
User Guide

Future Homes Carbon Assessment Tool v3.0

July 2026



Acknowledgements

Thanks to the many people who contributed their time to join the various working groups set up to identify the background data sources and tables needed to feed into the tool and the assumptions and conventions for new homes.

See the [Embodied and Whole Life Carbon project page](#) for a list of those involved.

Supported by



WSP were appointed by Future Homes Hub to develop the Future Homes Carbon Assessment Tool. Thanks to all the team at WSP.

Disclaimer

The Future Homes Carbon Assessment Tool is provided 'as is', without warranty of any kind, express or implied, including but not limited to any warranties of merchantability, fitness for a particular purpose and non-infringement. In no event shall the authors or copyright holders be liable for any claim, damages or other liability, whether in an action of contract, tort or otherwise, arising from, out of or in connection with the tool or the use or other dealings in the tool.

The Future Homes Carbon Assessment Tool relies on users inputting project information, including high-level building geometry inputs and selecting pre-defined build-ups for one or more elements. Pre-defined build-ups and associated material quantities within the tool are based on typical indicative build-ups and may not reflect the exact constructions and quantities used in your project. Users should therefore carefully consider and take responsibility for how they apply the tool.

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1 Introduction

The *Future Homes Carbon Assessment Tool* is a web browser-based application, which enables the upfront, life cycle embodied and whole life carbon of residential buildings and development sites to be calculated – e.g. a detached house, row of terraces or apartment building.

Users input project information, including building geometry inputs and operational energy consumption, and select one or more pre-defined or user-defined buildups for each element.

The Tool's calculation engine follows the [Future Homes Hub Whole Life Carbon Conventions for New Homes – June 2026](#) (WLC Conventions), which is aligned with *RICS Whole Life Carbon Assessment for the Built Environment 2nd Edition* (RICS PS).

The purpose of this document is to provide users with a How-To guide to using the Tool, whilst outlining the scope and assumptions underlying the calculation approach.

How does the Tool help homebuilders?

The Tool's key aim is to help homebuilders **assess their carbon impact of their design and specification options in a quick and consistent way** – reducing the barrier to embodied and whole life carbon assessment and savings, particularly for those who may be just starting their carbon journey.

The Tool;

- Builds into the front end an **elemental approach** to estimating quantities
- Provides a library of **typical buildups** for fabric and site elements
- References the **WLC Conventions Default Material and Carbon Dataset** for generic impact factors of materials used in these typical buildups
- Provides **component benchmark** figures for embodied carbon impacts associated with more complicated elements such as kitchens, bathrooms and mechanical and electrical equipment, which are difficult to quantify at early stages.
- Provides transparency and consistency of data – by outputting user inputs, material quantities, and disaggregated line-by-line data.

2 Scope

The Tool's elemental approach is well-suited to low-rise houses or apartment blocks (up to 4 storeys). For medium- and high-rise buildings, which tend to be more bespoke, commercial tools are better suited. **Table 1** shows building element and life-cycle stage scopes in relation to the WLC Conventions.

Table 1: Lifecycle Stage and Building Element Scope Summary

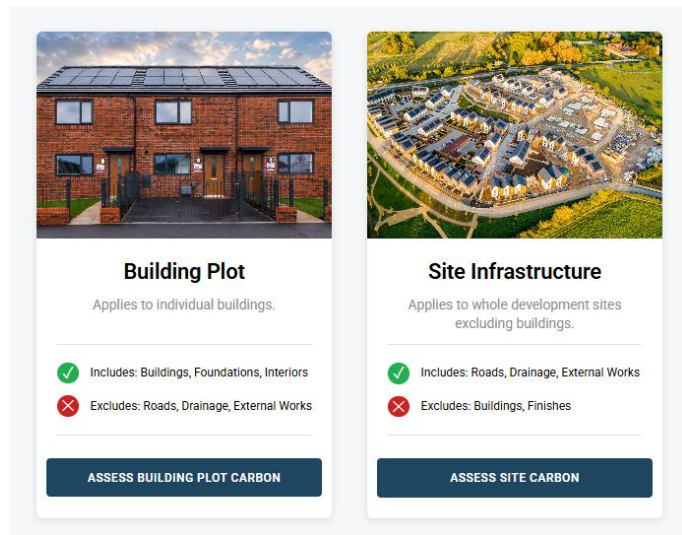
		Tool v3 Building Plot	Tool v3 Site Infrastructure	WLC Conventions for New Homes – Project-level whole life carbon
Life Cycle Stage	Biogenic Carbon	✓	✓	✓
	[A0] Pre-construction			✓
	[A1-A3] Product	✓	✓	✓
	[A4] Transport	✓	✓	✓
	[A5] Construction and Installation ¹	✓	✓	✓
	[B1-B5] Embodied In-use ²	✓	✓	✓
	[B6] Operational Energy	✓	✓	✓
	[B7] Operational Water	✓	✓	✓
	[B8] User Carbon			-
	[C1-C4] End of Life	✓	✓	✓
	[D] Benefits and loads beyond the system boundary ³			Reported Separately
Building Element	0.1 Facilitating Works ⁴		✓	✓
	1 Substructure	✓		✓
	2 Superstructure	✓		✓
	3 Finishes	✓		✓
	4 Fixed Furniture and Equipment (FF&E)	✓		✓
	5 Mechanical, Electrical and Plumbing (MEP) Services	✓		✓
	6 Pre-fabricated buildings and units ⁵			✓
	7 Works to existing buildings			✓
	8 External works		✓	✓

- [A5] Construction and Installation includes submodules A5.1-A5.3 only. A5.4 Worker Transport is excluded from both tool and Conventions scope.
- [B5] retrofit/refurbishment/planned changes is excluded from both tool and Conventions scope.
- Module [D] is excluded from the scope of Tool
- Pre-construction demolition is accounted for at site-level.
- At detailed design stage onwards, MMC (off-site) prefabricated elements should be broken downs into their constituent building elements and reported within the relevant elements at dwelling-level.

3 Accessing the tool and supporting resources

The **Future Homes Carbon Assessment Tool** is available in a dedicated site –

www.carboncalculator.org.uk



The overarching scope, factors, assumptions and reporting requirements are detailed in the **Whole Life Carbon Conventions for New Homes**. [Click here to download the WLC Conventions and access further guidance](#), including:

- **Pre-calculators for regulated and unregulated energy** to help with processing and entering data into the tool
- **Default Material and Carbon** dataset
- More detail on how **component benchmarks** have been derived

Along with this guide, further resources are available from the [Future Homes Carbon Assessment Tool page on the Knowledge Centre](#), including:

- **User-Defined Material and Buildup Entry** sheet
- **Typical Buildups (plot and site)** dataset

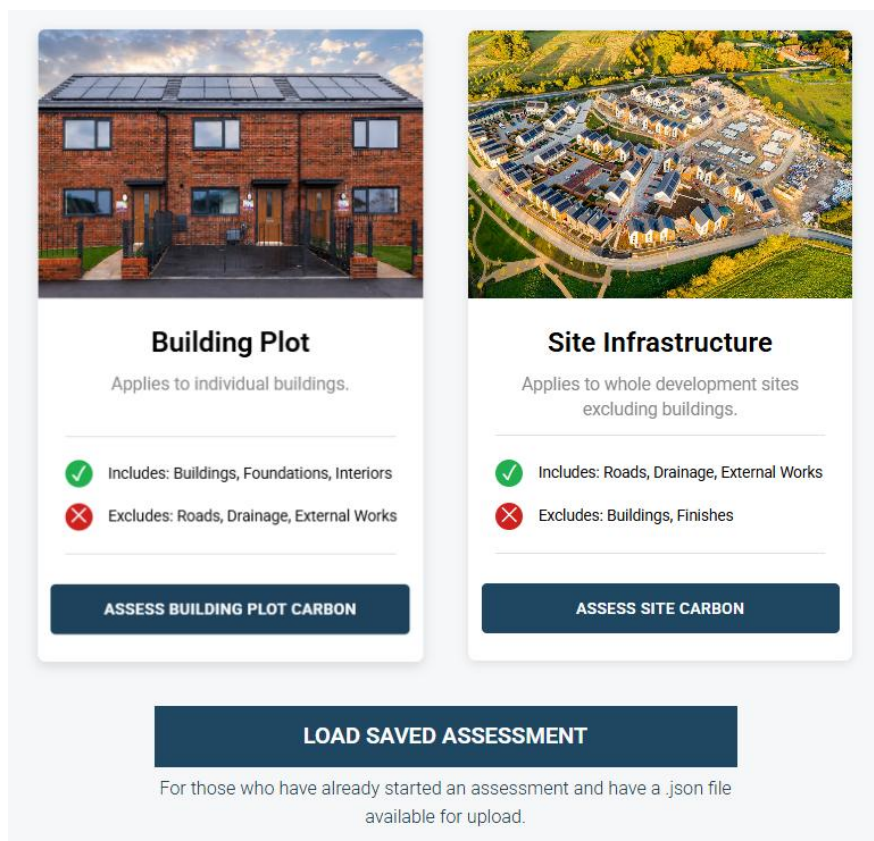
For technical support please contact the Hub team – [email us](#).

