



<https://GreenBuildingEncyclopaedia.uk>

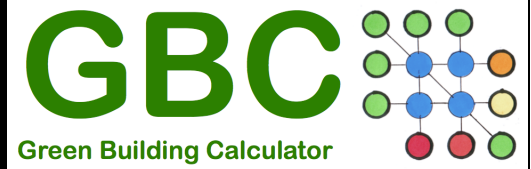


<https://GreenBuildingCalculator.uk>

U Value To Watts To CO2										Yes	?	
User name: BrianSpecMan did this												
Element	Applicable	Elements	U value	Area	Temperature			Heat loss		Floor area	Total Area	Areas
Baseament	Yes/No		W/m2 K	m2	External	Internal	Difference	Individual	Total	m2	m2	%
					degree C	degree C	degree C	W				
Yes	Yes	Basement retaining floor	0.0819489	300	11	-15	4	98		300		
Yes	Yes	Swimming Pool Basin	0.070365	1448	11	-15	4	410		1448		
Yes	Yes	Basement perimeter retaining wall	0.2512023	175	11	-15	4	176				
Yes	Yes	Basement roof at site level	0.044126	300	11	-15	4	53				
Yes	Yes	Basement roof at subterranean level	0.0448912	300	11	-15	4	102				
Yes	Yes	Basement partition	0.2032824	125	20	-15	-5	-127				
Yes	Yes	Glazed pavement over basement	2	11	11	-15	4	88				
				2659	External	Internal		Heat loss	600	Basement		
Yes	Yes	Ground bearing floor	0.0901849	300	11	-20	9	243		300		
Yes	Yes	Ground floor over ventilated void	0.0589331	300	11	-20	9	154				
Yes	Yes	Floor over basement	0.0523647	300	11	-20	9	141				
Yes	Yes	Upper internal floor	0.0528671	6	20	-20	0	0				
Yes	Yes	Floor suspended over air	0.0585441	6	20	-20	0	703				
Yes	Yes	Internal floor	0.0528671	6	20	-20	0	0				
Yes	Yes	Internal floor	0.0528755	9	20	-20	0	93				
				30	External	Internal		Heat loss	298			
Yes	Yes	External wall	0.0642495	4	11	-20	9	58				
Yes	Yes	Spigot curtain wall	0.81	1	11	-20	9	2.83				
Yes	Yes	Composite Panel	0.125493	5	20	-20	0	1.33				
Yes	Yes	Composite Panel	0.1255245	6	20	-20	0	1.33				
Yes	Yes	Composite Panel	0.2032824	2	20	-20	0	1.33				
				125	External	Internal		Heat loss	5,701			
Yes	Yes	Pitched Roof	0.0994608	632.5	0	-20	20	876		632.5		
Yes	Yes	Barrel vault roof	0.0862835	471.3	0	-20	20	813		471.3		
Yes	Yes	Flat Roof	0.0394565	300	0	-20	20	237		300		
Yes	Yes	Shallow roof	0.0862864	300	0	-20	20	518		300		
Yes	Yes	Flat ceiling	0.0867887	300	0	-20	20	521		300		
Yes	Yes	Glazed Roof	2	25	0	20	20	1,000		25		
				2029	External	Internal		Heat loss	3,967	Roof		
Yes	Yes	Windows	0.8	40	0	-20	20	800		40		
Yes	Yes	Glazed Pedestrian Door	0.79	10.5	0	-20	20	166		10.5		
Yes	Yes	Rooflights	0.75	25	0	-20	20	375				
Yes	Yes	Roof windows	0.81	10	0	-20	20	162				
Yes	Yes	Vehicle access/Land	2	45	0	-20	20	1,800				
Yes	Yes	High usage entrance	2	20	0	-20	20	800				
Yes	Yes	Pedestrian	2	12	0	-20	20	480				
Yes	Yes	Low	2	25	0	-20	20	1,000				
Yes	Yes	Roof Smoke	2	25	0	-20	20	1,000				
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029	External	Internal		Heat loss	3,967	Roof		
				2029								



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# Video Introduction



[https://youtu.be/72S70\\_Mzxfo](https://youtu.be/72S70_Mzxfo)

# GBE Whole Building Calculators

- Previous GBE Green Building Encyclopaedia
  - Whole Building Calculators: Embodied, Sequestered carbon and CO2 in use
    - Created for Post graduate Architectural students 2017
  - Waste Cost® lite: created from SWMP workshops
  - Psi values: created for a manufacturer
  - Elemental calculator: for a student
- GBE Green Building Calculator
  - Bring them all together in one place one file
  - 440 hours to assemble so far
  - <https://GreenBuildingCalculator.uk>
  - 10<sup>th</sup> June 2020 Version 1.0.0. Launched
  - 15 versions planned: 15 months of development

# Green Building Calculator

# Executive Summary

U Value To Watts To CO2

User name: BrianSpecMan did this

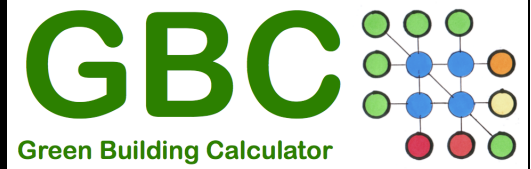
Yes

?

Element	Applicable Yes/No	Elements	U Value W/m2 K	Area m2	External Temperature degree C	Internal Temperature degree C	Difference degree C	Individual W	Total W	Floor area m2	Total area m2	Areas %
Basement	Yes	GBC Green Building Calculator 2018-2020										
	Yes	Basement retaining floor	0.0818469	300	11	-15	4	88			300	
	Yes	Swimming Pool Basin	0.070865	1448	11	-15	4	410			1448	
	Yes	Basement perimeter retaining wall	0.2512023	175	11	-15	4	176				
	Yes	Basement roof at site level	0.044126	300	11	-15	4	53				
	Yes	Basement roof at subterranean level	0.0344812	300	11	-15	4	102				
	Yes	Basement partition	0.2032284	125	20	-15	-5	-127				
	Yes	Glazed pavement over basement	2	11	11	-15	4	88				
			2629									
Floor	Yes	Ground bearing floor	0.0901849	300	External	Internal		Heat loss	800		Basement	
	Yes	Ground floor over ventilated void	0.0569331	300	External	Internal		Heat loss	243.30			
	Yes	Floor over basement	0.0523647	300	External	Internal		Heat loss	154			
	Yes	Upper internal floor	0.0528671	300	External	Internal		Heat loss	141			
	Yes	Floor suspended over void	0.0585441	60	External	Internal		Heat loss	703			
	Yes	Basement floor	0.0528671	60	External	Internal		Heat loss	60			
	Yes	Basement floor	0.0528755	60	External	Internal		Heat loss	60			
	Yes	Basement floor	0.0528755	60	External	Internal		Heat loss	60			
	Yes	Basement floor	0.0528755	60	External	Internal		Heat loss	60			
	Yes	Basement floor	0.0528755	60	External	Internal		Heat loss	60			
Wall	Yes	External ground wall	0.0642495	4	External	Internal		Heat loss	50			
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
	Yes	Ground wall	0.81	1	0	-20	20	2.8				
Roof	Yes	Pitched roof	0.0694608	632.5	0	-20	20	878			632.5	
	Yes	Barne vault roof	0.0862635	471.3	0	-20	20	813			471.3	
	Yes	Flat Roof	0.0394560	300	0	-20	20	230			300	
	Yes	Shallow roof	0.0862684	300	0	-20	20	518			300	
	Yes	Flat ceiling	0.0867887	300	0	-20	20	521			300	
	Yes	Glazed Roof	2	25	20	-20	20	140				
			2629									
Window/Door/Rooflight	Yes	Windows	0.8	50	0	-20	20	800			50	
	Yes	Glazed Pedestrian Doors	0.79	10.5	0	-20	20	166			10.5	
	Yes	Rooflights	0.75	25	0	-20	20	375				
	Yes	Roof windows	0.81	10	0	-20	20	162				
	Yes	Vehicle access/Large glass entrance	2	45	0	-20	20	1,800				
	Yes	Large glass entrance	2	20	0	-20	20	800				
	Yes	Roof windows	0.81	25	0	-20	20	405				
	Yes	Roof windows	0.81	25	0	-20	20	405				
	Yes	Roof windows	0.81	25	0	-20	20	405				
	Yes	Roof windows	0.81	25	0	-20	20	405				
Totals												
In Use Carbon												
Hours of operation/day 8												
KiloWatts/Floor area 0.004												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												
KiloWatts/Floor area 0.0005												



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

# GBC Green Building Calculator

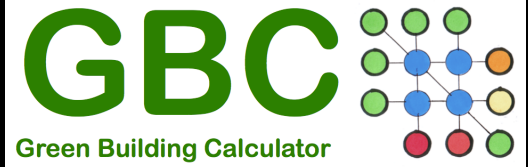
- **Scope: V1.0.0.**
- **Building Size:**
  - Number of buildings and floors, heights, lengths, areas, volumes
- **Temperatures: inside, outside and ground**
- **Hours in use: per day (temperatures maintained period)**
- **Room by Room heat loss calculator: size radiators UFH or Boiler**
- **Form Factor: to set higher targets where necessary**
- **Regulations v Design standards:**
  - U value target Selection:
  - Part L, LETI, Passivhaus, EnerPHit, AECB: CL or CLR or others
- **Winter Thermal Insulation Material Choices**
  - K values v U values = Thicknesses of different materials (50 mm is not enough)
- **Assemble elements and all their components,**
  - replace components with generic materials or products
  - Get U values, R values, meet targets or not, review thicknesses or materials
  - Energy Consumption, element by element %, add fuel choice > CO2 in use
  - Bill of Materials, Quantities, Labour, Products, Costs
  - Cost planning by the designer for the client investment not cost cutting

# Future Development Versions

- V2 Retrofit, Terraces, Community, Services
- V3 Decrement Delay, Form Factor
- V4 Building Section Coding, Competent Application, 892 ready made elements, Bespoke Assemblies, Specification Generator
- V5 Non-Domestic, Retrofit and Newbuild more refinement
- V6 Embodied Energy, Carbon and Sequestered carbon; Non-external envelope elements
- V7 Condensation Check, Thermal Bridge, Secondary Element Calculator, Thermal mass calculator
- V8 LCA Calculator
- V9 Landscape
- V10 Civils and Infrastructure
- V11 Waste Calculator
- V12 Plastic free v Recycled Plastic
- V13 Interiors
- V14 Reclaim or Self-build
- V15 BIM



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

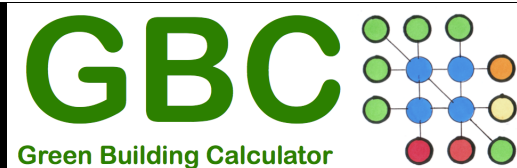
<https://GreenBuildingCalculator.uk>

# GBE Green Building Calculator

- 2020-2021 Future Development:
- 15 Versions 15 months development
- Users to guide GBC on order of priority



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

# User Survey

User Survey		Please arrange the numbers in your preferred order		
Please email the survey as a PDF or excel to <a href="mailto:BrianSpecMan@icloud.com">BrianSpecMan@icloud.com</a>		Preferred Version Order	Preferred sub-item order	Comment
About	A description of what GBE Green Building Calculator is, how it started and how it has developed	Launch Version 1.1	1	
Features Benefits	What is does and how that helps users	Launch Version 1.2	2	
Development	Aid memoir for development	Launch Version 1.3	3	
Phased Development Prices	This page: What is included in the launch version of GBE Green Building Calculator and GBE's suggested development order: Subject to user survey	Launch Version 1.4	4	
Instructions	Read these if GBE Green Building Calculator is not intuitive (it probably won't be if you have not done a U value calculation before)	Launch Version 1.5	5	
Revisions	A record of updates to GBE Green Building Calculator to enable an audit trail through the development process	Launch Version 1.6	6	
Project Revisions	Not part of GBE Green Building Calculator For users record keeping on design projects	Launch Version 1.7	7	
Whole Building	Whole Building: The start of GBE Green Building Calculator Input page: Sizes, Areas and Volumes, hours of operation, design temperatures, inside and out	Launch Version 1.8	8	
Schedule of Accommodation	Schedule of Accommodation Room by Rooms Input page: more specific than whole building if required; Areas and volumes, hours of operation, design temperatures, inside and out	Launch Version 1.9	9	
Room By Room Heat Losses	Input and Put-put page: Room by room heat loss calculator to determine Boiler size, radiator or under floor heating requirements, Developed to help designer to make the insulation thicknesses or window specifications to match a boiler capacity when it's a tight fit	Launch Version 1.10	10	
Form Factor	Results page: Analysis of Form Factor and optimal U values to respond to them To help designers see the importance of compactness, or the consequence of fragmentation of the building volume, on the energy consumption See Update 2.3	Launch Version 1.11	11	
Building Elements	Input page: simple yes/no Building Elements and secondary-elements are selected from readymade lists of 29 Elements and 12 Secondary Elements to match the scope of the project	Launch Version 1.12	12	
Building Element Areas	Input and output page: Building Elements and secondary-elements: their dimensions are added by user and their areas are automatically calculated.	Launch Version 1.13	13	
Multiple Size Building Element Areas	Input and output page: Since windows and doors come in a multitude of sized then a GBE Green Building Calculator schedules allows you to incorporate them all	Launch Version 1.14	14	
U values Etc. Energy Targets	Results page: Allows the users to compare and choose between Building Regulations Part L, other national regulations or standards, LETI, AECB CarbonLite, Passivhaus, EnerPHit, EAMs, etc. including: U values, Airtightness, Form factors, Elevational window %.	Launch Version 1.15	15	
Insulation Thicknesses	Input and output table: Information Resource: Quick look up table Users apply the chosen U value targets from the previous worksheet GBE Green Building Calculator automatically displays the thickness of different k valued insulation materials needed to meet U values targeted in each element.	Launch Version 1.16	16	
Decrement Delay Insulation Thickness	Input and output page: (incomplete at launch) Automatically see what thickness of different k valued insulation materials is needed to avoid overheating on summer See Update 2.1	Launch Version 1.17 Version 3.1	3.1	
Legend	Information Resource: A list of terms used in GBE Green Building Calculator with some explanation of their meaning in a tabulated format Potential link to GBE Jargon Buster pages	Launch Version 1.18	18	
Elements	Input and output page: Yes/No then choose from drop down menu, followed by automatic cell population Allows the user to populate and assemble elements by choosing their combination of functional components and then choosing the materials for each component. Components are in the right sequence but it may needs some know-how to choose the right one (Update 3 will help with readymade assemblies) Costs of insulation and windows are added to the search results. Ready to view on screen and print out. Major performance windows and glazing	Launch Version 1.19	19	
Bill of Materials Quantities Costs	Input and output page: Allows user to cost plan their Building with a Bill of materials, quantities, labour and costs based on building fabric only so far. It will be reliant upon users interrogating recent tender rates or building price books Services are planned to be addressed in update 1.4-1.7 (unless users say otherwise) Non-external envelope components are planned to be developed in Phase 3.4 (unless users want it sooner) See Update 1.2 & 1.3	Launch Version 1.20	20	

© GBE 2017-20 GBC Green Building Calculator



<https://GreenBuildingEncyclopaedia.uk>



# Green Building Calculator Website



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>



[Home](#) [Bespoke](#) [Buy now](#) [Contact us](#)



