



# BEECET USER GUIDE

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## A. Installation instructions

- i. This programme is implemented in C# and runs on Windows.
- ii. The implementation was carried out in MS Visual Studio 2012 and needs to 'build' successfully before being functional.
- iii. The programme is a plugin initially developed for Revit 2014 but this version has been configured to and requires Revit 2017 (BIM-enable tool) to run.
- iv. To install and run the programme, save the project folder in a convenient location such Visual Studio 2012 Project directory.
- v. Copy the database files, ICE database and ICEdatabase\_log, in the BEECETPro folder to Revit 2017 installation folder in Programs File in the computer hard (C) drive.
- vi. Open (this yields the C# environment) and build the project before running Revit 2017 programme
- vii. Ensure that the build is successful (this updates the BEECETTool.dll file in the bin folder) by confirming from the Output pane in the C# environment (IDE) and note the output directory string (e.g.: C:\Users\ID00077\Documents\Visual Studio 2012\Projects\BEECETPro\BEECET\bin\Debug\BEECETTool.dll )
- viii. Open the BEECETConnectRevit.addin ) file (contained in BEECETPro folder in Notepad and modify the line:  
 "<Assembly> C:\Users\Documents\Visual Studio 2012\Projects\BEECETPro\BEECET\bin\Debug\BEECETTool.dll<Assembly>"  
 ...by replacing it with the output directory string from (vii) above
- ix. Copy the modified 'BEECETConnectRevit.addin' file to the following directory:
  - a. In a non-user specific location in "application data"  
 C:\ProgramData\Autodesk\Revit\Addins\2017\
  - b. In a user specific location in "application data"  
 C:\Users\<user>\AppData\Roaming\Autodesk\Revit\Addins\2017\
- x. Then run Revit 2017 and follow the instructions in Section B to run the BEECET programme.



## B. Operation instructions

- i. Open a BIM project (e.g. Embodied Energy-BIM 2 FLOORS in BEECETPro folder) in Revit 2017
- ii. On the Add-Ins Tab, click on External Tools and then on BEECE Tool from the drop-down menu to call the program.

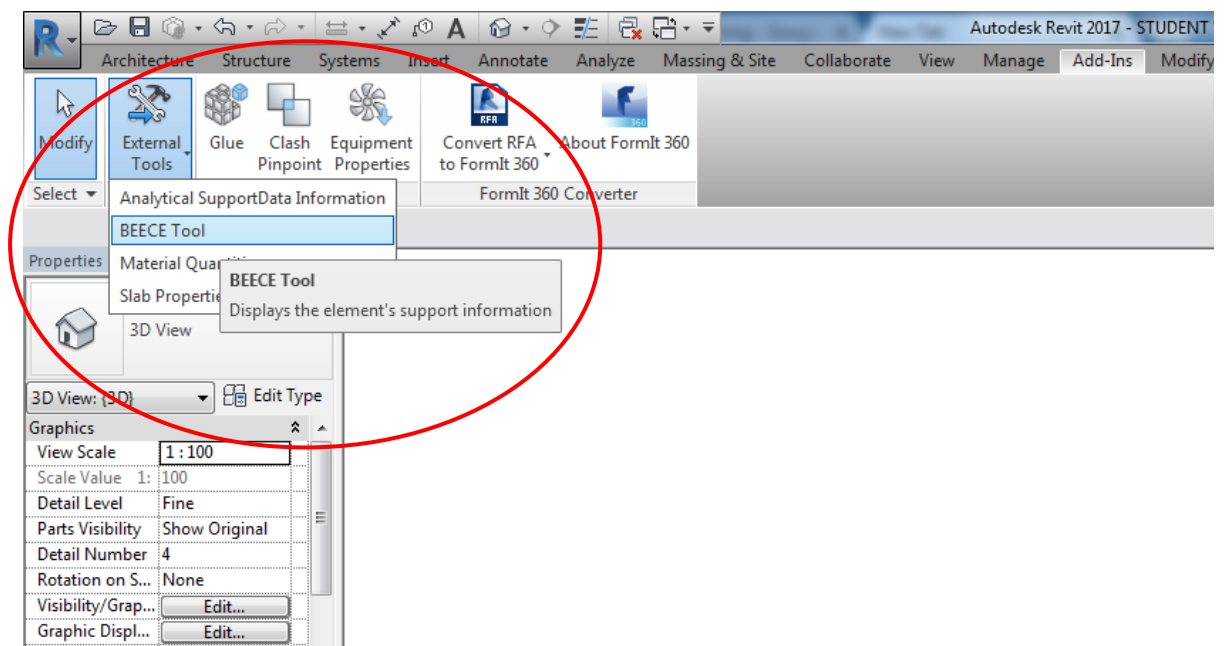


Figure 1: Calling BEECET from External Tools



iii. Follow steps 1-10 (figures 3-7) as described in subsequent pages to complete analysis.