4 Step-by-Step Tool User Guide

The Home Page

Landing on the home page, you have three choices:

1. Begin a new **Building Plot** assessment
2. Begin a new **Site Infrastructure** assessment
3. Load a saved assessment

The screenshot shows the home page of the Future Homes Carbon Assessment Tool. It features two main assessment options: "Building Plot" and "Site Infrastructure". Each option includes a representative image, a title, a description of its scope, a list of included and excluded elements with checkmarks and crosses, and a button to start the assessment. A third option, "Load Saved Assessment", is located below these two, with a button and a brief instruction.

Building Plot
Applies to individual buildings.

- ✓ Includes: Buildings, Foundations, Interiors
- ✗ Excludes: Roads, Drainage, External Works

ASSESS BUILDING PLOT CARBON

Site Infrastructure
Applies to whole development sites excluding buildings.

- ✓ Includes: Roads, Drainage, External Works
- ✗ Excludes: Buildings, Finishes

ASSESS SITE CARBON

LOAD SAVED ASSESSMENT
For those who have already started an assessment and have a .json file available for upload.

Once you proceed with either new assessment pathway, you will see the Project Details screen.

Finding your way around

The **NAVIGATION BAR** on the left-hand side allows you to jump to any specific section in the active assessment.

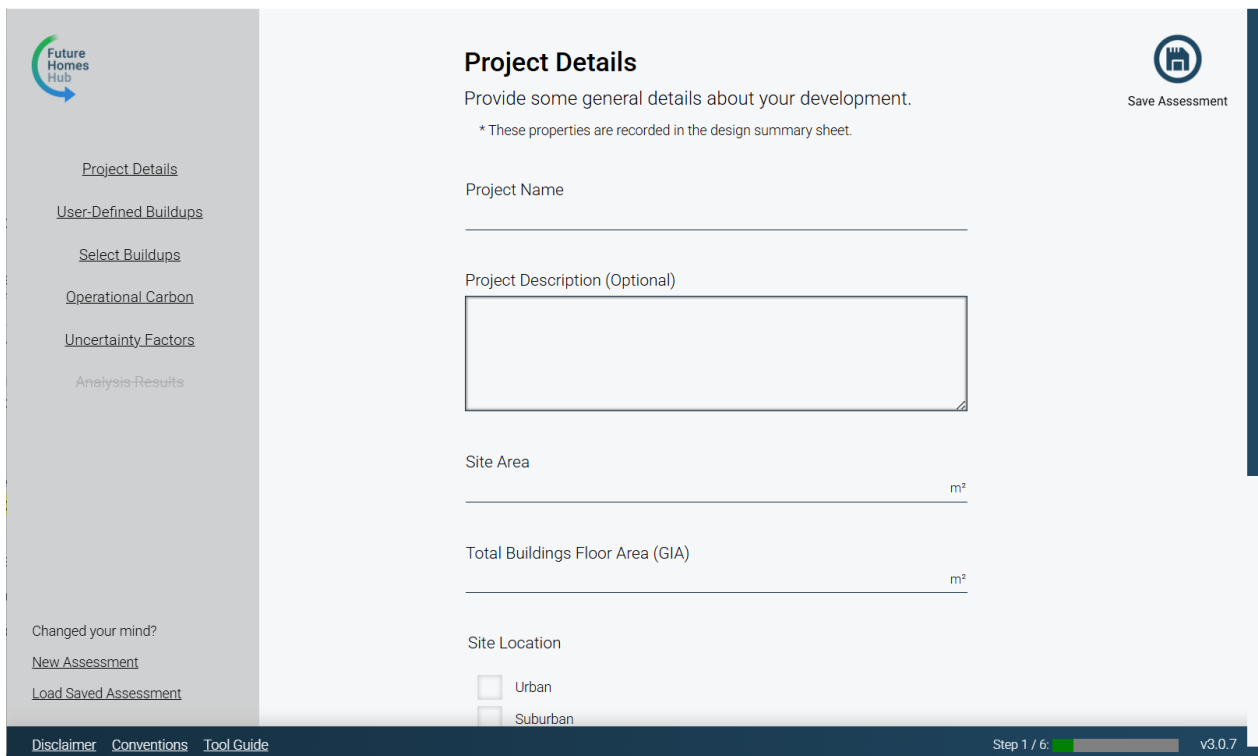
At any time you can '**SAVE ASSESSMENT**' by clicking the icon in the top-right corner. This will save the active project as a **.JSON** file, to be reloaded in a future session. By default, the save name will be your project name, and each additional save file will iterate with a following number (e.g. 'my project (1).json'). You can rename the files once they have downloaded.

At any time, you can choose to start a new assessment or load a saved assessment using the '**CHANGED YOUR MIND?**' links at the bottom of the Nav bar. Note that any information entered since the last save will be lost.

In the bottom bar you can find further helpful links, and on the right-hand side is the tool version number. Please note that **Version 3 is not backwards compatible** with Version 2, meaning that older save files cannot be loaded directly and would have to be recreated from input summary info.

There is a light and a dark theme for the user interface, which follow system settings.

The blue '**NEXT**' button at the bottom of each page moves you to the next section.

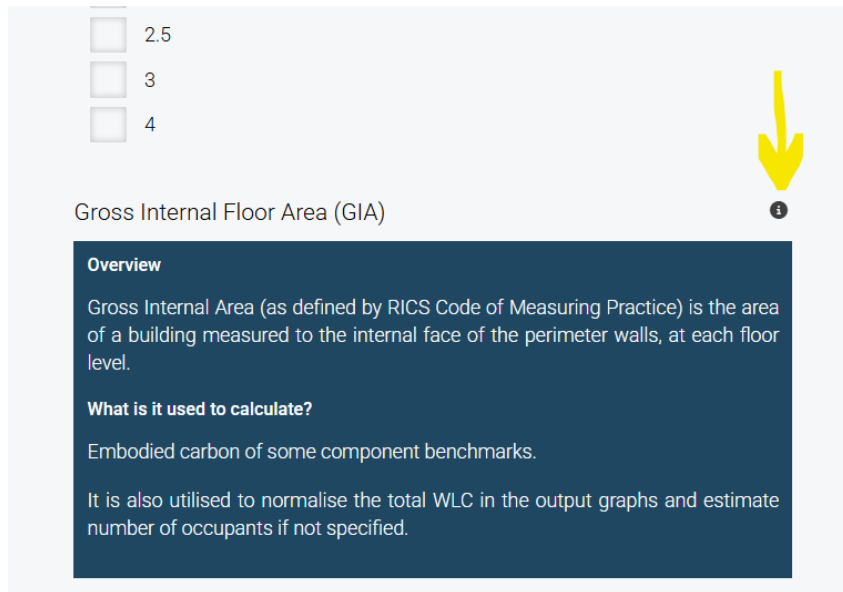


The screenshot shows the 'Project Details' section of the Future Homes Carbon Assessment Tool v3. The interface includes a left-hand navigation bar with links to 'Project Details', 'User-Defined Buildings', 'Select Buildings', 'Operational Carbon', 'Uncertainty Factors', and 'Analysis Results'. The main content area is titled 'Project Details' and contains a form for providing general details about the development. The form includes fields for 'Project Name', 'Project Description (Optional)', 'Site Area' (in m²), 'Total Buildings Floor Area (GIA)' (in m²), and 'Site Location' (with radio buttons for 'Urban' and 'Suburban'). A 'Save Assessment' icon is located in the top right corner. The bottom of the page features a dark blue footer with links to 'Disclaimer', 'Conventions', and 'Tool Guide', a progress indicator showing 'Step 1 / 6', and the version number 'v3.0.7'.