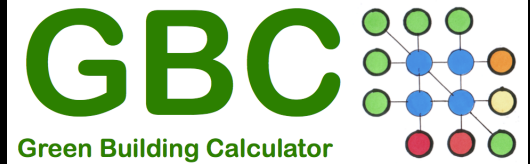
Green Building Calculator  
Create Greener Buildings

— Buy Now

U value to Watts to CO2												
User name:		BrianSpecMan did this										
Element	Applicable	Elements	U value	Areas	Temperature			Heat loss		Floor area	Total Areas	Areas
	Yes/No		W/m2.K	m2	External	Internal	Difference	Individual	Total	m2	m2	%
Basement	Yes	© GBE Green Building Calculator 2018-2020	0.0819469	300	11	-	15	4	98	300		
	Yes	Basement retaining floor	0.070865	1448	11	-	15	4	410	1448		
	Yes	Swimming Pool Basin	0.2512023	175	11	-	15	4	176			
	Yes	Basement perimeter retaining wall	0.044126	300	11	-	15	4	53			
	Yes	Basement roof at site level	0.0848912	300	11	-	15	4	102			
	Yes	Basement roof at subterranean level	0.2032824	125	20	-	15	-5	-127			
	Yes	Basement partition	2	11	11	-	15	4	88			
Floor	Yes	Glazed pavement over basement										
				2659	External	Internal		Heat loss	800	Basement	1748	21% Area %
	Yes	Ground bearing floor	0.0901849	300	11	-	20	9	243	300		4.1% Heat loss %
	Yes	Ground floor over ventilated void	0.0569331	300	11	-	20	9	154	300		
	Yes	Floor over basement	0.0523647	300	11	-	20	9	141	300		
	Yes	Upper internal floor	0.0528671	600	20	-	20	0	0	600		
	Yes	Floor suspended over air	0.0585441	600	0	-	20	20	703	600		
Wall	Yes	Compartment floor	0.0528671	90	0	-	20	20	95	90		Ratio: 1 to 0.32
	Yes	Party floor	0.0528755	900	0	-	20	20	952	900	3090	37% Area %
				3090	External	Internal		Heat loss	2,288	Floor		11.8% Heat loss %
	Yes	External wall	0.0642495	455	0	-	20	20	585	455		
	Yes	External glazed wall/Curtain wall	0.81	175	0	-	20	20	2,835	175		
	Yes	Internal glazed wall/Curtain wall	0.1255245	20	0	-	20	20	800	20		
	Yes	Internal Partition/Wall	0.2032824	525	0	-	20	20	1,318	525		
Roof & Ceilings	Yes	Compartment Communal wall	0.1255245	65	0	-	20	20	163	65		Ratio: 1 to 1.95
	Yes	Internal Partition/Wall	0.2032824	25	20	-	20	0	0	25	1265	15% Area %
				1265	External	Internal		Heat loss	5,701	Wall		29.5% Heat loss %
	Yes	Flat roof	0.04608	632.5	0	-	20	20	879	632.5		
	Yes	Shallow roof	0.0394566	471.3	0	-	20	20	813	471.3		
	Yes	Flat Roof	0.0394566	300	0	-	20	20	237	300		
	Yes	Shallow roof	0.0862984	300	0	-	20	20	518	300		
Window/Door/Rooflight	Yes	Flat ceiling	0.0867887	300	0	-	20	20	521	300		Ratio: 1 to 0.84
	Yes	Glazed Roof	2	25	0	-	20	20	1,000	25	2028.8	24% Area %
				2029	External	Internal		Heat loss	3,967	Roof		20.5% Heat loss %
	Yes	Windows	0.8	50	0	-	20	20	800	50		
	Yes	Glazed Pedestrian Doors	0.79	10.5	0	-	20	20	166	10.5		
	Yes	Rooflights	0.75	25	0	-	20	20	375	25		
	Yes	Roof windows	0.81	10	0	-	20	20	162	10		
	Yes	Vehicle access/Large doors	2	45	0	-	20	20	1,800	45		
	Yes	High usage entrance doors	2	20	0	-	20	20	800	20		
	Yes	Opaque Pedestrian Doors	2	12	0	-	20	20	480	12		
	Yes	Display window	2	25	0	-	20	20	1,000	25		Ratio: 1 to 12.78
	Yes	Roof Vents/Smoke vents	2	25	0	-	20	20	1,000	25	223	2.7% Area %
				223					6,583	Window/Door/Rooflight		34.0% Heat loss %



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>



[Home](#) [Bespoke](#) [Buy now](#) [Contact us](#)



Select and purchase according to your status:

**You can pay with a credit card or PayPal\***

Please choose from one of these options

Current Student

1-3 Person Practice

Larger Practice

Self-Builders

Self-Build TAN6 OPD Wales

\* We use PayPal to process payments. You will be able to pay with a debit or credit card.

© GBE 2017-20 GBC Green Building Calculator

# Download the file

Thanks for shopping with us

Hi Brian,

We have finished processing your order.

## Downloads

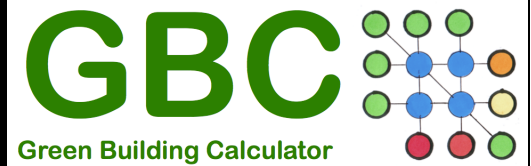
Product	Expires	Download
<a href="#">Green Building Calculator - Student</a>	Never	<a href="#">Green Building Calculator - Student</a>

[Order #229] (June 13, 2020)

# V1.0.0. In Detail



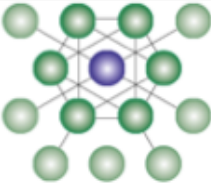

<https://GreenBuildingEncyclopaedia.uk>





Green Building Calculator

<https://GreenBuildingCalculator.uk>

# Welcome



Green Building Encyclopaedia



Green Building Calculator

Green Building Calculator

Launch Version 1.0.0

© GBE NGS ASWS BrianMurphy aka BrianSpecMan

2017 - 15th Feb 2020 - 8th June 2020

<https://GreenBuildingEncyclopaedia.uk>

<https://GreenBuildingCalculator.uk>

Hello and welcome to GBE Green Building Encyclopaedia's GBC Green Building Calculator

Brian Murphy aka BrianSpecMan is an Architectural Technician and Architect by training, a Specification writer by choice, an Environmentalist by action, an Educator by calling and an Author and Editor by necessity

He has 45 years in Construction, been writing Specification for 35 years and getting to know and understand Green Building Construction for 21 years, disseminating in education for 13 years, developing websites for 17 years

BrianSpecMan has for a long time wanted more joined up policy and targets, joined up regulations, joined up design thinking but its all a long time coming

BrianSpecMan wants more joined up tools to help in the design processes, Modelling has the potential to do this for CAD but we need more tools to do the same for BInformationM and one day join them all up.

He keeps observing battens being dropped, inefficiencies and redundancy in the way this Industry works and sees the consequences in the buildings we create, confirmed by ZCH's Performance gap

If we are to survive the Climate Emergency we need to get better than this

After Grenfell It is obvious we need better methods of working and more checks and balances in all decision making

In order to fill one gap in the information chain BrianSpecMan has developed Green Building Calculator

GBE wants Architects to be able to do their own Energy and Environmental Modelling and Cost Planning, all in a single tool that gives instant feedback to changes in specification.

GBE Green Building calculator can become and remain a living document at all stages of design:

Helping the designer and client to make better informed choices.

Responding to all choices of methods of construction, material and products;

Helping to defend the choices in the Value Engineering, Cost Cutting, Substitution cycles.



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# About

## Green Building Encyclopaedia GBE Calculator: Whole Building Worksheet: About

Subject or Worksheet:	Information	21/05/2020	Initials
Working File Name:	GBE Calculator Whole Building Working.xlsx	21/05/2020	BRM
Issue File name:	GBE Calculator Whole Building A13BRM__052020	21/05/2020	BRM
Purpose:	To provide a low cost Energy Performance and Cost analysis for building designs for those not engaging in PHPP, SAP, SBEM, IES, etc. calculations.	21/05/2020	BRM
History:	<p>This MS Excel calculator was developed to permit architecture students to analyse their own studio projects during a parallel technology module EREID Energy And Resource Efficiency in Design.</p> <p>Due to the high risk of inability by the students, potential differing approaches and inconsistency of results, GBE's BrianSpectMan created the spreadsheet week by week as the students progressed through the module under weekly time pressures.</p> <p>The consistent results meant we could compare different building shapes, methods of construction, materials choices and resultant energy demand and consumption.</p> <p>The Part-time students all took the file to their offices and started applying them to their live projects.</p> <p>The inevitable anomalies created by the fast time programme have been found and ironed out.</p>	25/05/2020	BRM
For a Future:	<p>With XR Extinction Rebellion, Greta Thunburgh's behaviour change campaign, Architects Declare and many other groups and Government bodies becoming involved in a bigger way, we have a chance to engage designers in more scrutiny of what they design.</p> <p>So GBE have restarted development of a calculator that can be useful to enable many more to engage more robustly in meeting new targets as they become common place.</p> <p>More over they will be able to understand why 50 mm of stone wool insulation is no longer enough, do their own U value calculation independently of manufacturers who will do them for free, if users pay for their insulation.</p>	25/05/2020	BRM
Approach:	<p>GBE have created an open-book approach by creating this in MS Excel calculator without hidden pages</p> <p>It allows for user access, interrogation, greater understanding and learning.</p> <p>It also allows user manipulation and bespoke development by users/organisation's</p> <p>It is hoped that with user feedback to GBE that there can be further development by GBE for the benefit of many users.</p> <p>No black-box or flight-recorder approach here.</p> <p>As a nod to QA procedures all actions are date stamped, and actions recorded in a revision table, if multiple users become involved then initials will be added against actions.</p> <ul style="list-style-type: none"> <li>• Whole Building and Room by Rooms Schedule of Accommodation, areas and volumes, hours of operation, design temperatures, inside and out</li> <li>• Room by room heat loss calculator to determine radiator or underfloor heating requirements</li> <li>• Analysis of Form Factor and optimal U values to respond to them</li> <li>• Elements and secondary-elements are selected from ready-made lists to match the project, their dimensions added by user and their areas are automatically calculated.</li> <li>• Since windows and doors come in a multitude of sized then a schedules allows their incorporation</li> </ul>	25/05/2020	BRM





<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# Instructions

## Instructions

## Legend

Green cells need the user to add, project specific information or replace default information with specific information

Red text in Turquoise cells is reproducing building-wide information but the user can over write it with room or element specific values

Blue cells provide results based on a calculation using data from other cells DO NOT OVERWRITE THE CELL CONTENT

## File: Spreadsheet

- Using your dimensioned drawings
- Using the latest edition of file GBE Green Building Calculator B01BRM080620.xlsx (if you need \*.xls let me know I will provide)
- Found in GBE Shop <https://greenbuildingencyclopaedia.uk/>
- Found in Green Building Calculator website <https://greenbuildingcalculator.uk/>
- Download the file to your C Drive (or other)
- Save the file as a template and make a working copy (File > Save as) and add your project reference or name to the file name
- Edit your working file in your C drive (or other)

## Worksheet Instructions: Whole Building

- Work sheet (tab) ScheduleAccommodation
  - Add your name (this feeds through to numerous worksheets)
  - Add your project name or reference
  - Add your project address
  - Observe the diagram used to complete Room by Room schedule, below right
  - Add your project details: Quantities, dimensions.
  - Confirm these match your plans
  - Confirm or change the number of hours of operation of the whole building (during which internal temperatures are to be maintained, this can be made room by room later)
  - Confirm or change the internal temperature to be maintained in the whole building (this can be changed to room by room later)
  - Confirm or change the other temperatures to be maintained in specific locations
  - Confirm subsoil temperature (below 1 m in the UK this 10-12 all year round) change for other parts of globe
  - Confirm or change external temperature Metrological Office data for location (winter average) change for other parts of globe
- Save your work

## Worksheet Instructions: Schedule of Accommodation

- Work sheet (tab) ScheduleAccommodation
- Rename the green cells to correspond to the rooms, areas and circulation spaces in your client brief or design aspiration for your building and any others that are different in your building
- Add more rows as necessary for your building, add new blank rows mid way in each of the floor groups and copy the content of an existing row into your new rows
- Pre-populated from Whole Building figure but can be changed here for each room
- NB: if you have similar rooms in a row that are not square nor parallel sides use the average of the largest and smallest sizes and add the quantity or rooms to column D
- Add the dimensions for each of your rooms
- NB: if you have one room that is not square nor parallel sided use the average of the two lengths and the average of the two widths to get an accurate size
- Pre-populated from Whole Building figure but can be changed here for each room
- Leave it as 'Yes' if you included the room, change to 'No' if you failed to include any room in your project
- Leave as your building default figure, unless some rooms are used and conditioned for different numbers of hours
- Change the temperature to the designed room temperature if different to the building temperature in cell O8
- Rough checks can be carried out to spot any glaring errors by comparing the following cells: (sometimes really rough checks)
- Differences will occur if your floor areas and floor plates vary from floor to floor or there are balcony cutouts, Bay windows, Oriel windows, etc.

Worksheet	Column(s)	Row(s)	Cells
Schedule Accommodation		Custom View: Whole Building	
	C	3	C3
	C	4	C4
	C	5	C5
	M to O	3 to 5	M3:O5
	D, E, F, G, I	10	D10, E10, F10, G10, I10
	L	10	L10
	N	10	N10
	O	10	O10
	O	12, 14 to 16	O12, O13, O14, O15, O16, O17
	O	13	O13
	O	17	O17

Worksheet	Column(s)	Row(s)	Cells
Schedule Accommodation		Custom View: Schedule Accommodation	
	C	23-31, 33-41, 43-51, 53-61	
	C	23-31, 33-41, 43-51, 53-61	
	D & E	23-31, 33-41, 43-51, 53-61	
	D	23-31, 33-41, 43-51, 53-61	
	F & G	23-31, 33-41, 43-51, 53-61	
	F & G	23-31, 33-41, 43-51, 53-61	
	I	23-31, 33-41, 43-51, 53-61	
	L	23-31, 33-41, 43-51, 53-61	
	N	23-31, 33-41, 43-51, 53-61	
	O	23-31, 33-41, 43-51, 53-61	O8
	H	10, 22, 23, 32, 42, 52, 62	
	H	10, 63	





# Whole Building

- Users add for the whole building:
  - sizes
  - hours of operation
  - design temperatures, inside and out
- It works out areas and volumes,



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

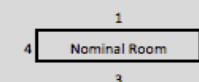
# Whole Building

User name:	BrianSpecMan did this
Project name:	Over type with Project name
Project address:	Over type with Project address

## Project Brief Employer Requirements or Architect's Proposal

Whole Building		No.	No.	m	m	m <sup>2</sup>	m	m <sup>3</sup>
Building(s)	Room Functions	Number of buildings	Number of floors	length(s) (or depth front to back in terrace)	width(s) (or party wall to party wall)	Floor Area Ceiling Area Roof Area	Room heights	Volumes
© GBE Green Building Calculator 2017-2020		1 to 1000	1 to 50	1 to 1000	1 to 1000	1 to 1 million	2.4 to 10	1 to 10 million
Whole Building	All rooms	2	5	20	15	3000	2.5	15,000 m <sup>3</sup>

Legend	
User Input cell feeds into calculations	
Calculator Results that the user can over right	
Calculator Results using user inputs	



Yes/No
Achieved in Design
Yes

Hours	Degrees C
Operation	Internal Temperature
1 to 24	-20 to +30°
8	20

Swimming pool water	16
Subsoil	11
Communal Space	15
Basement	15
Other Spaces	15
Winter outdoors	0

