017/18	50%	N/a
BIOGAS CHP123	Building 2	Biogas CHP - Elec	Stationary	Biogas (kWh)	1	40,000	30,000	-	30,000	1,000	RHI	11,500	10	2,000	N/a	N/a	N/a
BIOGAS CHP123	Building 2	Biogas CHP - Heat	Stationary	Biogas (kWh)	1	60,000	45,000	-	45,000				9	900	N/a	N/a	N/a

In this example BIO123 is the unique category/identifier for Biomass as the type of renewable technology.

**Renewable Inputs** - if 'Category' is completed 'Source' automatically displays 'Stationary'. Next, select 'Emission Type', in this case, 'Biomass - wood chips (kWh)'. Choose the **scope** from the dropdown and enter the **Fuel Input** (kWh). If the emission type is 'Renewable Heat - no input' or 'Renewable Electricity - no input' (e.g. for a wind turbine), then the 'Fuel Input' amount is "0".

**Renewable Outputs** - enter the total **output** consumed (in kWh) and any **output** (in kWh) exported to a third-party. The combined **output** (which is automatically calculated) must not exceed the input (except for 'Renewable Heat - no input', 'Renewable Electricity - no input' and 'Heat Pump - grid electricity input'), or an error message will advise that the input or **output(s)** need to be revised. Enter any revenue received from export of **outputs** to a third party. If the renewable technology attracts Renewable Heat Incentive (RHI) or Feed in Tariffs (FiTs), then select the 'Financial Support' type from the dropdown and enter the annual income (£). The tool auto-calculates the carbon footprint and cost for the current year. Enter any anticipated changes to the renewable technology (e.g. increase in capacity by 50%) by selecting from the drop-down list, stating the 'Year of Change', '% Change' and 'Final Year of Full Operation' where relevant.

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Where biogas CHP or landfill Gas CHP is installed two separate rows are required. In the above example, for biogas CHP, select 'Biogas' as Input for the 'Emission Type' for both rows (see second and third rows). Select 'Biogas (kWh)' as the input under 'Emission Type'. The amount of fuel input entered in each row should be proportionate and higher than the output (to account for efficiency losses). For example, if the total biogas fuel input is 100,000kWh, enter 40,000kWh fuel input for electricity AND enter 60,000kWh fuel input for heat. The outputs should then be 30,000kWh (electricity) and 40,000kWh (Heat) which accounts for efficiency losses.

### Example 2: Project List (Renewables)' Tab Biomass boiler + biogas CHP

Inputs			Outputs						Savings from Displaced Fuels				Most recent year	
Type of Renewable Technology	Emission Type	Fuel input (kWh)	Output consumed by organisation (kWh)	Output exported by organisation (kWh)	Total Output (kWh)	Income from export (£)	Financial support	Income from Financial Support (£)	Type of emission saving Source	Type of Emission Saving	Amount of Savings (MUST BE in units stated in Type of Emission Saving)	Annual Savings for this project already captured in most recent Carbon Footprint?	Simple Payback (Years)	Carbon Cost Effectiveness (£/tCO2e)
Biomass	Biomass - woodchips (kWh)	500,000	300,000	100,000	400,000	2,500	RHI	13,280	Stationary	Natural Gas (kWh)	500,000	No	3.0	989
Biogas CHP - Elec	Biogas (kWh)	40,000	30,000		30,000	2,500	RHI	13,280	Stationary	Grid Electricity (kWh)	40,000	No	2.2	493
Biogas CHP - Heat	Biogas (kWh)	60,000	40,000		40,000	2,500	RHI	13,280	Stationary	Natural Gas (kWh)	60,000	No	1.2	189

This example is for a biomass boiler project. The 'Emission Type' is 'Biomass - woodchips (kWh)'. The annual 'Fuel Input' is 500,000 (kWh). Where the emission type is either 'Renewable Heat - no input' or 'Renewable Electricity - no input' (e.g. for a wind turbine), the 'Fuel Input' is "0".

**Renewable outputs** - output **consumed** (300,000 kWh) and output **exported** (100,000 kWh) is auto-calculated as 400,000 kWh. If the combined **output** (auto-calculated) exceeds the input (except for 'Renewable Heat - no input', 'Renewable Electricity - no input' and 'Heat Pump - grid electricity input'), otherwise an error message will appear requiring revision of the data.

Enter revenue from the sale of any **outputs** exported to a third party. If the renewable technology attracts any renewable heat incentive (RHI) or feed in tariffs (FiTs), then select the 'Financial Support' type from the dropdown and enter annual income (£) in the resulting cell. The final section relates to

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**savings from displaced fuels.** This is fuel replaced from operation of the renewable technology. Select 'Type of Emission Saving Source' and 'Type of Emission Saving' from the dropdowns. Enter annual amount saved (or displaced) in relevant units. In the above example, the new biomass boiler is replacing natural gas fired boilers, saving 550,000kWh of natural gas per annum.

Finally, to avoid double counting, confirm if the annual savings have already been captured in the most recent carbon footprint. The tool auto-calculates the simple payback, carbon cost effectiveness and the carbon and cost savings for operational years.

Where biogas CHP or landfill Gas CHP is installed, then two separate rows will be required. E.g. for biogas CHP, select 'Biogas' as the Input for the 'Emission Type' for both rows (see second and third rows in table above).

In this case, for both rows, select 'Biogas (kWh)' as the Input under 'Emission Type'. The amount of fuel input entered in each row should be proportionate and higher (to account for efficiency losses) than the output. E.g. if the total biogas fuel input is 100,000kWh, enter 40,000kWh fuel input for electricity AND enter 60,000kWh fuel input for heat. The outputs should then be 30,000kWh (electricity) and 40,000kWh (heat) which accounts for efficiency losses.

For 'Savings from Displaced Fuel', select grid electricity for the electricity output row. The amount should be the total amount of grid electricity which is avoided (i.e. the same amount of CHP electricity which is being consumed by the organisation). For the heat output row, select e.g. gas and then enter the amount of gas displaced which would otherwise have provided the heat output (now supplied by the CHP)