Project details

Depending on the assessment pathway (plot or site), the information required is different.

If you require additional guidance for a specific input, hover over the **i icon** to reveal additional information.



2.5
3
4

Gross Internal Floor Area (GIA) **i**

Overview

Gross Internal Area (as defined by RICS Code of Measuring Practice) is the area of a building measured to the internal face of the perimeter walls, at each floor level.

What is it used to calculate?

Embodied carbon of some component benchmarks.

It is also utilised to normalise the total WLC in the output graphs and estimate number of occupants if not specified.

There are no mandatory fields, but some later parts of the assessment rely on information entered here. For a full description of each entry field, including measurement conventions and what they are used to calculate, see [Appendix A – WLC Tool v3 User Inputs](#).

Please note that leaving inputs blank will lead to incomplete WLC calculations.

User-defined buildups

(Optionally) Add your own buildups by uploading your completed version of the **User-Defined Material and Buildup Entry** Excel spreadsheet.

Add Your Own Buildups

Optionally upload your **completed** spreadsheet to augment the default FHH buildups collection.

Click [here](#) to download the spreadsheet template.

UPLOAD FILE

No file uploaded.

BACK

NEXT

See the [Future Homes Carbon Assessment Tool page on the Knowledge Centre](#) to download the blank template.

Once file has been successfully uploaded, the filename of the uploaded file will show underneath the button. Click **NEXT** to continue. For more information on how to use the spreadsheet – see [User-Defined Material and Buildup Entry sheet](#).

UPLOAD FILE

Material-and-Build-Up-Entry-v2.0 (User Guide Example).xlsx

Alternatively, should you wish to use FHH default buildups only, simply click **Next** to skip.

Please note that **Version 3 is not backwards compatible** with Version 2, meaning that older user-defined spreadsheets (v1.3) cannot be loaded directly and user-defined material and buildup data should be transferred into a v2.0 or later spreadsheet.

For support please contact the Hub team – see [2 Accessing the tool and supporting resources](#).

Select buildups

Select your chosen buildups by using the dropdown boxes under each element. Each buildup in the dropdown has a name, description and a buildup reference, e.g. FHH.BU.3.1. Any user-defined buildups for that element will be shown at the bottom of the list, highlighted in green.

Against each buildup, **enter the relevant buildup quantity** (the units, which are defined separately for each buildup, will be shown once the buildup is selected).

You may add additional buildups for each element if needed – use the green **'ADD BUILDUP'** button.

If you want to remove a buildup from the model, click the **'BIN'** icon to the left of the buildup name.

Select Buildups

Choose the appropriate buildup options for each building element.

* For further details of buildup units and measurement conventions, please refer to the tool user guide, available [here](#).

Foundations

	Strip, 450mm wide	▼	8	linear m (load-bearing walls)
	Strip, 600mm wide	▼	42	linear m (load-bearing walls)

[+ ADD BUILDUP](#)

External Wall - Facade

Select or search buildup...

External wall facade: 18mm dry dash render; 100mm dense aggregate blockwork

External weatherboarding on blockwork

FHH.BU.8.3

External wall facade. 18mm timber weatherboarding; timber battens, 100mm lightweight aggregate blockwork

Rendered board

FHH.BU.8.4

External wall facade. 18mm dry dash render; 12mm fibre cement board

External insulation, rendered

FHH.BU.8.5

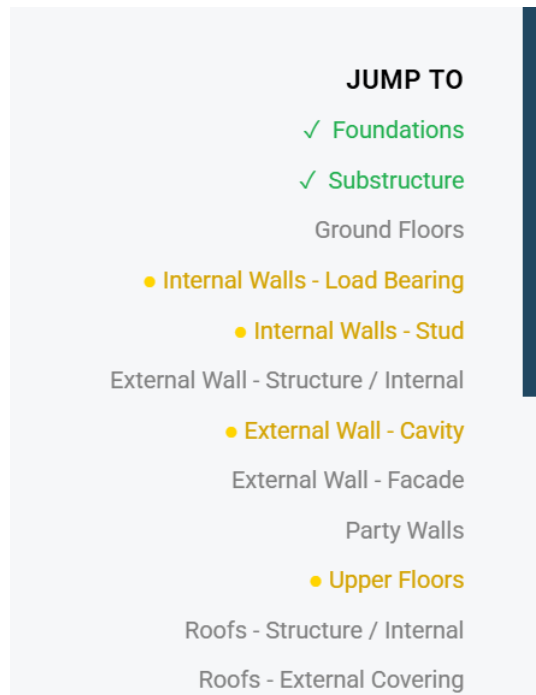
Example façade buildup with bespoke material

ACG.BU.8.1

0.0

0.0

You can interrogate the detail of each buildup either by downloading the **Typical Buildups (plot and site)** dataset, or on the 'Output Buildups' sheet of the **User-Defined Material and Buildup Entry** sheet.



The '**JUMP TO**' menu on the right-hand side of the screen helps you navigate quickly to different elements. Click on an element to jump there.

When both a buildup is selected and valid quantity entered, the element name has a green tick. If an element has been partially entered, it has an orange dot.

Operational carbon

Input the operational energy and operational water information, using the 'i' icons as needed to get more information on the input required.

Operational Carbon

Regulated Operational Energy

Click [here](#) to download the WLC pre-calculator – Regulated energy from SAP outputs

Regulated Energy	
	kWh/yr
% Regulated Energy From Gas	
	%
% Regulated Energy From Electricity	
	%

To help with inputs (building plots pathway only), a **pre-calculator for regulated energy demand** is available on the [WLC Conventions page on the Knowledge Centre](#).

Regulated Energy: this helps to extract exactly the right information from a SAP 10.2 output sheet to calculate annual regulated energy consumption for gas and electricity based on location-specific weather data. (kWh/year)

Unregulated energy is calculated within the tool according to the WLC Conventions based on cooking and appliances assumption input on this page.

Click **NEXT** to continue.

Uncertainty factor

Input the whole life carbon uncertainty factors, using the 'i' icons as needed to get more information on the inputs required.

Uncertainty Factor

Please provide values for the contingency, carbon data uncertainty, and quantities uncertainty factors.

*See the ⓘ icons for help with these values.