# Future development: Hours of operation

- Hours per day
- Days per week
- Weeks per year
- Heating / Cooling season duration
- Hours per year for total energy consumption and carbon per year

# Schedule of accommodation:

- Be more specific about: each room
- Room sizes
- Room temperatures
- Hours of operation

# Schedule of Accommodation

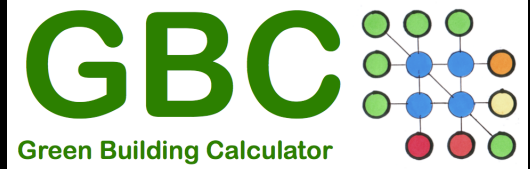
Schedule of Accommodation									Winter outdoors		0	
NB: 'Room by Room Losses' table is right of this schedule		No.	No.	m	m	m2	m	m3	Yes/No	Hours	Degrees C	
Room Functions		Number of rooms	Number of floors	length(s) (or depth front to back in terrace)	width(s) (or party wall to party wall)	Floor Area Ceiling Area Roof Area	Room heights	Volumes	Achieved in Design	Room in use and temperature controlled hours per day	Design Desired Temperature	
Floor(s)	© GBE Green Building Calculator 2017-2020	1 to 1000	1 to 50	1 to 1000	1 to 1000	1 to 1 million	2.4 to 10	1 to 10 million		1 to 24	-20 to +30°	
Total of 4 subtotals below					Total	3,445	Total	16,613				
Yes	Basement floor(s)	Whole Basement	1	1	20	15	300	2.5	750	Yes	8	15
	Bedroom	1	1	5	5	25	2.5	63	Yes	8	15	
	Play room	1	1	5	5	25	2.5	63	Yes	8	15	
	Operating theatre	1	1	10	10	100	2.5	250	Yes	8	15	
	WC	1	1	3	3	9	2.5	23	Yes	8	15	
	Shower	1	1	1	3	3	2.5	8	Yes	8	15	
	Garage	1	1	3	6	18	2.5	45	Yes	8	15	
	Storeroom	1	1	10	5	50	2.5	125	Yes	8	15	
	Kitchen	1	1	3	5	15	2.5	38	Yes	8	15	
	Basement floor(s)	Room Subtotal				245		613				
Yes	Ground floor(s)	Whole Ground floor	2	1	20	15	600	2.5	3,000	Yes	8	20
	Bedroom	2	1	10	5	100	2.5	500	Yes	8	20	
	Play room	2	1	10	5	100	2.5	500	Yes	8	20	
	Operating theatre	2	1	10	5	100	2.5	500	Yes	8	20	
	WC	2	1	10	5	100	2.5	500	Yes	8	20	
	Shower	2	1	10	5	100	2.5	500	Yes	8	20	
	Garage	2	1	10	5	100	2.5	500	Yes	8	20	
	Storeroom	2	1	10	5	100	2.5	500	Yes	8	20	
	Kitchen	2	1	10	5	100	2.5	500	Yes	8	20	
	Ground floor(s)	Room Subtotal				800		4,000				
Yes	Upper floor(s)	Whole upper floors	2	2	20	15	1,200	2.5	6,000	Yes	8	20
	Bedroom	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Play room	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Operating theatre	2	2	5	10	200	2.5	1,000	Yes	8	20	
	WC	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Shower	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Garage	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Storeroom	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Kitchen	2	2	5	10	200	2.5	1,000	Yes	8	20	
	Upper floor(s)	Room Subtotal				1,600		8,000				
Yes	Top Floor(s) under Roof(s)	Whole top floor	2	1	20	15	600	2.5	3,000	Yes	8	20
	Bedroom	2	1	5	10	100	2.5	500	Yes	8	20	
	Play room	2	1	5	10	100	2.5	500	Yes	8	20	
	Operating theatre	2	1	5	10	100	2.5	500	Yes	8	20	
	WC	2	1	5	10	100	2.5	500	Yes	8	20	
	Shower	2	1	5	10	100	2.5	500	Yes	8	20	
	Garage	2	1	5	10	100	2.5	500	Yes	8	20	
	Storeroom	2	1	5	10	100	2.5	500	Yes	8	20	
	Kitchen	2	1	5	10	100	2.5	500	Yes	8	20	

# Room by Room

- Room by room heat loss calculator
- Includes all surrounding surfaces, doors and windows
- to determine radiator or under floor heating requirements
- Or help reduce demand to match a boiler size



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

# Room By Room Heat Losses

Room By Room Heat Losses										Boiler Size Check															
Room	Area	Volume	U-Value	Temp	Loss	Room	Area	Volume	U-Value	Temp	Loss	Room	Area	Volume	U-Value	Temp	Loss	Room	Area	Volume	U-Value	Temp	Loss		
Room 1	100	2000	0.5	15	1500	Room 2	150	3000	0.5	2250	Room 3	200	4000	0.5	3000	Room 4	250	5000	0.5	3750	Room 5	300	6000	0.5	4500
Room 6	350	7000	0.5	5250	Room 7	400	8000	0.5	6000	Room 8	450	9000	0.5	6750	Room 9	500	10000	0.5	7500	Room 10	550	11000	0.5	8250	
Room 11	600	12000	0.5	12000	Room 12	650	13000	0.5	12750	Room 13	700	14000	0.5	13500	Room 14	750	15000	0.5	14250	Room 15	800	16000	0.5	15000	
Room 16	850	17000	0.5	17250	Room 17	900	18000	0.5	18000	Room 18	950	19000	0.5	18750	Room 19	1000	20000	0.5	19500	Room 20	1050	21000	0.5	20250	
Room 21	1100	22000	0.5	22000	Room 22	1150	23000	0.5	22750	Room 23	1200	24000	0.5	23500	Room 24	1250	25000	0.5	24250	Room 25	1300	26000	0.5	25000	
Room 26	1350	27000	0.5	27000	Room 27	1400	28000	0.5	28000	Room 28	1450	29000	0.5	28750	Room 29	1500	30000	0.5	29500	Room 30	1550	31000	0.5	30250	
Room 31	1600	32000	0.5	32000	Room 32	1650	33000	0.5	32750	Room 33	1700	34000	0.5	33500	Room 34	1750	35000	0.5	34250	Room 35	1800	36000	0.5	35000	
Room 36	1850	37000	0.5	37000	Room 37	1900	38000	0.5	38000	Room 38	1950	39000	0.5	38750	Room 39	2000	40000	0.5	39500	Room 40	2050	41000	0.5	40250	
Room 41	2100	42000	0.5	42000	Room 42	2150	43000	0.5	42750	Room 43	2200	44000	0.5	43500	Room 44	2250	45000	0.5	44250	Room 45	2300	46000	0.5	45000	
Room 46	2350	47000	0.5	47000	Room 47	2400	48000	0.5	48000	Room 48	2450	49000	0.5	48750	Room 49	2500	50000	0.5	49500	Room 50	2550	51000	0.5	50250	
Room 51	2600	52000	0.5	52000	Room 52	2650	53000	0.5	52750	Room 53	2700	54000	0.5	53500	Room 54	2750	55000	0.5	54250	Room 55	2800	56000	0.5	55000	
Room 56	2850	57000	0.5	57000	Room 57	2900	58000	0.5	58000	Room 58	2950	59000	0.5	58750	Room 59	3000	60000	0.5	59500	Room 60	3050	61000	0.5	60250	
Room 61	3100	62000	0.5	62000	Room 62	3150	63000	0.5	62750	Room 63	3200	64000	0.5	63500	Room 64	3250	65000	0.5	64250	Room 65	3300	66000	0.5	65000	
Room 66	3350	67000	0.5	67000	Room 67	3400	68000	0.5	68000	Room 68	3450	69000	0.5	68750	Room 69	3500	70000	0.5	69500	Room 70	3550	71000	0.5	70250	
Room 71	3600	72000	0.5	72000	Room 72	3650	73000	0.5	72750	Room 73	3700	74000	0.5	73500	Room 74	3750	75000	0.5	74250	Room 75	3800	76000	0.5	75000	
Room 76	3850	77000	0.5	77000	Room 77	3900	78000	0.5	78000	Room 78	3950	79000	0.5	78750	Room 79	4000	80000	0.5	79500	Room 80	4050	81000	0.5	80250	
Room 81	4100	82000	0.5	82000	Room 82	4150	83000	0.5	82750	Room 83	4200	84000	0.5	83500	Room 84	4250	85000	0.5	84250	Room 85	4300	86000	0.5	85000	
Room 86	4350	87000	0.5	87000	Room 87	4400	88000	0.5	88000	Room 88	4450	89000	0.5	88750	Room 89	4500	90000	0.5	89500	Room 90	4550	91000	0.5	90250	
Room 91	4600	92000	0.5	92000	Room 92	4650	93000	0.5	92750	Room 93	4700	94000	0.5	93500	Room 94	4750	95000	0.5	94250	Room 95	4800	96000	0.5	95000	
Room 96	4850	97000	0.5	97000	Room 97	4900	98000	0.5	98000	Room 98	4950	99000	0.5	98750	Room 99	5000	100000	0.5	99500	Room 100	5050	101000	0.5	100250	



Room By Room Heat Losses										Boiler Size Check									
Degrees K	Degrees K	m2	W/m2.K	W	Degrees K	Degrees K	m3	W/m2.K	W	Degrees K	Degrees K	m4	W/m2.K	W	Degrees K	Degrees K	m5	W/m2.K	W
Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss	Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss	Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss	Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss
Floor (below)					Floor Ceiling Roof (above) minus rooflights					External Wall 1 (Long) minus windows and doors					External Wall 2 (Short) minus windows and doors				
© GBE Green Building Calculator 2017-2020																			
11	4	300	0.0819	1082	20	-5	299	0.0583	-1743	11	4	45.9	0.2512	507	11	4	33.4	0.2512	339
11	4	25	0.0819	90	20	-5	2	0.0583	-12	11	4	9.4	0.2512	104	11	4	9.4	0.2512	104
11	4	25	0.0819	90	20	-5	21	0.0583	-122	11	4	9.4	0.2512	104	11	4	9.4	0.2512	104
11	4	100	0.0819	361	20	-5	96	0.0583	-559	11	4	21.9	0.2512	242	11	4	21.9	0.2512	242
11	4	9	0.0819	32	20	-5	4	0.0583	-23	11	4	4.4	0.2512	49	11	4	4.4	0.2512	49
11	4	3	0.0819	11	20	-5	(3)	0.0583	17	11	4	(0.6)	0.2512	-7	11	4	4.4	0.2512	49
11	4	18	0.0819	65	20	-5	17	0.0583	-99	11	4	4.4	0.2512	49	11	4	11.9	0.2512	119
11	4	50	0.0819	180	20	-5	49	0.0583	-286	11	4	21.9	0.2512	242	11	4	9.4	0.2512	104
11	4	15	0.0819	54	20	-5	13	0.0583	-76	11	4	4.4	0.2512	49	11	4	9.4	0.2512	104
15	5	600	0.0583	2623	20	0	600	0.0583	0	0	20	45.9	0.0642	0	0	20	33.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
15	5	100	0.0583	437	20	0	100	0.0583	0	0	20	21.9	0.0642	0	0	20	9.4	0.0642	0
20	0	1,200	0.0583	0	20	0	1,200	0.0583	0	0	20	44.9	0.0642	0	0	20	32.4	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	200	0.0583	0	20	0	200	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	600	0.0583	0	0	20	599	0.0868	0	0	20	43.9	0.0642	0	0	20	31.4	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
20	0	100	0.0583	0	0	20	99	0.0868	0	0	20	9.4	0.0642	0	0	20	21.9	0.0642	0
8085					-2902					1339					11				

Degrees K	Degrees K	m13	W/m2.K	W	Degrees K	Degrees K	m14	W/m2.K	W	Degrees K	Degrees K	m15	W/m2.K	W	W	BTU	W	BTU	W	BTU
Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss	Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss	Temperature other side	Temperature difference	Surface Area	U value	Surface Heat loss	Total surface heat losses					
Internal partition 4 (Short) minus internal doors					Internal partition 5					Internal partition 6					Room		Floor		Building	
															1	Watt	=	0.056884	BTU	
15	0	37.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0			1106	63	4300	245
15	0	12.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	508	29	Basement			
15	0	12.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	397	23				
15	0	25	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	783	45				
15	0	7.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	217	12				
15	0	7.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	126	7				
15	0	15	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	340	19				
15	0	12.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	600	34				
15	0	12.5	0.2033	0	15	0	0	0.2033	0	15	0	0	0.2033	0	297	17				
20	0	37.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0			3194	182		
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36	Ground floor			
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	12.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	628	36				
20	0	37.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0			0	0	Upper floors	
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	37.5	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0			0	0	Top Floor	
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
20	0	25	0.2033	0	20	0	0	0.2033	0	20	0	0	0.2033	0	0	0				
				0					0					0						
														Demand	12,591	Watts				
														Heat Source Size	0	Watts	0	KiloWatts		
														Difference	-12,591	Watts				

# Form Factor:

- A quick analysis of the building form factor
- Is it cubic, linear, lumpy or have wings,
- or is it terrace or multi-storey
- Sets target U values to engage with
- Which go beyond regulations to make a low energy consumption building

# Form Factor

<b>Student name:</b>	over type with User's name							
<b>Project name:</b>	over type with Project name							
<b>Project address:</b>	Over type with Project address							
<b>Project Brief Employer Requirements or Architect's Proposal</b>								
<b>Form Factor</b>		No.	No.	m	m	m <sup>2</sup>	m	m <sup>3</sup>
Building(s)	Room Functions	Number of buildings	Number of floors	length(s)	width(s)	Area	Room heights	Volumes
© GBE Calculator 2018-2020		1 to 1000	1 to 50	1 to 1000	1 to 1000	1 to 1 million	2.4 to 10	1 to 10 million
Whole Building	All rooms	1	5	20	15	1500	2.5	3750

Yes/No

Achived in Design

Yes

External wall	1	5	200	150	4375	2.5
Ground floor footprint	1		20	15	300	
Roof area	1		20	15	300	
Heat Loss Surface Area	1				4975	m <sup>2</sup>
Treated Floor Area	1	5	20	15	1500	m <sup>2</sup>

0	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Form Factor (FF)	SA/TFA	3.32
Typology/Shapeology	FF	
Target Form Factor FF	Apartment Block or uniform terrace	<2
	Semi-detached or compact detached houses	2 to 3
	Less compact detached houses or compact detached bungalows	3 to 4
	Complex shaped detached bungalows	>4

Target U values	Unit
0.2 to 0.15	W/m <sup>2</sup> .K
0.15 to 0.12	W/m <sup>2</sup> .K
0.12 to 0.10	W/m <sup>2</sup> .K
<0.1	W/m <sup>2</sup> .K

# Future development:

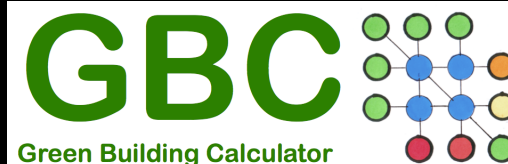
## Form factor

- Correlation between form factor and insulation thicknesses
- To adjust for dormers, bay windows, porches, conservatories, oriel windows, colonnades, etc.