The screenshot displays the 'STEEL SUSTAINABILITY ESTIMATOR' window. The interface is divided into several sections:

- Top Menu Bar:** Includes options like Architecture, Structure, Systems, Insert, Annotate, Analyze, Massing & Site, Collaborate, View, Manage, Add-Ins, and Modify.
- Left Sidebar:** Contains project information (Project ID: RBP100, Project Title: Research E, Project location: Nottingham) and a group tree listing various building components like Foundations, Superstructure, and Internal Finishes.
- Central Table:** A table with columns for Number, Work Breakdown Structure (WBS), Volume (m3), Material Type, Density (kg/m3), Mass (kg), Embodied Energy (EE) Intensity (MJ/kg), Embodied Carbon (EC) Intensity (kgCO2/kg), Embodied Energy (GJ), Embodied Carbon (tCO2), Work Breakdown EE (MJ), and Work Breakdown EC (tCO2). The table lists various roof and structural components.
- Right Sidebar:** Includes a 'Rule of measurement option' section with radio buttons for NRM1, UNICLA, and CSM7. Below it is a 'Material database' section with checkboxes for Australia, EU, Canada, UK (Balt ICE), China, and US. A 'CALCULATE' button is also present.

Red circles and numbers 1 through 10 highlight the following steps in the workflow:

- Design Option Number: 1
- Location by country: United Kingdom
- Building type: Residential building
- Rule of measurement option: NRM1
- Material Type: Aggregates - General Gravelly
- Material Type: Steel - CSG, Virgin
- Embodied Energy (EE) Intensity (MJ/kg)
- Embodied Carbon (EC) Intensity (kgCO2/kg)
- Embodied Energy (GJ)
- Embodied Carbon (tCO2)
- Group summary table

Figure 2: BEECET operation steps



1. Enter appropriate project information and select:
  - (i) Energy Use History and then click
  - (ii) Proceed as shown in Figure 4 to call the main programme window.