Contingency Factor

ⓘ

%

Carbon Data Uncertainty Factor

ⓘ

%

Quantities Uncertainty Factor

ⓘ

%

BACK

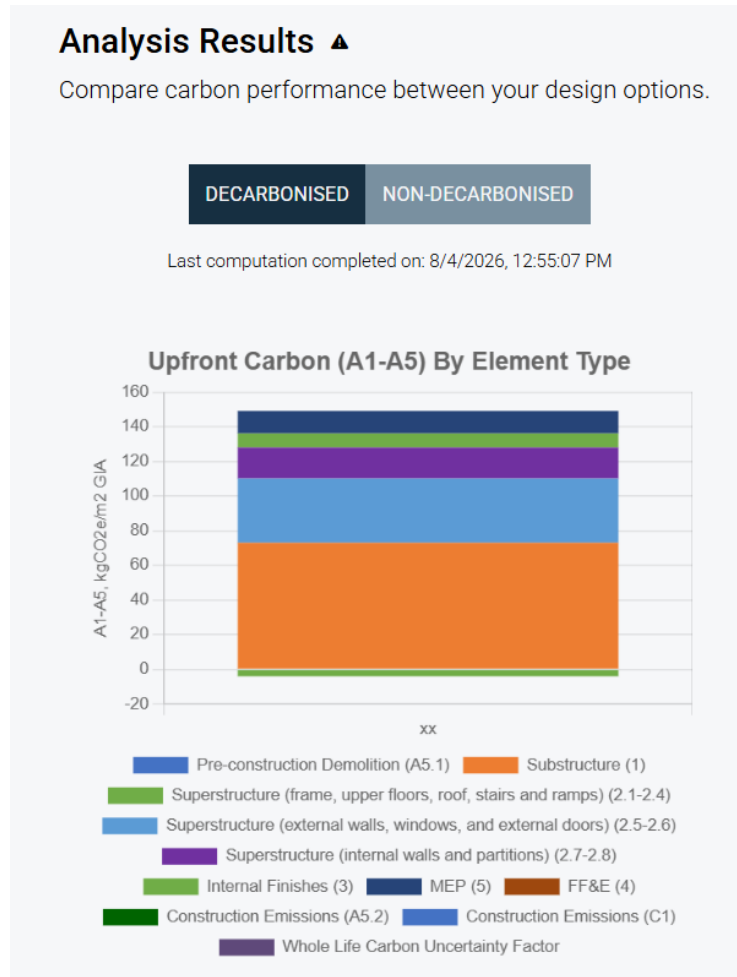
RUN ANALYSIS

To see the calculation results, press the **RUN ANALYSIS** button.

RICS PS – 4.10 Addressing uncertainty in WLCAs provides detailed guidance on how to calculate the Uncertainty Factors. Note that at detailed design and as built project stages, these factors depend on the top 10 most impactful materials, which can only be determined from the output results, so for the first pass leave these blank.

Analysis results

The Analysis results screen shows charts for **Upfront Embodied**, **Life Cycle Embodied** and **Whole Life Carbon** scopes, broken down by Element Type.



To see the detailed output, '**DOWNLOAD RESULTS IN EXCEL FORMAT**'.

DOWNLOAD RESULTS IN EXCEL FORMAT

SAVE ASSESSMENT

BACK

Detailed Results in Excel

Once results are sent to Excel, **a number of sheets are generated:**

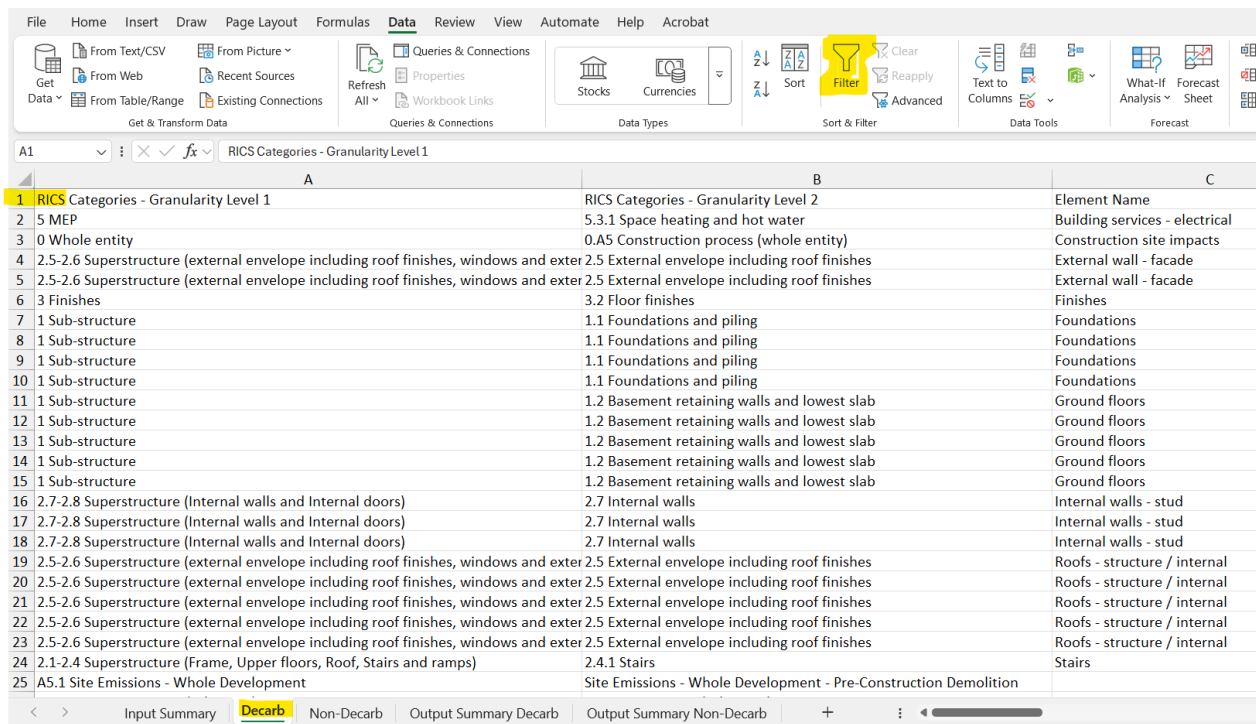
(i) **Input Summary** sheet – which summarises the tool version and pathway used, user inputs and build-up selections for each configured option. More detail on how to measure required inputs for the tool have been included in [Appendix A – WLC Tool v3 User Inputs](#).

	A	B	
1	Date of Analysis	8/4/2026	
2	Time of Analysis	2:07:56 PM	
3	Tool Version	v3.0.7	
4	Pathway Used	Building Plot	
5			
6	Project Details	Input	
7	Project Name	Demo project	
8	Project Description	No Input	
9			
10	Dwelling Type	Detached House	
11	Number of Homes	No Input	
12	Number of Occupants	No Input	
13	Number of Storeys	No Input	Storey(s)
14	Gross Internal Floor Area (GIA)	100	m ²
15	Demolished Gross Internal Floor Area (GIA)	No Input	m ²
16	Total Ground Floor Area	No Input	m ²
17			
18	Operational Carbon	Input	Unit
19	Regulated Energy	No Input	kWh/year
20	% Regulated Energy from Gas	No Input	%
21	% Regulated Energy from Electricity	No Input	%
22	Unregulated Operational Energy Cooking and Appliances Ass	No Input	
23	Operational Water - Water Use	No Input	litres/person/day
24	Renewable On-Site Energy Generation (Total)	No Input	kWh/year
25	Renewable On-Site Energy Generation (Used On-Site, At Tim	No Input	kWh/year
26			
27	Uncertainty Factor	Input	Unit
28	Contingency Factor	No Input	%
29	Carbon Data Uncertainty Factor	No Input	%
30	Quantities Uncertainty Factor	No Input	%
31			

32	Buildup Section/Name	Quantity	Unit
33	Foundations		
34	FHH.BU.1.1: Strip, 450mm wide	8	linear m (load-bearing walls)
35	FHH.BU.1.3: Strip, 600mm wide	42	linear m (load-bearing walls)
36			
37	Substructure		
38	No Input		
39			
40	Ground floors		
41	FHH.BU.3.1: Ground floor insitu (ground bearing)	100	m ² (ground floor area)
42			
43	Internal walls - load bearing		
44	No Input		
45			
46	Internal walls - stud		
47	FHH.BU.5.1: Timber stud, 63mm stud, non-load bearing	100	linear m (internal walls)
48			
49	External wall - structure / internal		
50	No Input		

(ii) Detailed results sheets for '**Decarb**' and '**Non-Decarb**' scenarios. Decarb scenario includes material decarbonisation and grid decarbonisation for relevant elements and life cycle stages according to the WLC Conventions (which follows RICS PS).

A good way to interrogate this sheet is to select the entire first row (column headers) and click **Data >> Filter**. This creates drop downs that enables the different aspects to be more easily inspected.