<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# Form Factor (Development)

<b>Student name:</b>	over type with User's name								
<b>Project name:</b>	over type with Project name								
<b>Project address:</b>	Over type with Project address								
<b>Project Brief Employer Requirements or Architect's Proposal</b>									
<b>Form Factor</b>		No.	No.	m	m	m <sup>2</sup>	m	m <sup>3</sup>	
Building(s)	Room Functions	Number of buildings	Number of floors	length(s)	width(s)	Area	Room heights	Volumes	
© GBE Calculator 2018-2020		1 to 1000	1 to 50	1 to 1000	1 to 1000	1 to 1 million	2.4 to 10	1 to 10 million	
Whole Building	All rooms	1	5	20	15	1500	2.5	3750	
		m <sup>3</sup>							
External wall		1	5	200	150	4375	2.5		
Ground floor footprint		1		20	15	300			
Roof area		1		20	15	300			
Heat Loss Surface Area	SA	1				4975	m <sup>2</sup>		
Treated Floor Area	TFA	1	5	20	15	1500	m <sup>2</sup>		
Form Factor range	0 1 2 3 4 5 6 7 8								
Form Factor (FF)	SA/TFA					3.32	Used by Zero Carbon Hub's Designer's Manual		
Target Form Factor FF	Typology/Shapeology					FF	Target U values	Y/N	Unit
	Apartment Block or uniform terrace					<2	1	0.2 to 0.15	N
	Semi-detached or compact detached houses					2 to 3	2	0.15 to 0.12	N
	Less compact detached houses or compact detached bungalows					3 to 4	3	0.12 to 0.10	Y
	Complex shaped detached bungalows					>4	4	<0.1	N
Surface to Volume Ratio	0.6 1 1.5 2 2.5 3.5 5								
Surface to Volume Ratio	SA/V					1.33	Used by AECB, CarbonLite and PassivhausUK columns V to Z in worksheet 'U values Etc'.		
Project Size: If areas vary between floors and/or if rooms need different temperatures go to 'ScheduleAccommodation'									
Pending:	%%%								
Passivhaus training data to add here									
Other Form Factor Calculations to add									
Interaction with U values to be implemented									
No dependents outside this worksheet									

Yes/No

Achived in Design

Yes

# Building Elements

## Sizes and Areas:

- List of 29 building elements and 12 secondary-elements and their areas
- User identifies which are included in their project design
- Add any of their respective dimensions and areas missing from the schedule of accommodation

# Building Elements

Building Elements			© GBE Calculator 2018-2020		
			User name:	over type with User's name	
Buildings	1	Foot print:	1500	Floors	5
Use/Function	Overwrite with building type not Fire station Opera house Facility Clinic				
External Winter low temperature	4	degrees C	Get local Met Office data for you site		
Subsoil temperature	11	degrees C	Below 1 meter constant 10 to 12 (UK)		
Internal Winter Temperature	20	degrees C	Replace with bespoke temperature 0 to 30		
Communal Area Winter Temperature	15	degrees C	Replace with bespoke temperature 0 to 30		
Basement Winter Temperature	15	degrees C	Replace with bespoke temperature 0 to 30		
Other Internal Temperatures	15	degrees C	Other parts of building at diff temp 0 to 30		
Hours of operation	8	Hrs	1 to 24?		
Storey height (default if consistent)	2.5	m	2.5 to 10 You can add different heights later		
Basement	Yes	Yes/No	External Walls	Yes	Yes/No
Basement Floor	Yes	Yes/No	Wall between integral unheated and heated room	Yes	Yes/No
Basement Perimeter Walls	Yes	Yes/No	Internal partitions/walls	Yes	Yes/No
Basement Roof at site level	Yes	Yes/No	Compartment walls	Yes	Yes/No
Basement Roof at subterranean level	Yes	Yes/No	Party Wall	Yes	Yes/No
Basement overhead Glazed pavement	Yes	Yes/No	Windows	Yes	Yes/No
Basement partition walls	Yes	Yes/No	Glazed Pedestrian Doors	Yes	Yes/No
Swimming pool basin	Yes	Yes/No	Opaque Pedestrian Doors	Yes	Yes/No
Ground floor over basement	Yes	Yes/No	Rooflights	Yes	Yes/No
Ground floor over void	Yes	Yes/No	Roof windows	Yes	Yes/No
Ground floor ground bearing	Yes	Yes/No	Glazed External Walls	Yes	Yes/No
Upper floor	Yes	Yes/No	Opaque Curtain wall	Yes	Yes/No
Compartment floors	Yes	Yes/No	Display Window	Yes	Yes/No
Party Floor	Yes	Yes/No	Large wall opening/Vehicle Door	Yes	Yes/No
External floor (over air)	Yes	Yes/No	High Usage Entrance Door	Yes	Yes/No
Flat roof	Yes	Yes/No	Glazed roof	Yes	Yes/No
Shallow roof	Yes	Yes/No	Roof vents	Yes	Yes/No
Pitched roof	Yes	Yes/No	Dormer Roofs	Yes	Yes/No
Dome Roof	Yes	Yes/No	Dormer Walls	Yes	Yes/No
Barrel vault roof	Yes	Yes/No	Dormer Windows	Yes	Yes/No
Flat ceiling (below pitched, barrel or domed roof)	Yes	Yes/No	Parapets	No	Yes/No
Vaulted ceiling	Yes	Yes/No	Chimneys	No	Yes/No
Barrel vault ceiling	Yes	Yes/No	Pending	No	Yes/No
Dome ceiling	Yes	Yes/No	Pending	No	Yes/No



# Building Element Areas

Yes/No	Building Element Areas			Yes/No	© GBE Calculator 2018-2020	
Yes	Basement Floor (BF)					
	Number of basements	1	No.		Basement Footprint	300 m2
	Width of basement	15	m		Total basement floor area(s)	300 m2
	Length of basement	20	m			
	Height of basement walls	2.5	m			
Yes	Basement Perimeter Walls (BPW)					
	Number of basements	1	No.		Length of Basement walls	70 m
	Width of basement	15	m		Basement wall areas	175 m2
	Length of basement	20	m		Total Basement Walls Area(s)	437.5 m2
	Height of basement walls	2.5	m			
Yes	Basement Partitions (BP)					
	Number of basements	1	No.		Basement Internal partitions areas	125 m2
	Width of Basement partitions	0.1	m		Total Basement Internal partitions areas	125 m2
	Length of Basement partitions	50	m			
	Height of Basement partitions	2.5	m			
Yes	Basement Roof at Site Level (BRSL)					
	Number of basement roof at site level	1	No.		Area of basement roof at site level	300 m2
	Width of Basement roof at site level	15	m		Total area of basement roof at site level	300 m2
	Length of Basement roof at site level	20	m			
Yes	Glazed Pavement over Basement (GPOB)					
	Number of Glazed Pavement over Basement	1	No.		Area of Glazed Pavement over Basement	11 m2
	Width of Glazed Pavement over Basement	1	m		Total Area of Glazed Pavement over Basement	11 m2
	Length of Glazed Pavement over Basement	11	m			
	Depth of Glazed Pavement over Basement	0.3	m			
Yes	Basement Roof at Subterranean Level (BRSL)					
	Number of basement roof at subterranean level	1	No.		Area of basement roof at subterranean level	300 m3
	Width of Basement roof at subterranean level	15	m		Total area of basement roof at subterranean level	300 m3
	Length Basement roof at subterranean level	20	m			
Yes	Swimming Pool Basin (SPB)					
	Number of Swimming pool basin	1	No.		Surface Area of Swimming pool basin	1448 m2
	Width of Swimming pool basin	8	m		Total Surface Area of Swimming pool basin	1448 m2
	Length of Swimming pool basin	100	m			
	Height of Swimming pool basin	3	m			
Yes	Ground floor (over basement) (GFOB)					
	Number of ground floors (over basement) (GFOB)	1	No.		Ground floor footprint	300 m2
	Width of ground floor (over basement) (GFOB)	15	m		Total Ground floor area(s) (over basement)	300 m2
	Length of Ground floor (over basement)	20	m		Length of GF External walls	70 m
	Height of GF External walls	2.5	m		Total GF External wall areas	175 m2
Yes	Ground floor (ground bearing) (GFGB)					
	Number of ground floors (ground bearing)	1	No.		Ground floor footprint (ground bearing)	300 m2
	Width of ground floor (ground bearing)	15	m		Total Ground floor area(s)	300 m2
	Length of ground floor (ground bearing)	20	m		Length of GF External walls	70 m
	Height of GF External walls	2.5	m		Total GF External wall areas	175 m2
Yes	Ground floor (over void) (GFOV)					
	Number of ground floors (over void)	1	No.		Ground floor (over void) area(s)	300 m3
	Width of ground floor (over void)	15	m		Total Ground floor area(s)	300 m2
	Length of ground floor (over void)	20	m		Length of GF External walls	70 m
	Height of GF External walls	2.5	m		Total GF External wall areas	175 m2

# Multiple Secondary Element Sizes:

- To accommodate a multitude of secondary element sizes an additional schedule is included

# Building Elements Multiples

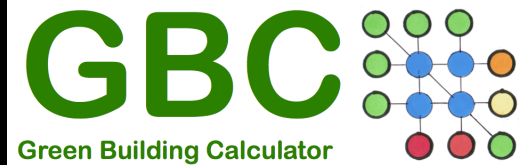
Multiple Size Building Elements				© GBE Calculator 2018-2020										
BF		m2	BF A	BF B	BF C	BF D	BF E	BF F	BF G	BF H	BF I	BF J	BF K	BF L
BF Width	m		0	0	0	0	0	0	0	0	0	0	0	0
BF Height	m		0	0	0	0	0	0	0	0	0	0	0	0
BF Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
BF Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
BPW		m2	BPW A	BPW B	BPW C	BPW D	BPW E	BPW F	BPW G	BPW H	BPW I	BPW J	BPW K	BPW L
BPW Width	m		0	0	0	0	0	0	0	0	0	0	0	0
BPW Height	m		0	0	0	0	0	0	0	0	0	0	0	0
BPW Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
BPW Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
BP		m2	BP A	BP B	BP C	BP D	BP E	BP F	BP G	BP H	BP I	BP J	BP K	BP L
BP Width	m		0	0	0	0	0	0	0	0	0	0	0	0
BP Height	m		0	0	0	0	0	0	0	0	0	0	0	0
BP Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
BP Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
BRSL		m2	BRSL A	BRSL B	BRSL C	BRSL D	BRSL E	BRSL F	BRSL G	BRSL H	BRSL I	BRSL J	BRSL K	BRSL L
BRSL Width	m		0	0	0	0	0	0	0	0	0	0	0	0
BRSL Height	m		0	0	0	0	0	0	0	0	0	0	0	0
BRSL Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
BRSL Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
GPOB		m2	GPOB A	GPOB B	GPOB C	GPOB D	GPOB E	GPOB F	GPOB G	GPOB H	GPOB I	GPOB J	GPOB K	GPOB L
GPOB Width	m		0	0	0	0	0	0	0	0	0	0	0	0
GPOB Height	m		0	0	0	0	0	0	0	0	0	0	0	0
GPOB Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
GPOB Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
BRSL		m2	BRSL A	BRSL B	BRSL C	BRSL D	BRSL E	BRSL F	BRSL G	BRSL H	BRSL I	BRSL J	BRSL K	BRSL L
BRSL Width	m		0	0	0	0	0	0	0	0	0	0	0	0
BRSL Height	m		0	0	0	0	0	0	0	0	0	0	0	0
BRSL Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
BRSL Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
SPB		m2	SPB A	SPB B	SPB C	SPB D	SPB E	SPB F	SPB G	SPB H	SPB I	SPB J	SPB K	SPB L
SPB Width	m		0	0	0	0	0	0	0	0	0	0	0	0
SPB Length	m		0	0	0	0	0	0	0	0	0	0	0	0
SPB Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
SPB Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
GFOB		m2	GFOB A	GFOB B	GFOB C	GFOB D	GFOB E	GFOB F	GFOB G	GFOB H	GFOB I	GFOB J	GFOB K	GFOB L
GFOB Width	m		0	0	0	0	0	0	0	0	0	0	0	0
GFOB Height	m		0	0	0	0	0	0	0	0	0	0	0	0
GFOB Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
GFOB Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
GFGB		m2	GFGB A	GFGB B	GFGB C	GFGB D	GFGB E	GFGB F	GFGB G	GFGB H	GFGB I	GFGB J	GFGB K	GFGB L
GFGB Width	m		0	0	0	0	0	0	0	0	0	0	0	0
GFGB Height	m		0	0	0	0	0	0	0	0	0	0	0	0
GFGB Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
GFGB Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0
GFOV		m2	GFOV A	GFOV B	GFOV C	GFOV D	GFOV E	GFOV F	GFOV G	GFOV H	GFOV I	GFOV J	GFOV K	GFOV L
GFOV Width	m		0	0	0	0	0	0	0	0	0	0	0	0
GFOV Height	m		0	0	0	0	0	0	0	0	0	0	0	0
GFOV Quantity	No.		0	0	0	0	0	0	0	0	0	0	0	0
GFOV Area Total	0		0	0	0	0	0	0	0	0	0	0	0	0

## U Values Etc.:

- Comparisons between National Building Regulations (E, W, S, NI and others), Energy Standards, FEES, AECB CarbonLite, Passivhaus, EnerPHit, EAMs, etc.
- Including: U values, Airtightness, Form factors, Primary Energy, etc.
- Allowing users to choose and apply chosen set of targets to projects.



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

# U values Etc. Energy Targets

CHOOSE WHICH COLUMN		Building Regulations Approved Document L										Scottish 2010		AECB		PH/AECB Passivhaus		BREEAM		Other Nat. Stads.		Minergie		Target U values		Northern Ireland					FEES SAP		FEES PHPP			
Building name																																				
Client name																																				
Project name																																				
Project address																																				
Project location																																				
Project description																																				
Project details																																				
Project owner																																				
Project manager																																				
Project architect																																				
Project engineer																																				
Project contractor																																				
Project date																																				
Project status																																				
Project type																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				
Project details																																				

## None address Overheating calculations

Regulations/Standards

Building Regulations Approved Documents L & M

Scottish 2010

AECB

Passivhaus 2010

Passivhaus 2010

EcoHomes Code for Sustainable Homes

BREEAM

LETI London Energy Transformation Initiative.

Other Nat. Stads.