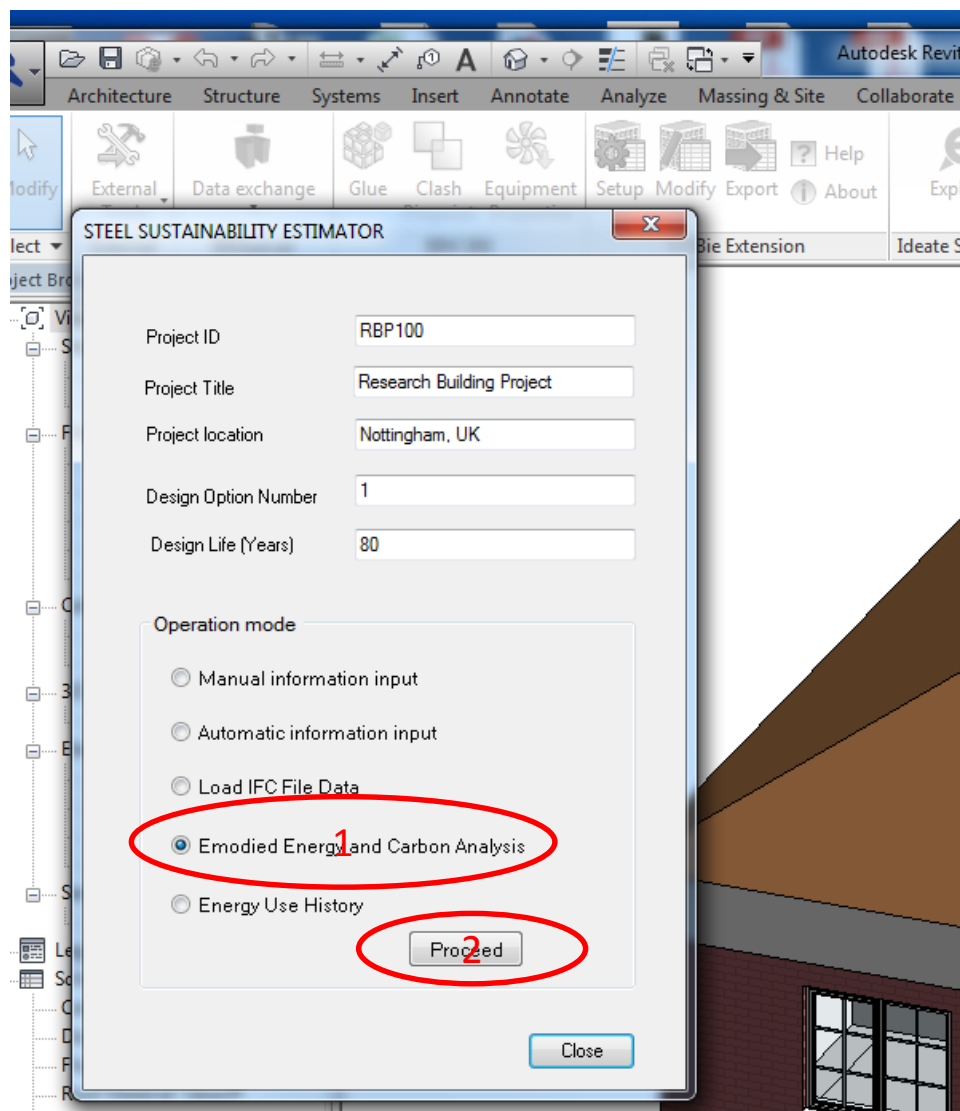


Figure 3: Selecting programme option



2. Select country of project location.
3. Select building
4. Select the rule of measurement (NRM1)
5. Scroll (browse) to all respective items with automated volume entry for confirmation.  
Alternatively enter independently calculate volume of choice.

Embodied\_Energy\_and\_Carbon

File Edit Tools Help

Project information

Location by country: United Kingdom Building type: Residential building

Rule of measurement option

☒ NRM1 ☐ UNICLASS ☐ SMM7 ☐ CESMM

Material database

☐ Australia ☐ Canada ☐ China ☐ EU ☒ UK (Bath ICE) ☐ US

**CALCULATE**

Group tree

- 0 - Facilitating Works
- 1 - Substructure
- 2 - Superstructure
- 3 - Internal Finishes
- 4 - Fittings Furnishes and Equipment
- 5 - Services
- 6 - Prefabricated Buildings and Building Units
- 7 - Work to Existing Buildings
- 8 - External Works

Group items details

	Number	Work Breakdown Structure (WBS) - Item	Volume (m3)	Material Type	Density (kg/m3)	Mass (kg)
149	2.3	Roof				
150	2.3.1	Roof Structure				
151	2.3.1.1	Truss and purlin system	23.01			
152	2.3.1.2	Roof slab	0.55			
153	2.3.1.3	Rigid insulation to roof	23.05			
154	2.3.1.4	Roof felt	0.01			
155	2.3.1.5	Metal panels	2.05			
156	2.3.2	Roof Coverings				
157	2.3.2.1	Roof Tiles	5.11			
158	2.3.2.2	Non structural screeds and thermal insulation and...	0.18			
159	2.3.2.3	Extra Over Roof Coverings to Dormers Including ...				
160	2.3.2.4	Eaves Verge Treatment to Roofs				
161	2.3.2.5	Edge Treatment to Roofs				
162	2.3.2.6	Flashings				
163	2.3.3	Specialist Roof Systems				
164	2.3.3.1	Specialist Roof Systems - structure including rafte...				
165	2.3.4	Roof Drainage				
166	2.3.4.1	Gutters				
167	2.3.4.2	Rainwater Pipes				
168	2.3.4.3	Testing Installations				

Group summary

	Number	Work Breakdown Structure	EE (GJ)	EC (tCO2)
»				

Figure 4: Result from selecting the option of rule of measurement (NRM1)



- On the Material Type column, select appropriate material type from the comboBox for all valid entries.