A	B	C
1 RICS Categories - Granularity Level 1	RICS Categories - Granularity Level 2	Element Name
2 5 MEP	5.3.1 Space heating and hot water	Building services - electrical
3 0 Whole entity	0.A5 Construction process (whole entity)	Construction site impacts
4 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	External wall - facade
5 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	External wall - facade
6 3 Finishes	3.2 Floor finishes	Finishes
7 1 Sub-structure	1.1 Foundations and piling	Foundations
8 1 Sub-structure	1.1 Foundations and piling	Foundations
9 1 Sub-structure	1.1 Foundations and piling	Foundations
10 1 Sub-structure	1.1 Foundations and piling	Foundations
11 1 Sub-structure	1.2 Basement retaining walls and lowest slab	Ground floors
12 1 Sub-structure	1.2 Basement retaining walls and lowest slab	Ground floors
13 1 Sub-structure	1.2 Basement retaining walls and lowest slab	Ground floors
14 1 Sub-structure	1.2 Basement retaining walls and lowest slab	Ground floors
15 1 Sub-structure	1.2 Basement retaining walls and lowest slab	Ground floors
16 2.7-2.8 Superstructure (Internal walls and Internal doors)	2.7 Internal walls	Internal walls - stud
17 2.7-2.8 Superstructure (Internal walls and Internal doors)	2.7 Internal walls	Internal walls - stud
18 2.7-2.8 Superstructure (Internal walls and Internal doors)	2.7 Internal walls	Internal walls - stud
19 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	Roofs - structure / internal
20 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	Roofs - structure / internal
21 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	Roofs - structure / internal
22 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	Roofs - structure / internal
23 2.5-2.6 Superstructure (external envelope including roof finishes, windows and exter	2.5 External envelope including roof finishes	Roofs - structure / internal
24 2.1-2.4 Superstructure (Frame, Upper floors, Roof, Stairs and ramps)	2.4.1 Stairs	Stairs
25 A5.1 Site Emissions - Whole Development	Site Emissions - Whole Development - Pre-Construction Demolition	

The following table explains what each of the headers is:

Column Title	Explanation
RICS Categories - Granularity Level 1	The RICS Categories have been included to enable users to map results to the RICS Reporting Template Tables.
RICS Categories - Granularity Level 2	
Element Name	Element name associated with this buildup
Buildup ID	Unique Build up reference number.
Buildup Name	Build up name.
Buildup Layer ID	Unique identifier for each material or product.
Buildup Layer Name	Material or product name and description for each 'layer'.
Buildup Layer Description	
Buildup Quantity (User Input)	This refers to the user input value for buildup quantity for this buildup. e.g. area of external wall (m ²)
Quantity of Material per Buildup Unit	This is a function of the buildup selected. It is the quantity of this material layer per buildup unit. e.g. number of bricks per m ² external wall area
Total Quantity	This is the total quantity for this material (in this buildup). i.e. buildup quantity x quantity of material per buildup unit. e.g. number of bricks
Buildup Layer Unit of Measure	Unit of measure for the buildup layer.
Biogenic (kgCO ₂ e)	Upfront Biogenic Carbon.
A1-A3 (kgCO ₂ e)	Product emissions, excluding Biogenic Carbon.
A4 (kgCO ₂ e)	Transport emissions.
A5.1 (kgCO ₂ e)	Construction emissions – pre-construction demolition.
A5.2 (kgCO ₂ e)	Construction emissions – construction activities.
A5.3 (kgCO ₂ e)	Construction emissions – on-site waste and waste management.
B1 (kgCO ₂ e)	In-use emissions.
B2 (kgCO ₂ e)	Maintenance emissions.
B3 (kgCO ₂ e)	Repair emissions.
B4 (kgCO ₂ e)	Replacement emissions.
B5 (kgCO ₂ e)	Planned refurbishment emissions.
B6.1-3 (kgCO ₂ e)	Operational Energy emissions.
B7 (kgCO ₂ e)	Operational Water emissions.
C1 (kgCO ₂ e)	Deconstruction and demolition emissions at EoL.
C2 (kgCO ₂ e)	Transport to waste processing facilities emissions at EoL.
C3 (kgCO ₂ e)	Waste processing emissions at EoL.
C4 (kgCO ₂ e)	Disposal emissions at EoL.

(ii) **Output Summary** sheets for '**Decarb**' and '**Non-Decarb**' scenarios. These are the figures behind the charts on the Analysis Results page.

	A	B	C
1	Upfront Carbon A1-A5 Excl. Biogenic, kgCO ₂ e/m ² GIA		
2	Building Categories	Analysis	
3	Pre-construction Demolition (A5.1)		0
4	Substructure (1)		73
5	Superstructure (frame, upper floors, roof, stairs and ramps) (2.1-2.4)		-4
6	Superstructure (external walls, windows, and external doors) (2.5-2.6)		37
7	Superstructure (internal walls and partitions) (2.7-2.8)		18
8	Internal Finishes (3)		8
9	MEP (5)		13
10	FF&E (4)		0
11	Construction Emissions (A5.2)		0
12	Construction Emissions (C1)		0
13	Whole Life Carbon Uncertainty Factor		0
14	Total		1745
15			
16			
17			
18	Embodied Carbon A-C Excl. B6-B7, kgCO ₂ e/m ² GIA		
19	Building Categories	Analysis	
20	Pre-construction Demolition (A5.1)		0
21	Substructure (1)		88
22	Superstructure (frame, upper floors, roof, stairs and ramps) (2.1-2.4)		-5
23	Superstructure (external walls, windows, and external doors) (2.5-2.6)		43
24	Superstructure (internal walls and partitions) (2.7-2.8)		46
25	Internal Finishes (3)		29
26	MEP (5)		22
	< > Input Summary Decarb Non-Decarb Output Summary Decarb Output Summary Non-Decarb +		

5 User-Defined Material and Buildup Entry sheet

The user-defined material and buildup entry spreadsheet allows users to;

1. **Create bespoke user-defined buildups from Hub default materials, and/or,**
2. **Define bespoke materials and then create bespoke build-ups from both user-defined and Hub default materials**

In both cases, the user-defined build-ups can be loaded into the Tool (see [User-defined buildups](#)).

The following section outlines how to use the spreadsheet to define bespoke materials and build-ups.

The spreadsheet has four main sheets – an input and output sheet for materials, and an input and output sheet for buildups. The following section outlines how to use the spreadsheet to define bespoke materials and build-ups.

If you want to add bespoke materials, start at Step 1.

If you want to add bespoke build-ups based on Hub default materials only, please skip to Step 2.

Step 1 – Material Entry



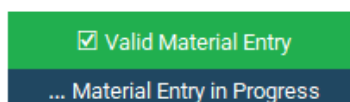
FHH Carbon Assessment Tool | Step 1: Material Entry

Key

User Input required
Optional - Override Default Value

1. To input bespoke materials, click on the **'Input-Materials (Optional)'** tab.

As noted by the key – blue cells are mandatory inputs, green cells are optional inputs, and grey cells are automatically calculated outputs.



2. **For each material, the user must complete the row of information required.** The first column shows the user when sufficient information has been provided by showing “...” to signify a work in progress, or “☑” for a complete row.

Some fields are free text / values, while others are dropdowns.

If additional information is required for a specific entry field – refer to the **pop out notes** in the **example row** or in **row 1**.

	Product			Transport to Site			Site Waste			
	Total A1-A3 (Incl. Biogenic) kgCO ₂ e/functional unit	(A1-A3) Biogenic kgCO ₂ e/functional unit	Total A1-A3 (Excl. Biogenic) kgCO ₂ e/functional unit	RICS 2023 Transportation Scenario	A4 - Default kgCO ₂ e/functional unit	A4 - User Override Value kgCO ₂ e/functional unit	Wastage Rate %	Assumed waste scenario	A5.3 - Default kgCO ₂ e/functional unit	A5.3 - User Override Value kgCO ₂ e/functional unit
☒	180.000	0.000	180.000	Locally manufactured (concrete)	11.950		2%	Disposal to landfill/incineration	3.879	
...	2.000	0.000	2.000	European manufactured	0.189		1%	Reuse/recycling off-site	0.022	
...			0.000		0.000					
...			0.000		0.000					
...			0.000		0.000					

Please select the assumed waste scenario. For more information on waste scenarios, please see RICS PS 2023 Section 5.1.4.

- If users wish to override a calculated carbon value – they can enter a value in the corresponding (optional) **'User Override'** cell.