Minimum Values

UKA

UKB

UKA

UKA & UKB

UKB

Domestic

Domestic

Step 1

Step 1

Step 2

Step 3

Step 4

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

Domestic

# Future Development: Capture National U values

Regulations/Standards		Other National Standards			
Winter heat loss © GBE Green Building Calculator 2017-2020		Domestic		Non-domestic	
User Name:		Other National Regulation or GBC standards			
Chosen column:		New Build	Refurbishment	New Build	Refurbishment
	Target U values	W/m2.K	W/m2.K	W/m2.K	W/m2.K
	Yes/No	Yes	Yes	Yes	Yes
Floor	Basement Floor				
	Swimming Pool Basin				
	Upper floors (including ground floor over basement)				
	Ground floor over ground				
	Ground floor over ventilated void				
	Floor with underfloor heating				
	External floor over air				
	Compartment Floor				
	Party Floor				
Wall	Basement Perimeter Wall				
	Basement internal Wall/Partitions				
	External wall				
	External wall Insulated Cavity				
	External wall Solid wall insulated (Int or Ext)or Ext)				
	External wall Solid wall insulated (Internal)				
	Internal partition/wall				
	Compartment Wall				
	Party Wall				
	Solid Wall				
	Unfilled cavity unsealed edges				
	Unfilled cavity sealed edges thermal breaks				
	Filled cavity sealed edges thermal breaks				
Roof	Roofs (includes opaque parts of dormers)				
	Flat roof				
	Shallow roof				
	Pitched roof (insulation at rafter)				
	Loft ceiling (insulation at ceiling)				
	Barrel Vault roof				
	Dormed Roof				
	Eaves overhang				
	Verge overhang				
	Basement roof at site level				
	Basement roof at subterranean level				
Glazing	Glazing (Maximum % of total area)				
	Windows (whole window value)				
	Glazed Pedestrian Doors				
	Vehicle access and similar large doors				
	High usage entrance doors				
	Opaque Door				
	Rooflights				
	Roof windows				
	Roof ventilation including smoke vents				
	Glazed roof				
	Glazed wall/Curtain walling				
	Display windows				
	Opaque Curtain wall				
	Glazed pavement				



# Insulation: Material k values to U Value Thicknesses

- Lists of insulation materials organised by material groups
- with best, average and worst k values
- Applying the chosen U values, this provides an instant comparison of materials and thicknesses



# Insulation Thicknesses k values

Material	Thickness (mm)	k-value (W/mK)	U-value (W/m²K)	R-value (m²K/W)
Concrete	100	1.7	0.17	0.59
Concrete	150	1.7	0.26	0.38
Concrete	200	1.7	0.35	0.28
Concrete	250	1.7	0.44	0.23
Concrete	300	1.7	0.53	0.19
Concrete	350	1.7	0.62	0.16
Concrete	400	1.7	0.71	0.14
Concrete	450	1.7	0.80	0.12
Concrete	500	1.7	0.89	0.11
Concrete	550	1.7	0.98	0.10
Concrete	600	1.7	1.07	0.09
Concrete	650	1.7	1.16	0.08
Concrete	700	1.7	1.25	0.08
Concrete	750	1.7	1.34	0.07
Concrete	800	1.7	1.43	0.07
Concrete	850	1.7	1.52	0.06
Concrete	900	1.7	1.61	0.06
Concrete	950	1.7	1.70	0.06
Concrete	1000	1.7	1.79	0.05
Concrete	1050	1.7	1.88	0.05
Concrete	1100	1.7	1.97	0.05
Concrete	1150	1.7	2.06	0.04
Concrete	1200	1.7	2.15	0.04
Concrete	1250	1.7	2.24	0.04
Concrete	1300	1.7	2.33	0.04
Concrete	1350	1.7	2.42	0.04
Concrete	1400	1.7	2.51	0.03
Concrete	1450	1.7	2.60	0.03
Concrete	1500	1.7	2.69	0.03
Concrete	1550	1.7	2.78	0.03
Concrete	1600	1.7	2.87	0.03
Concrete	1650	1.7	2.96	0.03
Concrete	1700	1.7	3.05	0.03
Concrete	1750	1.7	3.14	0.03
Concrete	1800	1.7	3.23	0.03
Concrete	1850	1.7	3.32	0.03
Concrete	1900	1.7	3.41	0.03
Concrete	1950	1.7	3.50	0.03
Concrete	2000	1.7	3.59	0.02
Concrete	2050	1.7	3.68	0.02
Concrete	2100	1.7	3.77	0.02
Concrete	2150	1.7	3.86	0.02
Concrete	2200	1.7	3.95	0.02
Concrete	2250	1.7	4.04	0.02
Concrete	2300	1.7	4.13	0.02
Concrete	2350	1.7	4.22	0.02
Concrete	2400	1.7	4.31	0.02
Concrete	2450	1.7	4.40	0.02
Concrete	2500	1.7	4.49	0.02
Concrete	2550	1.7	4.58	0.02
Concrete	2600	1.7	4.67	0.02
Concrete	2650	1.7	4.76	0.02
Concrete	2700	1.7	4.85	0.02
Concrete	2750	1.7	4.94	0.02
Concrete	2800	1.7	5.03	0.02
Concrete	2850	1.7	5.12	0.02
Concrete	2900	1.7	5.21	0.02
Concrete	2950	1.7	5.30	0.02
Concrete	3000	1.7	5.39	0.02
Concrete	3050	1.7	5.48	0.02
Concrete	3100	1.7	5.57	0.02
Concrete	3150	1.7	5.66	0.02
Concrete	3200	1.7	5.75	0.02
Concrete	3250	1.7	5.84	0.02
Concrete	3300	1.7	5.93	0.02
Concrete	3350	1.7	6.02	0.02
Concrete	3400	1.7	6.11	0.02
Concrete	3450	1.7	6.20	0.02
Concrete	3500	1.7	6.29	0.02
Concrete	3550	1.7	6.38	0.02
Concrete	3600	1.7	6.47	0.02
Concrete	3650	1.7	6.56	0.02
Concrete	3700	1.7	6.65	0.02
Concrete	3750	1.7	6.74	0.02
Concrete	3800	1.7	6.83	0.02
Concrete	3850	1.7	6.92	0.02
Concrete	3900	1.7	7.01	0.02
Concrete	3950	1.7	7.10	0.02
Concrete	4000	1.7	7.19	0.02
Concrete	4050	1.7	7.28	0.02
Concrete	4100	1.7	7.37	0.02
Concrete	4150	1.7	7.46	0.02
Concrete	4200	1.7	7.55	0.02
Concrete	4250	1.7	7.64	0.02
Concrete	4300	1.7	7.73	0.02
Concrete	4350	1.7	7.82	0.02
Concrete	4400	1.7	7.91	0.02
Concrete	4450	1.7	8.00	0.02
Concrete	4500	1.7	8.09	0.02
Concrete	4550	1.7	8.18	0.02
Concrete	4600	1.7	8.27	0.02
Concrete	4650	1.7	8.36	0.02
Concrete	4700	1.7	8.45	0.02
Concrete	4750	1.7	8.54	0.02
Concrete	4800	1.7	8.63	0.02
Concrete	4850	1.7	8.72	0.02
Concrete	4900	1.7	8.81	0.02
Concrete	4950	1.7	8.90	0.02
Concrete	5000	1.7	8.99	0.02
Concrete	5050	1.7	9.08	0.02
Concrete	5100	1.7	9.17	0.02
Concrete	5150	1.7	9.26	0.02
Concrete	5200	1.7	9.35	0.02
Concrete	5250	1.7	9.44	0.02
Concrete	5300	1.7	9.53	0.02
Concrete	5350	1.7	9.62	0.02
Concrete	5400	1.7	9.71	0.02
Concrete	5450	1.7	9.80	0.02
Concrete	5500	1.7	9.89	0.02
Concrete	5550	1.7	9.98	0.02
Concrete	5600	1.7	10.07	0.02
Concrete	5650	1.7	10.16	0.02
Concrete	5700	1.7	10.25	0.02
Concrete	5750	1.7	10.34	0.02
Concrete	5800	1.7	10.43	0.02
Concrete	5850	1.7	10.52	0.02
Concrete	5900	1.7	10.61	0.02
Concrete	5950	1.7	10.70	0.02
Concrete	6000	1.7	10.79	0.02
Concrete	6050	1.7	10.88	0.02
Concrete	6100	1.7	10.97	0.02
Concrete	6150	1.7	11.06	0.02
Concrete	6200	1.7	11.15	0.02
Concrete	6250	1.7	11.24	0.02
Concrete	6300	1.7	11.33	0.02
Concrete	6350	1.7	11.42	0.02
Concrete	6400	1.7	11.51	0.02
Concrete	6450	1.7	11.60	0.02
Concrete	6500	1.7	11.69	0.02
Concrete	6550	1.7	11.78	0.02
Concrete	6600	1.7	11.87	0.02
Concrete	6650	1.7	11.96	0.02
Concrete	6700	1.7	12.05	0.02
Concrete	6750	1.7	12.14	0.02
Concrete	6800	1.7	12.23	0.02
Concrete	6850	1.7	12.32	0.02
Concrete	6900	1.7	12.41	0.02
Concrete	6950	1.7	12.50	0.02
Concrete	7000	1.7	12.59	0.02
Concrete	7050	1.7	12.68	0.02
Concrete	7100	1.7	12.77	0.02
Concrete	7150	1.7	12.86	0.02
Concrete	7200	1.7	12.95	0.02
Concrete	7250	1.7	13.04	0.02
Concrete	7300	1.7	13.13	0.02
Concrete	7350	1.7	13.22	0.02
Concrete	7400	1.7	13.31	0.02
Concrete	7450	1.7	13.40	0.02
Concrete	7500	1.7	13.49	0.02
Concrete	7550	1.7	13.58	0.02
Concrete	7600	1.7	13.67	0.02
Concrete	7650	1.7	13.76	0.02
Concrete	7700	1.7	13.85	0.02
Concrete	7750	1.7	13.94	0.02
Concrete	7800	1.7	14.03	0.02
Concrete	7850	1.7	14.12	0.02
Concrete	7900	1.7	14.21	0.02
Concrete	7950	1.7	14.30	0.02
Concrete	8000	1.7	14.39	0.02
Concrete	8050	1.7	14.48	0.02
Concrete	8100	1.7	14.57	0.02
Concrete	8150	1.7	14.66	0.02
Concrete	8200	1.7	14.75	0.02
Concrete	8250	1.7	14.84	0.02
Concrete	8300	1.7	14.93	0.02
Concrete	8350	1.7	15.02	0.02
Concrete	8400	1.7	15.11	0.02
Concrete	8450	1.7	15.20	0.02
Concrete	8500	1.7	15.29	0.02
Concrete	8550	1.7	15.38	0.02
Concrete	8600	1.7	15.47	0.02
Concrete	8650	1.7	15.56	0.02
Concrete	8700	1.7	15.65	0.02
Concrete	8750	1.7	15.74	0.02
Concrete	8800	1.7	15.83	0.02
Concrete	8850	1.7	15.92	0.02
Concrete	8900	1.7	16.01	0.02
Concrete	8950	1.7	16.10	0.02
Concrete	9000	1.7	16.19	0.02
Concrete	9050	1.7	16.28	0.02
Concrete	9100	1.7	16.37	0.02
Concrete	9150	1.7	16.46	0.02
Concrete	9200	1.7	16.55	0.02
Concrete	9250	1.7	16.64	0.02
Concrete	9300	1.7	16.73	0.02
Concrete	9350	1.7	16.82	0.02
Concrete	9400	1.7	16.91	0.02
Concrete	9450	1.7	17.00	0.02
Concrete	9500	1.7	17.09	0.02
Concrete	9550	1.7	17.18	0.02
Concrete	9600	1.7	17.27	0.02
Concrete	9650	1.7	17.36	0.02
Concrete	9700	1.7	17.45	0.02
Concrete	9750	1.7	17.54	0.02
Concrete	9800	1.7	17.63	0.02
Concrete	9850	1.7	17.72	0.02
Concrete	9900	1.7	17.81	0.02
Concrete	9950	1.7	17.90	0.02
Concrete	10000	1.7	18.00	0.02

# Materials > k values > U values > Thickness

Materials > k values > U values > Thicknesses

Chosen column:		Group	Mainly mineral based														
AB	Form		Fibre					Foam									
			Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Slabs sections	Slabs sections	Slabs sections	Slabs sections	Slabs sections	Slabs sections	Slabs sections	Slabs sections	Slabs sections	Slabs sections
			Class Mineral Wool	Stone Mineral Wool	Blast Furnace Slag wool	Asbestos fibre (yes its used in eastern europe)	Ceramic Fiber (no longer available in UK/EU market)	Cellular glass	Cellular glass / Recycled Glass balls	Cellulat glass chips	Lightweight Expanded clay Aggregate	Lightweight Expanded Sewage Aggregate	Calcium Silicate	Extruded Hollow Clay Blocks	Autoclaved Aerated Concrete	Hollow Dense concrete block	Aerated Concrete
			Initials														
			Material														
			Initials														
			k values	Worst	W/m.K	0.045	0.045	0.040	Don't	Don't	0.060	0.060	0.100		0.059	0.390	0.110
			k values	Best	W/m.K	0.031	0.031	0.031	Use	Use	0.037	0.039	0.100		0.059	0.270	0.110
			k values	Average	W/m.K	0.038	0.038	0.036	It	It	0.049	0.050	0.100	0.000	0.000	0.059	0.330
			U values	W/m2.K	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
Floor	© GBE Calculator 2018	Yes	Basement Floor	0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Swimming Pool Basin	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Upper floors (including ground floor over basement)	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Ground floor over ground	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Ground floor over ventilated void	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Floor with underfloor heating	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	External floor over air	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Compartment Floor	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Party Floor	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
				0.00													
Walls	Basement Perimeter Wall	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Basement internal Wall/Partitions	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	External wall	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	External wall Insulated Cavity	No		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	External wall Solid wall insulated (Int or Ext)	No		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Internal partition/wall	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Compartment Wall	Yes		0.30	W/m2.K	127	127	118			162	165	333		197	1100	367
	Party Wall	Yes		0.30	W/m2.K	127	127	118			162	165	333		197	1100	367
	Solid Wall	No		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Unfilled cavity unsealed edges	No		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
Unfilled cavity sealed edges thermal breaks	No		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733	
Filled cavity sealed edges thermal breaks	No		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733	
Roof	Roofs (includes opaque parts of dormers)			0.00													
	Flat roof	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Shallow roof	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Pitched roof (insulation at rafter)	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Loft ceiling (insulation at ceiling)	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Barrel Vault roof	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Domed Roof	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
	Eaves overhang	Yes	Unregulated		W/m2.K												
	Verge overhang	Yes	Unregulated		W/m2.K												
	Basement roof at site level	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733
Basement roof at subterranean level	Yes		0.15	W/m2.K	253	253	237			323	330	667		393	2200	733	
Glazing	Glazing (Maximum % of total area)			0.00	%												
	Windows (whole window value)	Yes		0.95	W/m2.K	40	40	37			51	52	105		62	347	116
	Glazed Pedestrian Doors	Yes		0.95	W/m2.K	40	40	37			51	52	105		62	347	116
	Vehicle access and similar large doors	Yes		0.75	W/m2.K	51	51	47			65	66	133		79	440	147
	High usage entrance doors	Yes		0.75	W/m2.K	51	51	47			65	66	133		79	440	147
	Opaque Door	Yes		0.75	W/m2.K	51	51	47			65	66	133		79	440	147
	Rooflights	Yes		0.95	W/m2.K	40	40	37			51	52	105		62	347	116
	Roof windows	Yes		0.95	W/m2.K	40	40	37			51	52	105		62	347	116
	Roof ventilation including smoke vents	Yes		0.75	W/m2.K	51	51	47			65	66	133		79	440	147
	Glazed roof	Yes		0.95	W/m2.K	40	40	37			51	52	105		62	347	116
			Instructions	ScheduleAccommodation	BuildingAreas	U values Etc	Insulation	Legend	Elements	UToWattsToCO2	CostsPerm2	MaterialCostThickness	Revisions	Resistances			