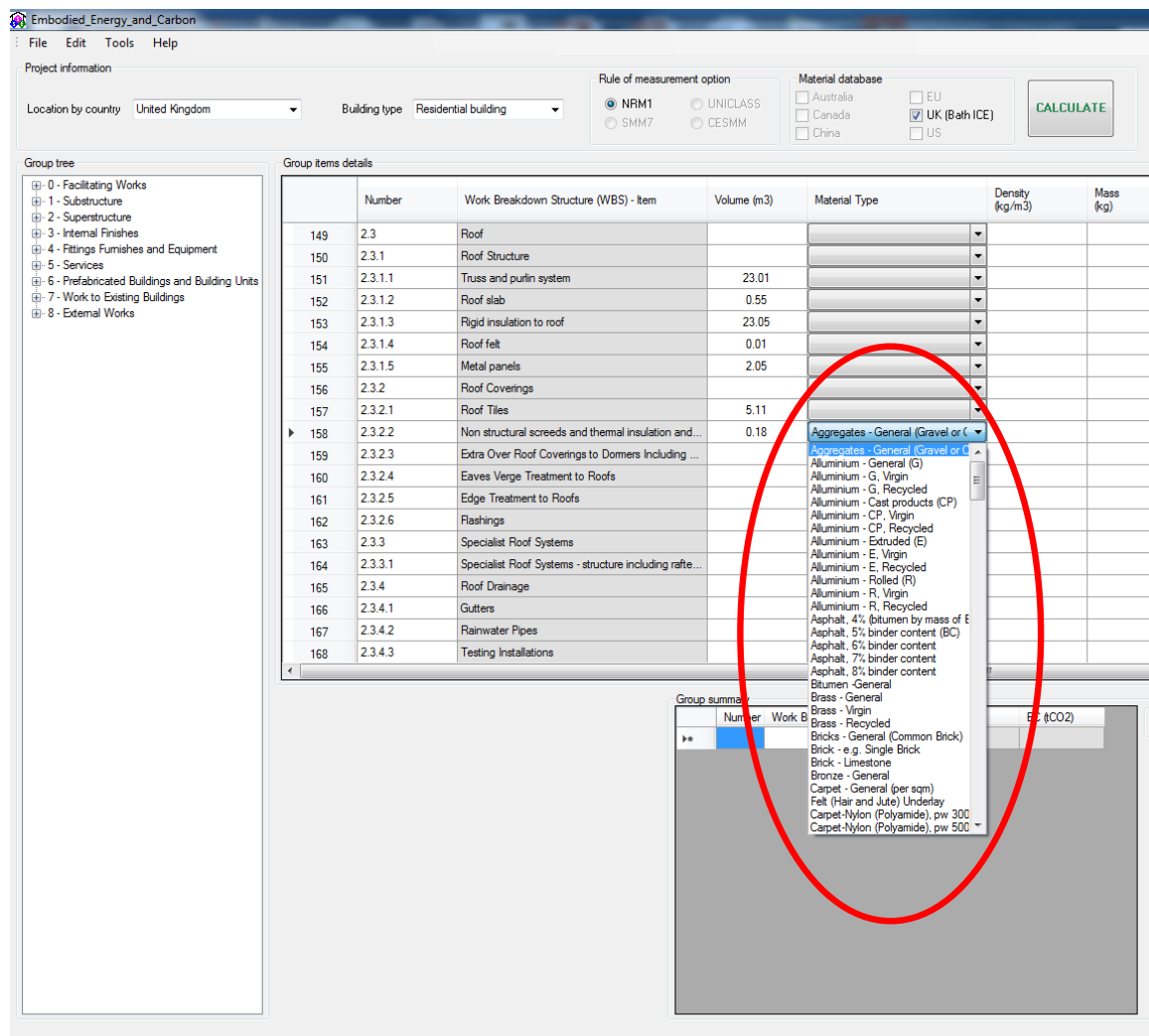


Figure 5: Selecting option of material from drop-down list connected to the ICEDatabase



7. Check and confirm corresponding embodied energy and carbon intensities and
8. The corresponding values embodied energy and carbon for items are displayed in adjoining columns