For example, the A5.3 calculated value below has been overridden.

	Product			Transport to Site			Site Waste				Carbon
	Total A1-A3 (Incl. Biogenic) kgCO ₂ e/functional unit	(A1-A3) Biogenic kgCO ₂ e/functional unit	Total A1-A3 (Excl. Biogenic) kgCO ₂ e/functional unit	RICS 2023 Transportation Scenario	A4 - Default kgCO ₂ e/functional unit	A4 - User Override Value kgCO ₂ e/functional unit	Wastage Rate %	Assumed waste scenario	A5.3 - Default kgCO ₂ e/functional unit	A5.3 - User Override Value kgCO ₂ e/functional unit	B1 kgCO ₂ e/functional unit
☒	180.000	0.000	180.000	Locally manufactured (concrete)	11.950		2%	Disposal to landfill/incineration	3.879	1.000	0.000
☒	2.000	0.000	2.000	European manufactured	0.189		1%	Reuse/recycling off-site	0.022	0.025	0.000
...			0.000		0.000				0.000		
...			0.000		0.000				0.000		
...			0.000		0.000				0.000		

Please enter a value here, should you wish to override the default value.

Once all required fields have been complete – the first column confirms a valid material entry with a tick.

4. Bespoke input materials appear below the default materials on the 'Output-Materials' sheet.

	B	C	D	E	F	H	J	K
	Default or Custom Entry?	Is the Material Entry Valid?	Material / Product type	Material Impact Factor ID	Material / Product Name	EPD Functional Unit	Upfront Biogenic kgCO2e/functional unit	Total A1-A Biogenic kgCO2e/functional unit
99	Default FHH Dataset	Valid Entry	Timber_products	FHH-TIM-056	Timber - Softwood UC3 (external 30 year)	m3	-737.000	46.71
100	Default FHH Dataset	Valid Entry	Timber_products	FHH-TIM-055	Timber - Softwood UC4 (ground contact)	m3	-737.000	54.47
101	Default FHH Dataset	Valid Entry	Glass_products	FHH-GLA-042	Window - uPVC frame DG	m2	-0.787	80.78
102	Default FHH Dataset	Valid Entry	Glass_products	FHH-GLA-043	Window - uPVC frame TG	m2	-1.030	97.33
103	Custom Entry	Valid Entry	Clay_and_stone_products	ACG-CLA-001	lbstock Chesterton brick	kg	-0.002	0.12
104	Custom Entry	Invalid Material Entry - please review	Gypsum_products	ACG-GYP-002	Incomplete example		0.000	0.00
105	Custom Entry							
106	Custom Entry							
	Custom Entry							

Note: All materials must be valid in order for them to be selected in the Input-Buildups tab. **Please review all invalid entries prior to progressing.**

Step 2 – Buildup Entry



FHH Carbon Assessment Tool | Step 2: Build-up Entry

Key

User Input required

Optional Input

No input required

Example

1. To create bespoke build-ups – click on the ‘**Input-Buildups**’ tab.

As noted by the key at the top of the sheet – blue cells are mandatory inputs, green cells are optional inputs, and grey cells are automatically calculated outputs.

2. For each buildup, the user must complete the buildup properties and at least one buildup layer row.
 - Some fields are free text / values, while others are dropdowns.
 - **Company identifier** appears as the prefix of the new buildup ID.
 - **Buildup description** is for your information; it is shown beneath the buildup name when selecting the bespoke buildup within the Select buildups screen of the main tool.
 - **Relevant element category** chooses the element list that the buildup appears in within the Select buildups screen.
 - **RICS categories**, level 1 and 2, define where the carbon is accounted for in the calculation results.

FHH Carbon Assessment Tool | Step 2: Build-up Entry

Key
 User Input required (Blue)
 Optional Input (Green)
 No input required (Grey)
 Example (Light Blue)

What is a build-up? What is a Build-up Layer?
 Each element category will be defined by a specific build-up.
 A build-up is a system relevant to the element category, made up of a collection of build-up layers (i.e. materials or components). Build-up quantities are provided per build-up functional unit.
 For example, a foundation build-up could be a "100mm deep, 100mm wide Mass Concrete Strip Foundation".
 The build-up layers would be: (1) Concrete and (2) Excavation material. Quantities would be provided per metre length of load bearing walls at ground floor.

Build-up Properties

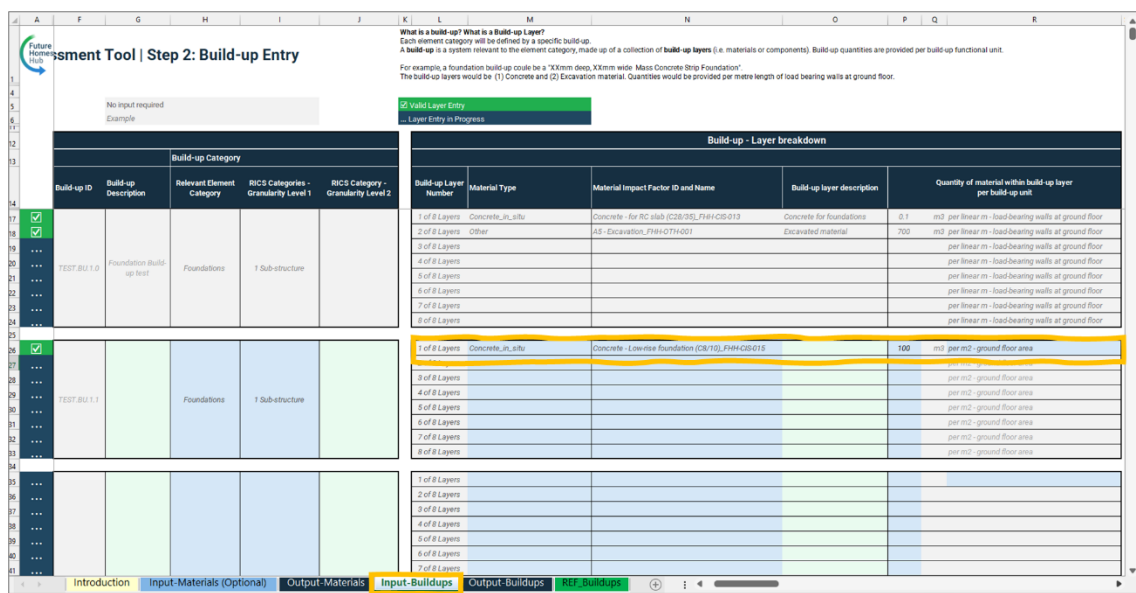
Build-up Identifier	Build-up Category						
Build-up Item #	Company Identifier	Build-up Name	Build-up ID	Build-up Description	Relevant Element Category	RICS Category - Granularity Level 1	RICS Category - Granularity Level 2
0	TEST	TestXYZ	TEST.BU.1.0	Foundation Build-up test	Foundations	1 Sub-structure	
1	TEST	TEST.VALID	TEST.BU.1.1		Foundations	1 Sub-structure	
2						1 Sub-structure 2.1-2.4 Superstructure (Frame, Upper floors, Roof, Stairs and ramps) 2.5-2.6 Superstructure (external envelope including roof finishes, windows and external doors) 2.7-2.8 Superstructure (internal walls and internal doors) 3 Finishes 4 FF&E 5 MEP	

Build-up - Layer breakdown

Build-up Layer Number	Material Type	Material Impact Factor ID and Name	Build-up layer description	Quantity of material per m
1 of 8 Layers	Concrete, in situ	Concrete - for RC slab (C28/35), FHH-CSD-019	Concrete for foundations	0.1 m³ per linear m
2 of 8 Layers	Other	AS-Excavation, FHH-OT14001	Excavated material	700 m³ per linear m
3 of 8 Layers				per linear m
4 of 8 Layers				per linear m
5 of 8 Layers				per linear m
6 of 8 Layers				per linear m
7 of 8 Layers				per linear m
8 of 8 Layers				per linear m

Navigation: Introduction | Input-Materials (Optional) | Output-Materials | **Input-Buildups** | Output-Buildups | **PDF-Buildups**

- Each layer is made up of either a default or a bespoke material. When you select the **Material type** the list of available materials will be filtered
- **Buildup description** is for information only.
- **Quantity** is the quantity of this material layer per buildup unit. Note that the units are fixed by the material selected so take care to reflect the appropriate quantity per buildup functional unit.
- **Buildup functional unit** is defined once and is the same for all buildup layers. This is the quantity that users will enter in the Select buildups screen, e.g. m² external wall area.
- The first column shows the user when sufficient information has been provided by showing “...” to signify a work in progress, or  for a complete row.