Mainly mineral based														Fibre						Foam							Mainly Fossil Oil-based			
													Foam trapped rigid packed beads vacuum	Fiber Quilts	Fiber Quilts	Fiber Quilts	Fiber Quilts	Beads, Boards	Boards	Beads, Boards	Boards	Boards	Boards	Boards	Boards	Boards	Boards	Boards	Boards	
Cellulat glass chips	Loose LECA	Loose LESA	Boards CS	Extnud Hollow Clay Blocks EHCBC	Autoclaved Aerated Concrete AAC	Hollow Dense concrete block HDCB	Aerated Concrete AC	Lightweight aggregate concrete LAC	Aerogel A	Expanded Perlite EP	Expanded Perlite water repellent EPWR	Exfoliated Vermiculite EV	Vacuum insulated panel VIP	Polyester fibre PF	Polypropylene Fleece PPF	Soft Foam Polyethylene SFP	Other plastic fibre OPF	Expanded polystyrene EPS	Recycled Expanded polystyrene REPS	Expanded polystyrene Cement Bound EPSCB	Extnud polystyrene XPS	Extnud polystyrene (HFC Blown) XPSH	Extnud polystyrene (CO2 blown) XPSC	Polyurethane PUR	Polyisocyanurate PIR					
0.100			0.059	0.390	0.110	0.550	0.160	0.230	0.013	0.050	0.053		0.006		0.500	0.040		0.044	0.040	0.060	0.040	0.032	0.040	0.040	0.035					
0.100			0.059	0.270	0.110	0.550	0.160	0.120	0.013	0.050	0.053		0.006		0.500	0.040		0.032	0.032	0.060	0.027	0.032	0.040	0.022	0.025					
0.100	0.000	0.000	0.059	0.330	0.110	0.550	0.160	0.175	0.013	0.050	0.053	0.000	0.006	0.000	0.500	0.040	0.000	0.038	0.036	0.060	0.034	0.032	0.040	0.031	0.030					
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400	223	213	267	207	200					
667			393	2200	733	3667	1067	1167	87	333	353		40		3333	267		253	240	400										



			Mainly Plant based																				Animal Fibre				Mixed					
Multifil	Foam		Fibre																				Quilt		Loose		Insulu	Spray	Block			
	Foam Profile	Injected foam	Rigid Board	Board	Board	Batt	Quilt	Flake	Board	Board	Quilt	Quilt	Quilt	Quilt	Quilt	Granula's	Rigid Board	Panel	Panel	Quilt	Thatch	Rigid Board									Bale	
Multifil Aluminium Polyethylene Multi-material Quilt	Rubber Foam	Blobbed plastic foam	Wood fibre board rigid (wet formed)	Wood fibre board	Porous Wood Fibre Board	Wood fibre Batt	Wood fibre wool	Cellulose Fiber Flake (recycled newspaper)	Cellulose	Cellulose fibre board (Softboard)	Textile /Textile mix	Flax	Flax with Polyester supporting fibre	Hemp	Hemp	Cork	Expanded Cork Board	Medium Density Fibreboard	Orientated Strand Board	Grass	Straw	Straw Board	Straw bale	Lamb's/Sheep's wool	Goat hair	Bird Feather	↓	Hemp-lime (Hempcrete)	Hemp-lime	Hemp-lime	Hemp & wood fibre	
RF	BBPF	WFRB	WFBa	PWFB	WFBa	WFW	CFF	CB	CFB	T	FF	FP	HF	HFP	C	ECB	MDF	OSB	GF	S	420	SBa	25	L/SW	GH	BF	SCC	HLI	HL.S	HL.B	HWF	
			0.039	0.055	0.045	0.050	0.036	0.036	0.039	0.040	0.120		0.040	0.040	0.040	0.060	0.045	0.070	0.130					0.040	0.039			0.070			0.038	
			0.038	0.038	0.039	0.050	0.036	0.036	0.030	0.038	0.080		0.038	0.040	0.038	0.040	0.038	0.040	0.180	0.130				0.039	0.039			0.070			0.038	
0.000	0.000	0.039	0.047	0.042	0.050	0.036	0.036	0.035	0.039	0.100	0.000	0.039	0.040	0.039	0.040	0.044	0.043	0.125	0.130	0.000	0.000	0.000	0.000	0.040	0.039	0.000	0.000	0.070	0.000	0.000	0.038	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280	333	240	240	230	260	867		260	267	260	267	293	283	833	867					263	260			467			25
			257	310	280																											

# Future Development:

- More materials
- More densities
- More k values
- Specific heat capacity

# Future Development Insulation: Materials to Decrement Delay

- Includes the first stages of development of the Decrement Delay calculator

# Decrement Delay Insulation Thickness (Dev)

Decrement Delay Insulation Thickness												
		Fibre										
Format		Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Quilts batts slabs	Cavity Blown	Cavity Blown	Quilts batts slabs	Quilts batts slabs
Materials		Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Glass Mineral Wool	Stone Mineral Wool	Blast Furnace Slag wool
Initials		GMW	GMW	GMW	GMW	GMW	GMW	GMW	CBLD GMW	CBHD GMW	SMW	BFSW
Used in project?		Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
Density		10to80	10	12	24	32	48	80	17	30	33to160	0
k Value (average)		0.031	0	0	0	0	0	0	0	0	0.031	0.031
Specific Heat Capacity		Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
Hours of delay (Target)	11	Hours	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
Thickness		mm	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending

Calculation	
$Q = e \cdot 1m^2 \cdot \text{density}$	
$Q = d / 1.38 \cdot \sqrt{(k/p \cdot C)} \cdot 1m^2 \cdot \text{density}$	

Formulas	
$d = 1.38 \cdot e \cdot \sqrt{1/a}$	
(diffusivity) $a = k/p \cdot C$	
$e = d / 1.38 \cdot \sqrt{(k/p \cdot C)}$	

thickness of material layer	0.3	m
Rh ð (volumic mass) [density]	700	kg/m3
surface area of wall considered	1	m²
thermal conductivity	1	W/m.K
Specific heat value	0.58	Wh/kg.K
Decrement delay (Hours)	12	hours
Decrement delay (Hours)	0.020546475	

Formulas	$d = 1.38 \cdot e \cdot \sqrt{1/a}$	d	Decrement d	#DIV/0!
Formulas	$a = k/p \cdot C$	a	diffusivity	
Formulas	$e = d / 1.38 \cdot \sqrt{(k/p \cdot C)}$	e	thickness of material layer	
Formulas	$Q = e \cdot 5 \cdot p$	Q	Quantity	
Calculation	$Q = (1 / 1.38 \cdot \sqrt{(p \cdot C / k)}) \cdot 5 \cdot p \cdot (DL/CLE)$	Q	Quantity	#DIV/0!

	kg	Calculated	Checked
--	----	------------	---------



# Legend & Terms:

- Not a functioning part of the calculator
- Legend of cell colour codes, cell fills and Schedule of terms and insulation materials to help understanding
- Future development: Link to jargon Busters

## Legend

© GBE Green Building Calculator 2017-2020																																						
Explanation																																						
User Input cell feeds into calculations																																						
Calculator Results that the user can over right																																						
Calculator Results using user inputs																																						
Orange cells above lists of Yes or ? Is just information about adjacent deils																																						
User input cell requiring user decision (drop down list)																																						
User input *Yes' will turn green automatically																																						
User to consider the result and review decisions so far																																						
User input 'No' will turn red automatically																																						
Expanded	Avoid	Avoid In external cladding	Insulation	Material	Component	Method of Construction	Impacts	Format	Rigid Board	Quilt	Slab	Board	Panel	Injected	Foamed insitu	Bale	Cast Block	Batt	Foamed in Mixing	Membrane	Section/Extrusion	Block	Cast Insitu	Bonded to boards	Animal	Vegetable	Mineral	Fossil	Plastic	Mixed	Product Reference	Impacts	Services	Certification	Fire			
Aerogel	.	.	Y	Y	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.	Y	.	Y	Y	.	Y	.	.	.	.	.	.	.	.	.	.			
Autoclaved Aerated Concrete	.	.	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	Y	Y	.	Y	.	.	.	.	.	.	.	.	.	.			
Aerated Concrete	.	.	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	Y	Y	.	Y	.	.	.	.	.	.	.	.	.			
Attic Eaves Furniture	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Asbestos fibre (yes its used in eastern europe)	Y	Y	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.			
Aluminised polyethylene and air pockets	.	?	Y	Y	Y	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	Y	Y	.	.	.	.	.	.			
Air Tightness Layer	.	.	.	.	Y	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	Y	.	Y	.	.	.	.	.	.	.			
Board	.	.	.	.	.	.	.	Y	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Biobased plastic foam	.	?	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	Y	.	.	.	.	.	.	.			
Basement Floor (BF)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Bathroom Furniture	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Bird Feather	.	.	Y	Y	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.			
Blast Furnace Slag wool	.	.	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.			
Bitumen Impregnated Fibre Board	.	?	Y	Y	Y	.	.	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	Y	.	.	.	.	.	.	.			
Breather membrane	.	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Basement Partitions (BP)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Basement Perimeter Walls (BPW)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Breatheable Roofing Membrane	.	.	.	.	Y	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	Y	Y	.	.	.	.	.	.			
Basement Roof at Site Level (BRSL)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Basement Roof at Subterranean Level (BRSL)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Breathing Sheathing Board	.	.	Y	.	Y	.	.	Y	Y	.	.	Y	.	.	.	.	.	.	.	Y	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.			
Barrel Vault Ceiling (BVC) below Barrel Vault Roof (BVR)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Barrel Vault Roof (BVR) (single or combinations of: Tiles, slates, shingles, shakes, thatch, malleable metal roofs, profiled metal roofing)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Cork	.	?	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.			
Coal Cogeneration Plant	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Cellulose	.	.	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.			
Communal Compartments Floors & Walls (Between Apartments and Stairs, Risers and Corridors in Multiple apartment blocks and towers)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Ceramic Fibre (no longer available in market)	Y	.	Y	Y	.	.	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y	.	.	.	.	.	.	.	.			
Cellulose fibre board (Softboard)	.	.	Y	Y	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Cellulose Fiber Flake (recycled newspaper)	.	.	Y	Y	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Cellular glass	.	.	Y	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Cellular glass / Recycled Glass balls	.	.	Y	Y	.	.	.	Y	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.			
Cogeneration Station	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y			
Coal Heat Plant	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	Y			

# Elements: Assemblies of Components & U or R value

- Detailed descriptions of 24 of 29 potential elements and 12 secondary-elements making up the external envelop of a building
- Allows the user to choose elements and assemble them by choosing their combination of functional components and then choosing the materials for each component.
- Where possible a default size is added
- Where necessary the user adds insulation and other component thicknesses.
- Using each materials k values and set resistances it calculates all of the R and U values automatically

Elemental U values Component k values & thicknesses														User name: BrianSpecMan did this													
Yes/Yes	Component Function	Manufacturer	Product Reference	Material	Density kg/m3	Thermal Conductivity W/m.K	Thickness mm	Thickness m	Thermal Resistance m2.K/W	Width or thickness (solid) mm	Spacing or cavity (void) mm	Fraction of area or section %	Thermal Resistances m2.K/W	Calculated Total U value W/m2.K	Target Elemental U value W/m2.K	Difference	Pass or fail	Thickness mm	E=2	m2	£						
Yes	BASEMENT FLOOR	text	text	text	kg/m3	W/m.K	mm	m	m2.K/W	mm	mm	%	m2.K/W	W/m2.K	W/m2.K	W/m2.K	Auto	mm	E=2	300	£						
Yes	Resistance of Inside Surface (Rsi)								0.13				0.13														
Yes	Inner decoration			lacquer	1000	1	1	0.001	0.001	1	1	100%	0.001														
Yes	Floor finish			Hardwood flooring	700	0.180	25	0.025	0.139	1	1	100%	0.139														
Yes	Inner floor lining underlayment			Gypsum fibreboard		0.360	48	0.048	0.133	1	1	100%	0.133														
Yes	Inner levelling/wearing			Cement Lime Screed	1200	1.400	45	0.045	0.032	1	1	100%	0.032														
Yes	Internal insulation			PIR Insulation	32	0.025	235	0.025	0.235	9.400	1	1	100%	9.400				235	£1.00	300	£300						
Yes	Drainage filtration layer			HDPE		0.05		0.050	2	48		4%	0.002														
Yes	Inner tanking			Polyethylene (PE)	0.4	0.230	1	0.001	0.004	1	1	100%	0.004														
Yes	Retaining floor			Concrete	2300	2.300	150	0.15	0.065	1	1	100%	0.065														
Yes	Damp/Gas proof membrane			Polyethylene (PE)	0.4	0.230	1	0.001	0.004	1	1	100%	0.004														
Yes	Ground gas ventilation labyrinth			Expanded polystyrene EPS	15	0.040	100	0.1	2.500	50	100	50%	1.250					100	£1.00	300	£300						
Yes	Binding layer			Sand	2.000	50		0.05	0.028	1	1	100%	0.028														
Yes	Insulating backfill			LECA	1	150	0.150	0.150	0.150	1	1	100%	0.150					150	£1.00	300	£300						
Yes	Consolidated hardcore			Recycled masonry	1	150	0.150	0.150	0.150	1	1	100%	0.150														
Yes	Drainage later			Sea shells	1	50	0.050	0.050	0.050	1	1	100%	0.050														
Yes	Undisturbed subsoil			Clay	1.500	1000		0.667	1	1	1	100%	0.667														
Yes	Resistance of Outside Surface (Rso)			Potential	2056				0				0.000														
				Actual	2056		2.056						12.203	0.082	0.15	-0.068	Check Pass	485		Observe	£900						
				overall thickness mm				overall thickness m					Total elemental R value	Total elemental U value	Target elemental U value	Difference	Pass or Fail	Elemental Insulation (mm)	Material rate	Area	Elemental Insulation Cost						
																				% of wh insulation cost	2.46%						

# Future Development: Elements

- 5 external envelope elements to be added
- Non external elements to be added for EE EC SC and LCA calculations
- Services systems to be added
- Furniture & stairs

# Elements: Bill of Materials

## Quantities Costs

- To allow Architects to cost plan their projects
- Bill of materials, quantities, labour and costs is added based on building fabric only so far.
- User add their own researched prices
- Recent tenders for labour rates

# Bill of Materials Quantities Costs

Bill of Materials Quantities Costs						
	Area	Labour rate	Labour Cost	Materials rate	Materials Cost	Total Cost
	m2	£/m2	£	£/m2	£	£
300						
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£1.00	£300	£300
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£1.00	£300	£300
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£1.00	£300	£300
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
£0.00	£3.00	£3.00	£0		£900	£900
Elemental Labour Cost per m2	Elemental Materials Cost per m2	Elemental Total Cost per m2	Elemental Labour Cost		Elemental Material Costs	Elemental Cost Materials & Labour
	Area	Labour rate	Labour Cost	Materials rate	Materials Cost	Total Cost
	m2	£/m2	£	£/m2	£	£
175						
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£1.00	£175	£175
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£1.00	£175	£175
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£1.00	£175	£175
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£0.00	£0	£0
Yes	175	£0.00	£0	£0.00	£0	£0
£0.00	£3.00	£3.00	£0		£525	£525
Elemental Labour Cost per m2	Elemental Materials Cost per m2	Elemental Total Cost per m2	Elemental Labour Cost		Elemental Material Costs	Elemental Cost Materials & Labour



# BoM Q L Costs

Bill of Materials Quantities Costs						
	Area	Labour rate	Labour Cost	Materials rate	Materials Cost	Total Cost
	m2	£/m2	£	£/m2	£	£
	300					
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£1.00	£300	£300
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£1.00	£300	£300
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£1.00	£300	£300
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
Yes	300	£0.00	£0	£0.00	£0	£0
£0.00		£3.00	£3.00	£0	£900	£900
Elemental Labour Cost per m2		Elemental Materials Cost per m2	Elemental Total Cost per m2	Elemental Labour Cost	Elemental Material Costs	Elemental Cost Materials & Labour