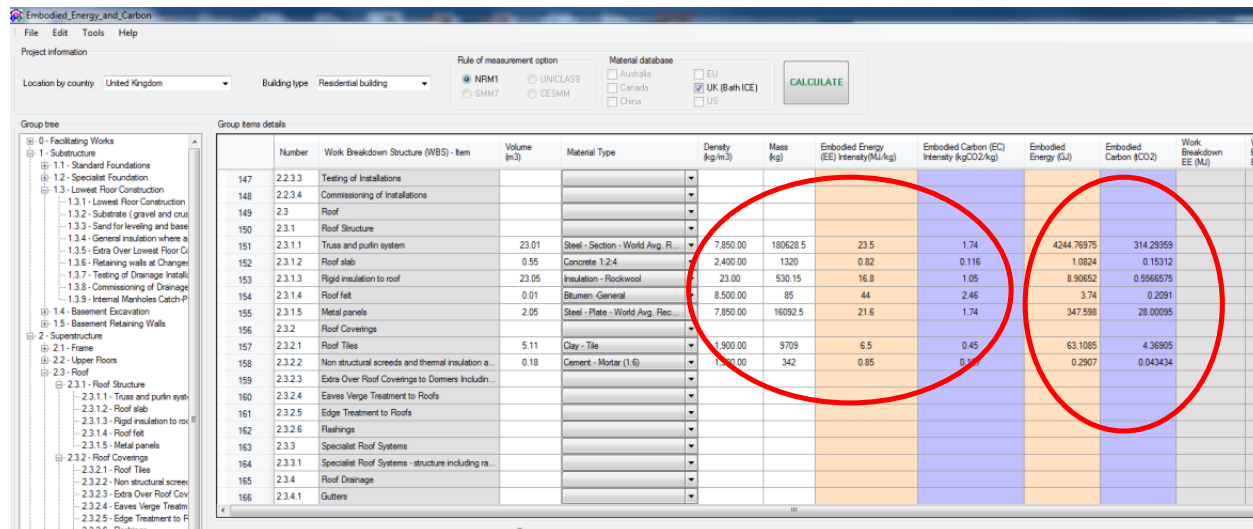


Figure 6: Expanded view of columns showing automated calculations

9. Click calculate button to get estimations and summary

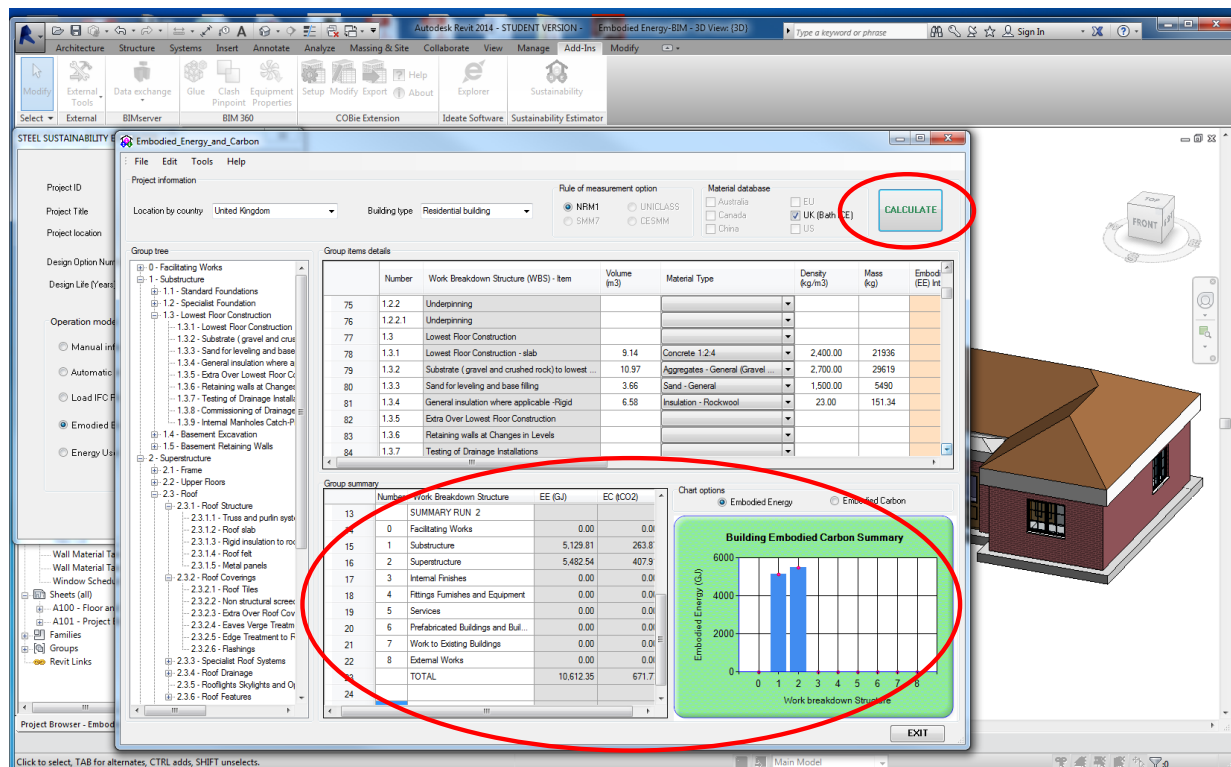


Figure 7: Final output window from the estimation process