- To review user-defined input buildups – click on the **‘Output-Buildups’** tab.

Only valid buildups will be loaded into the tool. **Please review all invalid entries prior to progressing.**

334	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.1	TEST VALID	
335	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.1	TEST VALID	
336	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.1	TEST VALID	
337	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.1	TEST VALID	
338	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.1	TEST VALID	
339						
340	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.2	TEST INVALID	Invalid Material Entry - please review Material selected does not exist
341	Custom Entry	1 Sub-structure	Foundations	TEST.BU.1.2	TEST INVALID	

Appendix A – WLC Tool v3 User Inputs

Inputs here relate to building plot pathway. To be updated with site infrastructure pathway inputs soon. In the meantime, if you have any issues using the tool, please contact our technical team for support – [email us](#).

Project details

Input	Unit	Description
Project Name		
Project Description		
Dwelling Type		<i>Detached House, Semi-Detached House, Terraced House, Bungalow or Apartment Block. For benchmark information.</i>
Number of Homes		Overview The total number of dwellings in the building. Further Guidance For a single detached house, mid- or end-terrace house input 1. For an apartment block, or row of terraces / maisonette flats, input the total number of dwellings in the block.
Number of Occupants		Overview The total number of occupants in the building (across all dwellings). What is it used to calculate? Operational Water and Operational Unregulated Energy calculations. Further Guidance For a single detached, mid- or end-terrace house, enter the number of occupants in the house. For an apartment block, or row of terraces / maisonette flats, input the total number of occupants for the building block. If left blank, number of occupants will be estimated based upon GIA floor area and number of dwellings in the building - following WLC Conventions for New Homes assumptions.
Number of Storeys		Overview Number of storeys including ground floor. What is it used to calculate? Embodied carbon of stairs. Also, for benchmark information.
Gross Internal Floor Area (GIA)	m ²	Overview Gross Internal Area (as defined by RICS Code of Measuring Practice) is the area of a building measured to the internal face of the perimeter walls, at each floor level. What is it used to calculate? Embodied carbon of some component benchmarks. It is also utilised to normalise the total WLC in the output graphs and estimate number of occupants if not specified.

Select buildups

Input	Unit	Description
linear m (load-bearing walls)	m	Length of load-bearing ground floor walls (internal and external, including party walls) measured along the wall centreline.
m ³	m ³	Volume of material
kg	kg	Mass of material
m ² (ground floor area)	m ²	Ground floor area measured to the internal face of the perimeter walls.
linear m (internal walls)	m	Plan length of internal wall, measured along the wall centreline, per storey. Assumed internal wall height is 2.4m. Do not include party walls.
m ² (roof area in pitch)	m ²	Roof area in pitch, excluding roof windows, measured externally.
m ² (roof area in plan)	m ²	Roof area in plan, measured to the outside of wall plate.
m ² (external wall area)	m ²	External wall area excluding windows and doors, measured to the external corners. Typically, DPC (damp proof course) level is considered to be the dividing line between external wall and sub-structure wall. For semi-detached or terraced dwellings measure to the centre line of the party wall.
m ² (upper floor area)	m ²	Area of upper floors measured to the internal face of the perimeter walls.
m ² (window area)	m ²	Area of rough openings associated with windows, roof windows, and glazed doors. Do not include non-glazed doors.
m ² (external door area)	m ²	Area of rough openings associated with external doors. Do not include glazed doors.
m ² (party wall area)	m ²	Area of party walls (walls between different dwellings) within a terraced housing block or apartment building. Typically, party walls are measured to the inside face of external walls.

linear m (lintels)	<i>Total length of lintels in the building. If actual length of lintels is unavailable, assume lintels extend beyond window / door headers by 150mm on each side.</i>
m ² (GIA)	<i>Gross Internal Area (as defined by RICS Code of Measuring Practice) is the area of a building measured to the internal face of the perimeter walls, at each floor level.</i>
m ²	<i>Area of this buildup</i>
number of (kitchens)	<i>Number of kitchens in the building</i>
number of (bathrooms)	<i>Number of bathrooms and ensuites in the building including a sink, WC, and bath/shower. Do not include WCs.</i>
number of (WCs)	<i>Number of WCs in the building including a sink and WC only. Do not include bathrooms and ensuites.</i>
number of (storeys)	<i>Number of storeys including ground floor. If the building has more than one stair core, then multiply by the number of cores.</i>

Operational carbon

Input	Unit	Description
Regulated Energy	kWh/year	Overview Total annual operational energy consumption from regulated uses (i.e. those covered by Building Regulations Part L). This equates to total demand net of any generation by renewables. If your building has multiple dwellings, please aggregate the total regulated energy for all dwellings in the building. What is it used to calculate? Operational carbon from regulated uses. Further Guidance To make it easy to extract the right information from the SAP worksheet, please refer to the WLC pre-calculator – Regulated energy from SAP outputs on the Hub's website (https://futurehomes.org.uk/wlc-tool) link
% Regulated Energy from Gas	%	Overview Gas consumption as a proportion of total energy demand excluding any contribution from renewables. If your building has multiple dwellings, please aggregate the gas consumption and total energy demand before calculating the proportion. What is it used to calculate? Operational carbon from regulated uses.

		Further Guidance Refer to the WLC pre-calculator – Regulated energy from SAP outputs on the Hub’s website
% Regulated Energy from Electricity	%	Overview Electricity consumption as a proportion of total energy demand excluding any contribution from renewables. If your building has multiple dwellings, please aggregate the electricity consumption and total energy demand before calculating the proportion. What is it used to calculate? Operational carbon from regulated uses. Further Guidance Refer to the WLC pre-calculator – Regulated energy from SAP outputs on the Hub’s website
Cooking and Appliances Assumption		Note: Unregulated energy will be estimated based on the Gross Internal Area and Number of Occupants. If Number of Occupants has not been provided, this will be estimated based upon GIA floor area. If GIA floor area has not been provided, the tool will not calculate a carbon value for Unregulated Operational Energy. To understand the assumptions behind this calculation, please refer to the WLC pre-calculator – Unregulated energy on the Hub’s website (https://futurehomes.org.uk/wlc-tool) link
Renewable Energy Generation (Total)	kWh/year	Overview Total annual renewable energy generation associated with the building. Energy generation includes on-site: PV, wind, hydro-electric, and micro-CHP. What is it used to calculate? Operational carbon from regulated uses. Further Guidance Refer to the WLC pre-calculator – Regulated energy from SAP outputs on the Hub’s website
Renewable Energy Generation (Used on site, at time of generation)	kWh/year	Overview Total annual renewable energy generation used on site at time of generation. What is it used to calculate? Allocation of electricity generated and used on site, exported then re-imported, and imported only – in line with RICS carbon conversion factor Set 2 – WLC benchmarking. Further Guidance Refer to the WLC pre-calculator – Regulated energy from SAP outputs on the Hub’s website

Water Use	litres/pers on/day	Overview Mains water consumption in litres of water used per person, per day. If your building has multiple dwellings, please input the average water consumption across all occupants in the building. What is it used to calculate? Operational carbon associated with water supply and treatment. Further Guidance If project specific information is not available, 120 litres/person/day can be used as an indicative assumption. This is in line with Approved Document Part G.
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Uncertainty factors

Input	Unit	Description
Contingency Factor	%	Overview To account for uncertainty, the WLC assessor must consider contingency for the project based on the uncertainty at the time of the assessment. Default Contingency Factors Early design stage: 15% Technical design and construction: 6% Post-completion: 0%
Carbon Data Uncertainty Factor	%	Overview The carbon data uncertainty factor is based on how accurately project carbon data represents the products and materials being used in the asset. Remarks At early design - the carbon data uncertainty should be 0%, as this is accounted for within the contingency factor. At technical design and construction, and post-completion - the carbon data uncertainty should be calculated based on the top 10 most impactful products (in terms of embodied carbon), in line with RICS PS 2.0 Section 4.10.2.
Quantities Uncertainty Factor	%	Overview The quantities uncertainty factor for key products (the most impactful products and materials used) provides an indication of the uncertainty associated with the quantities used for the WLCA. Remarks At early design the quantities uncertainty should be 0%, as this is accounted for within the contingency factor. At technical design and construction, and post-completion - the quantities uncertainty should be calculated based on the top 10 most impactful products (in terms of embodied carbon), in line with RICS PS 2.0 Section 4.10.3.