# Future Development:

## Bill of materials

- To be added:
- Non-envelope items,
- Services
- National Building Price book datasets?
  - But they are part of the race to the bottom

# Resistances:

- Is an information resource for default surface and cavity resistivity's;
- 'Element' obtains values from here

# Resistances

	Direction of heat flow			
	Upwards	Horizontal	Downwards	
inside resistance	0.10	0.13	0.17	
outside resistance	0.04	0.04	0.04	
underfloor space*	-	0.13	0.17	
Below Ground Exterior Surface		0		*These values should be used for the upper and lower surfaces of the underfloor space according to BS EN ISO 13370:1998
	BS EN ISO 6946			
	Roofs, walls and exposed floors			
	Air space resistances (m2.K/W)			
	Direction of heat flow			
thickness of air space	Upwards	Horizontal	Downwards	
0	0	0	0	
5	0.11	0.11	0.11	
7	0.13	0.13	0.13	
10	0.15	0.15	0.15	
15	0.16	0.17	0.17	
25	0.16	0.18	0.19	
50	0.16	0.18	0.21	
100	0.16	0.18	0.22	
300	0.16	0.18	0.23	
	BS EN ISO 6946			
	Scaling factors for ceiling fixings and wall ties			

# Conductivities:

- Is an information resource for materials and their properties for use in Components of 'Elements'
- The user can copy information manually into Elements

# Future Development: Conductivities

- Automated cell population to be implemented
- Its is to be developed as a look up table to automatically populate Component of 'Elements'

# Conductivities of Materials

Note: If available, certified test values should be used in preference to those in this table							
Format	Common Building Materials	Density $\rho$ kg/m <sup>3</sup>	Thermal Conductivity $\lambda$ W/m.K	Thickness mm	Thickness m	Resistivity m <sup>2</sup> .K/W	U value W/m <sup>2</sup> .K
Insitu	Aerated Concrete block, 140 mm	400	0.160	140	0.14	0.875	1.143
Insitu	Aerated Concrete, slab, 250 mm	500	0.160	250	0.25	1.563	0.640
Consolidated layer	Aggregate, gravel or crushed rock, 100 mm	2240	1.300	100	0.1	0.077	13.000
Rigid sheet	Aluminium, 1 mm	2700	230.000	1	0.001	0.000	230000.000
Coating	Asphalt, 8% binder, 10 mm	1550	1.200	10	0.01	0.008	120.000
Layer	Bitumen, 10 mm	1700	0.200	10	0.01	0.050	20.000
Masonry wall/leaf	brick, general clay, 102 mm, inner leaf, 1:1:6 C:L:S	1873	0.620	102	0.102	0.165	6.078
Masonry wall/leaf	brick, general clay, 102 mm, inner leaf, 1:3 L:S	1870	0.620	102	0.102	0.165	6.078
Masonry wall/leaf	brick, general clay, 102 mm, outer leaf, 1:1:6 C:L:S	1873	0.840	102	0.102	0.121	8.235
Masonry wall/leaf	brick, general clay, 102 mm, outer leaf, 1:3 L:S	1870	0.840	102	0.102	0.121	8.235
Multi-layer membrane	Built-up roofing felt, 10 mm	960	0.160	10	0.01	0.063	16.000
Masonry wall/leaf	Calcium Silicate block (Silica) 100 mm	1850	0.910	100	0.1	0.110	9.100
Insitu	Cast concrete, 28/35 Mpa, 250 mm	2000	1.300	250	0.25	0.192	5.200
Boards	Cellular glass, 282 mm	135	0.048	282	0.282	5.875	0.170
	Cellulose, 230 mm	42	0.039	230	0.23	5.897	0.170
Tiles	Ceramic tiles, 8 mm	1900	1.200	8	0.008	0.007	150.000
Boards, Foam	Chipboard	800	0.120		0	0.000	#DIV/0!
Tiles	clay tiles, 10 mm	1900	0.850	10	0.01	0.012	85.000
Block/Wall	Concrete block, high density, 13 N/mm <sup>2</sup> , 140 mm	2240	1.630	140	0.14	0.086	11.643
Block/Wall	Concrete block, light density, 8 N/mm <sup>2</sup> , 140 mm	600	0.190	140	0.14	0.737	1.357
Block/Wall	Concrete block, medium density, 10 N/mm <sup>2</sup> , 140 mm	1400	0.510	140	0.14	0.275	3.643
Panel	Cork, 235 mm	160	0.040	235	0.235	5.875	0.170
	Expanded Polystyrene (EPS), 206 mm	25	0.035	206	0.206	5.886	0.170
	External rendering, C:S, 1:3, 12 mm	1300	0.500	12	0.012	0.024	41.667
Lining	Fermacell, 12.5 mm	1200	0.320	12.5	0.0125	0.039	25.600
Slates	Fibre cement slates, uncoated, 10 mm	350	0.082	10	0.01	0.122	8.200
Boards	Fibreboard, high density, 10 mm	880	0.120	10	0.01	0.083	12.000
	Flax insulation, 224 mm	30	0.038	224	0.224	5.895	0.170



# Products:

- Lists of manufacturers
- Products
- Dimensions
- Characteristics
- Applications

# Conductivity of Products

[illegible]

# Future Development: Products

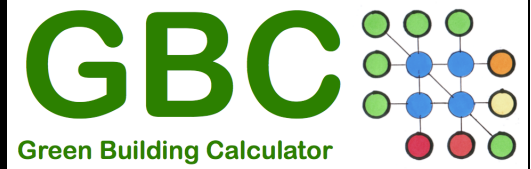
- intending to develop into a Look Up Table to populate 'Elements: Components'
- Only permit them to be used as intended by manufacturer
- Users can still override but consciously

## Secondary Elements: Windows doors rooflights

- Is an information resource
- for secondary elements
- their properties for use in  
Components of 'Elements'
- The user can obtain their own  
or copy information manually



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

# Secondary Elements

## Secondary Elements Materials Performance Costs

© GBE Calculator 2018-2020

Primary Elements	Manufacturer	Product/Reference	Secondary Element	Fenestration	Material	Finish	Glazing	Coating	Gas	Performance			U values			Psi values @		Ironmongery	Opening	Secondary Element Size					Frame		sealed unit spacer			Glazing			
										Solar Heat Gain	Visible Light Transmittance	R value	U value Glass Ug	U value Frame Uf	U value Window Uw	Sealed unit spacer	Perimeter	Materials	width	height	width	height	area	sightline width	Elements	Frame %	width	spacer length	Spacer area	width	height	area	
										%	%		W/m2.K	W/m2.K	W/m2.K			Finishes	mm	mm	mm	mm	m2	mm	No.	%	mm	mm	m2	mm	mm	m2	
External Wall	NicaDesign	Engineered Pine Sash	Windows	Sash	Engineered Pine								0		0				910	910	900	900	0.8	50	2	11.19%	10	3280	0.033	820	820	0.672	
External Wall	NicaDesign	Hardwood Sash	Windows	Sash	Hardwood								0		0				910	910	900	900	0.8	50	2	11.19%	10	3280	0.033	820	820	0.672	
External Wall	NicaDesign	Engineered Pine Casement	Windows	Casement	Engineered Pine								0		0				910	910	900	900	0.8	75	1	16.74%	10	3080	0.031	770	770	0.593	
External Wall	NicaDesign	Hardwood Casement	Windows	Casement	Hardwood								0		0				910	910	900	900	0.8	75	1	16.74%	10	3080	0.031	770	770	0.593	
External Wall	NicaDesign	French Doors	French Doors	Side hung pair	Hardwood								0		0				910	2110	900	2100	1.9	75	1	16.70%	10	5480	0.055	770	1970	1.517	
External Wall	NicaDesign	Front Door	Entrance Doors	?	?								0		0				910	2110	900	2100	1.9	75	1	16.70%	10	5480	0.055	770	1970	1.517	
External Wall	NicaDesign	Bi-fold Door	Doors	Bi-fold	?								0		0				2110	2110	2100	2100	4.4	75	2	14.37%	10	7880	0.079	1970	1970	3.881	
External Wall	NicaDesign	Sliding Door	Doors	Sliding	Aluminium								0		0				2110	2110	2100	2100	4.4	75	2	14.37%	10	7880	0.079	1970	1970	3.881	
External Wall	NicaDesign	Aluminium Bi-fold Door	Doors	Bi-fold	Aluminium								0		0				2110	2110	2100	2100	4.4	55	2	10.56%	10	8040	0.080	2010	2010	4.040	
External Wall	NicaDesign	Steel-look door	Doors	?	Aluminium								#VALUE!		0				910	2110	900	2100	1.9	50	1	?	10	5680	0.057	820	2020	1.656	
External Wall	NicaDesign	Steel-look window	Windows	?	Aluminium								#VALUE!		0				910	910	900	900	0.8	50	1	?	10	3280	0.033	820	820	0.672	
External Wall	NicaDesign	Aluminium Tilt & Turn Window	Windows	Tilt & Turn	Aluminium								0		0				910	910	900	900	0.8	75	1	16.74%	10	3080	0.031	770	770	0.593	
External Wall	NicaDesign	Aluminium Tilt & Turn Door	Doors	Tilt & Turn	Aluminium								0		0				910	910	900	900	0.8	75	1	16.74%	10	3080	0.031	770	770	0.593	
External Wall		Clear	For windows & doors	Any	Any		2 x Clear	None	1 x Dry air	0.76	81%	2.084	0.48	N/A	N/A	N/A	N/A	N/A						50	1		10		0	900	900	0.81	
External Wall		Clear	For windows & doors	Any	Any		3 x Clear	None	2 x Dry air	0.685	74%	3.226	0.31	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		Low-e	For windows & doors	Any	Any		2 x Clear	1 x LowE	1 x Argon	0.685	79%	3.846	0.26	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		Low-e	For windows & doors	Any	Any		3 x Clear	1 x LowE	2 x Argon	0.615	73%	5.433	0.184	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		Low-e	For windows & doors	Any	Any		3 x Clear	2 x LowE	2 x Argon	0.56	70%	7.521	0.133	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		SunStop	For windows & doors	Any	Any		2 x Clear	1 x Solar	1 x Argon	0.367	70%	4.044	0.248	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		SunStop	For windows & doors	Any	Any		3 x Clear	1 x Solar	2 x Argon	0.338	63%	5.377	0.186	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		SunStop	For windows & doors	Any	Any		3 x Clear	2 x Solar	2 x Argon	0.31	54%	8.056	0.124	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		System V	For windows & doors	Any	Any		2 x clear	2 x LowE	1 x Argon	0.623	77%	4.783	0.209	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81
External Wall		System V	For windows & doors	Any	Any		2 x clear	1 x LowE 1 x Solar	1 x Argon	0.361	69%	4.998	0.2	N/A	N/A	N/A	N/A	N/A						50	1						900	900	0.81

© GBE 2017-20 GBC Green Building Calculator

# Future development: Secondary Elements

- Look up table to automatically populate Component of 'Elements'
- Secondary Element calculator
  - $U_g$ ,  $U_f$ ,  $U_w$ ,  $\Psi$  glazing bar,  $\Psi$  perimeter

# Element Summery:

- Summarises 24 Elements and 12 Secondary Elements calculated U values,
- Compares with targeted U values,
- highlighting any shortfalls



# Element Summary

Element Summary	Calculated Total U value	Target Elemental U value	Difference	Pass or fail	Form Factor target U value	Difference	Pass or fail	Yes	Yes	Count
	W/m2.K	W/m2.K			W/m2.K	W/m2.K		Y	Y	No.
BASEMENT FLOOR	0.082	0.15	-0.07	Pass	0.110	-0.028	Pass	Y		
BASEMENT PERIMETER WALLS	0.251	0.15	0.10	Fail	0.110	0.141	Fail	Y		
BASEMENT INTERNAL WALL/PARTITION	0.203	Unregulated	#VALUE!	#VALUE!	0.110	0.093	Fail	Y		
FLOOR OVER BASEMENT	0.052	Unregulated	#VALUE!	#VALUE!	0.110	-0.058	Pass	Y		
GLAZED PAVEMENT	2.000	0.000	2.000	Fail	0.110	1.890	Fail	Y		
BASEMENT ROOF AT SITE LEVEL	0.044	0.15	-0.11	Pass	0.110	-0.066	Pass	Y		
BASEMENT ROOF AT SUBTERRANEAN LEVEL	0.085	0.15	-0.07	Pass	0.110	-0.025	Pass	Y		
SWIMMING POOL BASIN	0.071	0.15	-0.08	Pass	0.110	-0.039	Pass	Y		
GROUND FLOOR (OVER GROUND)	0.090	0.15	-0.06	Pass	0.110	-0.020	Pass	Y		
GROUND FLOOR OVER VENTED VOID	0.057	0.150	-0.093	Pass	0.110	-0.053	Pass	Y		
UPPER FLOOR (including Ground floor over basement)	0.058	Unregulated	#VALUE!	#VALUE!	0.110	-0.052	Pass	Y		
COMPARTMENT FLOOR	0.053	0.15	-0.10	Pass	0.110	-0.057	Pass	Y		
COMPARTMENT PARTY FLOOR	0.053	0.150	-0.097	Pass	0.110	-0.057	Pass	Y		
EXTERNAL FLOOR (OVER AIR)	0.059	0.150	-0.091	Pass	0.110	-0.051	Pass	Y		
EXTERNAL WALL	0.064	0.15	-0.09	Pass	0.110	-0.046	Pass	Y		
INTERNAL PARTITION/WALL	0.203	Unregulated	#VALUE!	#VALUE!	0.110	0.093	Fail	Y		
COMPARTMENT WALL	0.126	0.150	-0.024	Pass	0.110	0.016	Fail	Y		
COMPARTMENT PARTY WALL	0.125	0.150	-0.025	Pass	0.110	0.015	Fail	Y		
FLAT ROOF	0.039	0.150	-0.111	Pass	0.110	-0.071	Pass	Y		
FLAT LOFT/ATTIC CEILING (insulation at ceiling)	0.087	0.150	-0.063	Pass	0.110	-0.023	Pass	Y		
SHALLOW ROOF	0.086	0.150	-0.064	Pass	0.110	-0.024	Pass	Y		
PITCHED ROOF (Insulation at rafter level)	0.071	0.150	-0.079	Pass	0.110	-0.039	Pass	Y		
BARREL VAULT ROOF	0.086	0.150	-0.064	Pass	0.110	-0.024	Pass	Y		
DOME ROOF	0.049	0.150	-0.101	Pass	0.110	-0.061	Pass	Y		24
WINDOWS	0.800	0.850	-0.050	Pass		0.800			Y	
DISPLAY WINDOW	2.000	0.850	1.150	Fail		2.000			Y	
EXTERNAL GLAZED WALL/CURTAIN WALL	0.810	0.850	-0.040	Pass		0.810			Y	
OPAQUE CURTAIN WALLING	2.000	0.000	2.000	Fail		2.000			Y	
GLAZED PEDESTRIAN DOORS	0.790	0.850	-0.060	Pass		0.790			Y	
HIGH USAGE ENTRANCE DOOR	2.000	0.850	1.150	Fail		2.000			Y	
OPAQUE PEDESTRIAN DOORS	2.000	0.000	2.000	Fail		2.000			Y	
VEHICLE ACCESS/LARGE DOOR	2.000	0.000	2.000	Fail		2.000			Y	
ROOFLIGHTS	0.750	0.850	-0.100	Pass		0.750			Y	
ROOF WINDOWS	0.810	0.850	-0.040	Pass		0.810			Y	
ROOF AIR & SMOKE VENTILATORS	2.000	0.850	1.150	Fail		2.000			Y	
GLAZED ROOF	2.000	0.850	1.150	Fail		2.000			Y	12