Appendix B – Tool Calculation Approach

Elements, Buildups and Quantity Calculations

Following **RICS PS – Appendix M Standardised approach to creating elemental build-ups**, the Tool calculates material quantities for individual elements within the building based on predefined or user-defined buildups for each element category.

- **Plot buildups** have been based on indicative, typical details suited to low-rise (4 storeys or less) residential buildings – covering detached houses, semi-detached and terraced houses, maisonettes and apartment blocks.
- **Site buildups** are relevant for all types of new homes developments.

The full **Typical Buildups (plot and site)** dataset is available from the [Future Homes Carbon Assessment Tool page on the Knowledge Centre](#). It also forms part of the

An example calculation for a foundation element has been included in Figure 1.

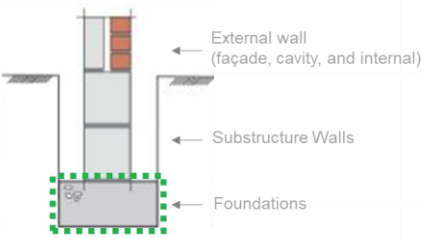
Element Category: Foundations				
Build-up	Build-up Layer	Assumption	Material / Product	Quantity / Unit of Build-up
 Strip, typical (User Selected)	Mass Concrete	450mm wide bucket x 225mm deep x 1m length	Concrete – Low Rise Foundation (GEN I)	0.101 m ³ / m length of strip foundation
	External wall (façade, cavity, and internal)			
	Substructure Walls			
	Foundations			
				Related User Input (Length of Load Bearing Walls – Ground Floor) defines the length of the strip foundation. 100 m of Load bearing walls = 100 m of Strip, typical
				0.101 m³ / m length of strip foundation * 100 m = 101 m³ of Concrete – Low Rise Foundation (GEN I)

Figure 1: Material quantity calculation for a typical strip foundation

Operational Energy Use Carbon Conversion Factors

The Tool references Set 2 - UK Carbon conversion factors included within the **RICS PS Energy supplementary data tables**.

Two sets of results – one based on no grid decarbonisation and another accounting for grid decarbonisation – are automatically generated. The relevant factors have been shown in **Table 2** and **Table 3**.

In line with RICS PS, and the WLC Conventions, as Set 2 Carbon Factors are being utilised – on-site renewable energy generation is included in the WLC results.

Material Decarbonisation

50% material decarbonisation for all predicted impacts associated with **B1.2, B2-B4 and C1-C2** are applied in accordance with RICS PS Decarbonisation scenarios for embodied impacts.

Results accounting for material decarbonisation are shown in addition to the no decarbonisation scenario.

Biogenic carbon

The biogenic carbon factors for each material that appear within the build-ups align with the FHH default material and carbon dataset included within the FHH WLC Conventions.

A1-A3 Biogenic carbon removals (negative emissions) have been reported separately from A1-A3 totals within the reporting template sheet.

The corresponding biogenic carbon emissions (positive emissions) are reported within Module C3 for all elements.

In line with FHH WLC Conventions, the Upfront Carbon totals exclude biogenic carbon, while the WLC A-C totals include biogenic carbon.

Whole Life Carbon Uncertainty Factor

The Whole Life Carbon Uncertainty Factor, as defined by RICS PS, is composed of:

1. A contingency factor,
2. A carbon data uncertainty factor, and
3. A quantities uncertainty factor.

The Tool allows users to enter their bespoke % contingency, carbon data uncertainty, and quantities uncertainty factors. For clarity the carbon uplifts associated with the WLC UF are shown as a separate line item within the detailed results and are also included within the aggregated result totals.

Inclusion of the Uncertainty Factor is required by the WLC Conventions. Refer to RICS PS – 4.10 Addressing uncertainty in WLCAs.

Table 2: Carbon conversion Set 2 – Non-decarbonised scenario, RICS PS 2nd edition

	Direct emissions (Scope 1)	Direct emissions (Scope 2)	WTT emissions (indirect)	Direct (T&D)	WTT emissions (indirect)
Electricity (whether from renewables or not)	n/a	#kWh/yr x 60 year RSP x 0.2071 kgCO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity</i>	#kWh/yr x 60 year RSP x 0.0459 kgCO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity WTT</i>	#kWh/yr x 60 year RSP x 0.0179 kgCO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity T&D</i>	#kWh/yr x 60 year RSP x 0.0040 kgCO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity WTT of T&D</i>
On-site renewables that are actually used onsite	n/a	#kWh/yr x 60 x 0 kgCO ₂ e/kWh = 0	n/a		
On-site renewables that are exported to the grid and used again by the building in the same year (up to matching annual consumption)	n/a	#kWh/yr x 60 x 0 kgCO ₂ e/kWh = 0	n/a	#kWh/yr x 60 x 0.0179 kg CO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity T&D</i>	#kWh/yr x 60 x 0.0040 kg CO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity WTT of T&D</i>
On-site renewables generated in excess of annual energy consumption thus exported	n/a				
Gas	#kWh/yr x 60 year RSP x 0.2023 kg CO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: Fuels</i>	n/a	#kWh/yr x 60 year RSP x 0.0335 kg CO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: WTT of fuels</i>		

Table 3: Carbon conversion Set 2 – Decarbonisation scenario, RICS PS 2nd edition

	Direct emissions (Scope 1)	Direct emissions (Scope 2)	WTT emissions (indirect)	Direct (T&D)	WTT emissions (indirect)
Electricity (whether from renewables or not)	n/a	#kWh/yr x 60 year RSP x 0.0413 kg CO ₂ e/kWh <i>FES 2023 Falling short excluding BECCS</i>	#kWh/yr x 60 year RSP x 0.0459 kg CO ₂ e/kWh x energy decarbonisation factor (0.20) <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity WTT</i>	#kWh/yr x 60 year RSP x 0.0179 kg CO ₂ e/kWh x energy decarbonisation factor (0.20) <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity T&D</i>	#kWh/yr x 60 year RSP x 0.0040 kg CO ₂ e/kWh x energy decarbonisation factor (0.20) <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity WTT of T&D</i>
On-site renewables that are actually used onsite	n/a	#kWh/yr x 60 x 0 kgCO ₂ e/kWh = 0	n/a		
On-site renewables that are exported to the grid and used again by the building in the same year (up to matching annual consumption)	n/a	#kWh/yr x 60 x 0 kgCO ₂ e/kWh = 0	n/a	#kWh/yr x 60 x 0.0179 kg CO ₂ e/kWh x energy decarbonisation factor (0.20) <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity T&D</i>	#kWh/yr x 60 x 0.0040 kg CO ₂ e/kWh x energy decarbonisation factor (0.20) <i>UK government conversion factors for company reporting of greenhouse gas emissions: UK electricity WTT of T&D</i>
On-site renewables generated in excess of annual energy consumption thus exported	n/a				
Gas	#kWh/yr x 60 year RSP x 0.2023 kg CO ₂ e/kWh <i>UK government conversion factors for company reporting of greenhouse gas emissions: Fuels</i>	n/a	#kWh/yr x 60 year RSP x 0.0335 kg CO ₂ e/kWh x energy decarbonisation factor (0.2) <i>UK government conversion factors for company reporting of greenhouse gas emissions: WTT of fuels</i>		