# Future Development: Element Summary

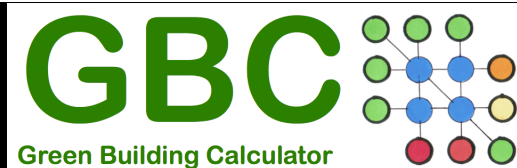
- 5 More elements to be added
- Other parts to be added  
Porch, Sun space,  
Externsion, Dormer

# UToWattsToCO2:

- Assembles elemental areas and U values to calculates energy losses from
  - each element
  - total secondary elements
  - total losses
  - each element losses as a % of the whole
- comparisons can be made by the user
  - gives a chance to reconsider earlier decisions
- Particularly useful is the comparison of basement, walls, roofs, floors and all glazing
- Choose fuel source to get CO2 readout



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# U value to Watts to CO2 In Use

U Value To Watts To CO2					Yes		?					
User name:		BrianSpecMan did this										
Element	Applicable	Elements	U value	Areas	Temperature			Heat loss		Floor area	Total Areas	Areas
	Yes/No	© GBE Green Building Calculator 2018-2020	W/m2.K	m2	External	Internal	Difference	Individual	Total	m2	m2	%
Basement	Yes	Basement retaining floor	0.0819469	300	11	-15	4	98		300		
	Yes	Swimming Pool Basin	0.070865	1448	11	-15	4	410		1448		
	Yes	Basement perimeter retaining wall	0.2512023	175	11	-15	4	176				
	Yes	Basement roof at site level	0.044126	300	11	-15	4	53				
	Yes	Basement roof at subterranean level	0.0848912	300	11	-15	4	102				
	Yes	Basement partition	0.2032824	125	20	-15	-5	-127				
	Yes	Glazed pavement over basement	2	11	11	-15	4	88				Ratio: 1 to 0.20
Floor				2859	External	Internal		Heat loss	800	Basement	1748	21% Area %
	Yes	Ground bearing floor	0.0901849	300	11	-20	9	243		300		4.1% Heat loss %
	Yes	Ground floor over ventilated void	0.0569331	300	11	-20	9	154		300		
	Yes	Floor over basement	0.0523647	300	11	-20	9	141		300		
	Yes	Upper internal floor	0.0528671	600	20	-20	0	0		600		
	Yes	Floor suspended over air	0.0585441	600	0	-20	20	703		600		
	Yes	Compartment floor	0.0528671	90	0	-20	20	95		90		Ratio: 1 to 0.32
Wall	Yes	Party floor	0.0528755	900	0	-20	20	952		900	3090	37% Area %
				3090	External	Internal		Heat loss	2,288	Floor		11.8% Heat loss %
	Yes	External wall	0.0642495	455	0	-20	20	585		455		
	Yes	External glazed wall/Curtain wall	0.81	175	0	-20	20	2,835		175		
	Yes	Opaque Curtain wall	2	20	0	-20	20	800		20		
	Yes	Compartment Party wall	0.125493	525	0	-20	20	1,318		525		
	Yes	Compartment Communal wall	0.1255245	65	0	-20	20	163		65		Ratio: 1 to 1.95
Roof & Ceilings	Yes	Internal Partition/Wall	0.2032824	25	20	-20	0	0		25	1265	15% Area %
				1265	External	Internal		Heat loss	5,701	Wall		29.5% Heat loss %
	Yes	Pitched Roof	0.0694608	632.5	0	-20	20	879		632.5		
	Yes	Barrel vault roof	0.0862835	471.3	0	-20	20	813		471.3		
	Yes	Flat Roof	0.0394566	300	0	-20	20	237		300		
	Yes	Shallow roof	0.0862984	300	0	-20	20	518		300		
	Yes	Flat ceiling	0.0867887	300	0	-20	20	521		300		Ratio: 1 to 0.84
Window/Door/Rooflight	Yes	Glazed Roof	2	25	0	20	20	1,000		25	2028.8	24% Area %
				2029	External	Internal		Heat loss	3,967	Roof		20.5% Heat loss %
	Yes	Windows	0.8	50	0	-20	20	800		50		
	Yes	Glazed Pedestrian Doors	0.79	10.5	0	-20	20	166		10.5		
	Yes	Rooflights	0.75	25	0	-20	20	375		25		
	Yes	Roof windows	0.81	10	0	-20	20	162		10		
	Yes	Vehicle access/Large doors	2	45	0	-20	20	1,800		45		
Total areas	Yes	High usage entrance doors	2	20	0	-20	20	800		20		
	Yes	Opaque Pedestrian Doors	2	12	0	-20	20	480		12		
	Yes	Display window	2	25	0	-20	20	1,000		25		Ratio: 1 to 12.78
	Yes	Roof Vents/Smoke vents	2	25	0	-20	20	1,000		25	223	2.7% Area %
				223				6,583	Window/Door/Rooflight	4838	8354	100% Area %
								19,339	Total			100.0% Heat loss %
Total areas			9043		TCHL		Floor area		4,838	m2		
Total glazed areas			223				Watts		19,339	W		
Total areas minus glazed areas			8820				KiloWatts		19	kW		
Glazed areas % of Total areas			2.5%				KiloWattHours		2.4	kWh		
Total Conduction Heat Loss (TCHL)							KiloWatts/floor area		0.004	kW/m2		
							KiloWattHours/floor area		0.0005	kWh/m2		
							KiloWattHours/Floor area/annum			kWh/m2/Year		

# FuelCarbonFactor:

- Is an information resource
- developed as a look up table
- used by 'UToWattsToCO2'

# Fuel Carbon Factor

## UK Carbon Content of Fuel

	kgCO <sub>2</sub> /kWh	Fuel Factor
Biomass	0.025	0.14
Coal	0.33	1.78
Grid Electricity	0.537	2.90
LPG	0.214	1.16
Natural Gas	0.185	1.00
Oil (Gas oil)	0.252	1.36
Renewable		

2009 (Carbon Trust)

# Future Development:

## Fuel carbon factor

- Current figures from BRegs
- Needs up to date factors
- From Defra
- Latest data: EU wide 2020
- Can add national datasets to choose from



FuelOptions	kgCO2/kWh	
Biomass	0.025	0.025
Coal	0.33	0.33
Grid Electricity	0.537	0.186
LPG	0.214	0.214
Natural Gas	0.185	0.185
Oil (Gas oil)	0.252	0.252
Renewable		
	2009	2020

# Carbon in Mains Electricity EU

2020 Provisional Data YTD	Wartsila Eneergy Transition lab	
	Electricity carbon Intensity	
Country	gCO2/kWh	kgCO2/kWh
Norway	10	0.01
Sweden	18	0.018
France	30	0.03
Austria	88	0.088
Lithuania	118	0.118
Spain	126	0.126
Portugal	134	0.134
Finland	136	0.136
Latvia	138	0.138
Belgium	148	0.148
Denmark	168	0.168
UK	186	0.186
Slovenia	222	0.222
Slovakia	224	0.224
Hungary	228	0.228
Romainai	234	0.234
Ireland	238	0.238
Germany	240	0.24
Italy	290	0.29
Greece	380	0.38
Estonia	385	0.385
Bulgaria	395	0.395
Czechnia	430	0.43
Netherlands	530	0.53
Poland	700	0.7

# Cost Per m2:

- Not part of the calculator
- This is a converter:
- If the information provided by Manufacturers/Suppliers is not in £/m2
- This will help with converting the information provided to the required format
- Manually or Copy and Paste results into calculator

# Cost per m2

## Cost per m2

Yes

© GBE Calculator 2018-2020

Yes

User name:

over type with User's name

### Loose insulation materials

Cost per Container/Package	5	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Applied thickness	300	mm	0.3	m
			0.270	m2
Cost per m2			1.35	£/m2

Copy table above to below for different materials/products

Cost per Container/Package	10	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Applied thickness	300	mm	0.3	m
			0.270	m2
Cost per meter2			2.7	£/m2

Cost per Container/Package	20	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Applied thickness	300	mm	0.3	m
			0.270	m2
Cost per meter2			8.1	£/m2

Cost per Container/Package	50	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Applied thickness	300	mm	0.3	m
			0.270	m2
Cost per meter2			8.1	£/m2

### Sized insulation pieces

Cost per Container/Package	6	£		
Pieces: Length	1200	mm	1.2	m
Pieces: Width	560	mm	0.56	m
Pieces: Thickness	150	mm	0.15	m
Pieces volume:			0.1008	m3
Number of pieces	5	No.	0.02016	m3
Applied thickness/area	300	mm	0.3	m
			0.067	m2
Cost per m2			0.40	£/m2

Copy table above to below for different materials/products

Cost per Container/Package	18	£		
Pieces: Length	1200	mm	1.2	m
Pieces: Width	560	mm	0.56	m
Pieces: Thickness	150	mm	0.15	m
Pieces volume:			0.1008	m3
Number of pieces	5	No.	0.02016	m3
Applied thickness/area	300	mm	0.3	m
			0.067	m2
Cost per m2			1.21	£/m2

Cost per Container/Package	32	£		
Pieces: Length	1200	mm	1.2	m
Pieces: Width	560	mm	0.56	m
Pieces: Thickness	150	mm	0.15	m
Pieces volume:			0.1008	m3
Number of pieces	5	No.	0.02016	m3
Applied thickness/area	300	mm	0.3	m
			0.067	m2
Cost per m2			2.15	£/m2

Yes

Yes

### Compressed insulation materials

Cost per Container/Package	25	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Packed volume			0.08	m3
Unpacked volume			No	m3
Applied volume			No	m3
Applied thickness	300	mm	0.3	m
			0.27	m3
Cost per m2			6.75	£/m2

Copy table above to below for different materials/products

Cost per Container/Package	50	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Packed volume			0.08	m3
Unpacked volume			No	m3
Applied volume			No	m3
Applied thickness	250	mm	0.25	m
			0.27	m3
Cost per m2			13.5	£/m2

Cost per Container/Package	100	£		
Package size: Length	900	mm	0.9	m
Package size: Width	300	mm	0.3	m
Package size: Depth	300	mm	0.3	m
Package size: Volume			0.08	m3
Packed volume			0.08	m3
Unpacked volume			No	m3
Applied volume			No	m3
Applied thickness	300	mm	0.3	m
			0.27	m3
Cost per m2			27	£/m2

### Windows/Doors/Rooflights

Cost per item	100	£		
Item Size: Length	900	mm	0.9	m
Item Size: Height	900	mm	0.9	m
Item Size: Area			0.81	m2
Cost per m2			123.46	£/m2

Copy table above to below for different materials/products

Cost per item	200	£		
Item Size: Length	900	mm	0.9	m
Item Size: Height	900	mm	0.9	m
Item Size: Area			0.81	m2
Cost per m2			246.91	£/m2

Cost per item	300	£		
Item Size: Length	900	mm	0.9	m
Item Size: Height	900	mm	0.9	m
Item Size: Area			0.81	m2
Cost per m2			370.37	£/m2

Cost per item	400	£		
Item Size: Length	900	mm	0.9	m
Item Size: Height	900	mm	0.9	m
Item Size: Area			0.81	m2
Cost per m2			493.83	£/m2

Cost per item	500	£		
Item Size: Length	900	mm	0.9	m
Item Size: Height	900	mm	0.9	m
Item Size: Area			0.81	m2
Cost per m2			617.28	£/m2

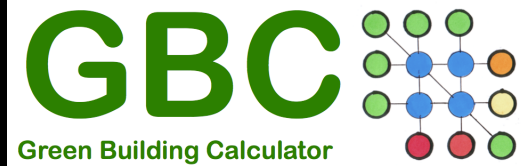
Cost per item	600	£		
Item Size: Length	900	mm	0.9	m
Item Size: Height	900	mm	0.9	m
Item Size: Area			0.81	m2
Cost per m2			740.74	£/m2

## Drop Down List:

- Not part of the calculator
- Used to populate cells with readymade answers to avoid typing, avoid errors and limit choices
- Lists can be added to by user, as long as the last two cells remain at bottom of sets



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# Drop Down List

## Drop Down Lists

© GBE Green Building Calculator 2017-2020

Instructions: To add to lists add cells to the one column only, (above the last two cells not below or they will not show)														
Yes/No	PrimaryElements	Manufacturer	Product Reference	Secondary Element	Fenestration	Material	Finish	Glazing	Performance	IronmongeryMaterialsFinishes	WhichRoof	AreaCalculation	CPDTraining	Worksheet
Yes	External Wall	NicaDesign	Steel-look door	Windows	Sash	Engineered Pine	Brushed Stainless Steel	Single	Part L	Stainless Steel	Flat	Singular	Zoom by GBE	Welcome
Yes/No	Internal partition		Steel-look window	French Doors	Casement	Hardwood	Mill Finish Aluminium	Double	Passivhaus	Aluminium	Pitched	Multiple	MS Teams By You	About
No				Entrance Doors	Side hung	Aluminium	Polyester Powder Coating	Triple	LETI	Anodized Aluminium	Barrel Vault		In-house (Post COVID)	FeaturesBenefits
?				Doors	Bi-fold		Anodic Oxide Coating	Double/LowE	BREEAM	PPC Aluminium	Dormed	Other	CPD	Development
					Vertical Sliding		Clear Lacquer	Triple/LowE	AECB CL		Mansard		Training	VersionDevelopmentPrices
Other					Tilt & Turn		High Build Micro Porous Stain	Double/LowE/Gas/Spacer	AECB CLR		Monopitch		Coaching	Instructions
					Fixed		Paint	Triple/LowE/Gas/Spacer	EnerPHit					Revisions
	Other	Other	Other	Other	Horizontal Sliding	Other	Mineraal based Paint			Other			Other	ProjectRevisions
							Clay Finish				other			ScheduleAccommodation
														FormFactor
					Other									BuildingAreas
														U values Etc.
									Other					Insulation
														Legend
														Elements
														Resistances
														Conductivities
														Products
														SecondaryElementCosts
														ElementSummary
														UToWattsToCO2
														FuelCarbonFactor
														CostsPerm2
														DropDownLists
														SupplierRequest
														Logo
														FeedbackForm
														UserSurvey
														VersionPreparation
														TermsConditions
														GDPR
														Other

© GBE 2017-20 GBC Green Building Calculator

# Future Development: Drop Down Lists

- When ensuring products are used in correct applications
- These lists will expand exponentially



# Supplier Request Form:

- Used to request information on products from manufacturers or suppliers
- Will be available to download

[illegible]

# Future Development: Supplier Request form

- Some refinements to capture all necessary for:
- EE, EC, SC,
- LCA
- Competent Application

# User Feedback Form:

- Users can let us know of any problems and potential improvements
- Version Upgrades as rewards



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# User feed back form

User Feedback Form							
© GBE Green Building Calculator 2017-2020							
User name:	BrianSpecMan did this	Format					
Green Building Calculator							
Date:	10/06/20	DD/MM/YY	Yes	Yes	08/06/2020	BRM	
GBC Version:	Launch Version 1.0.0	Autofilled	Yes	Yes	08/06/2020	BRM	
Worksheet:		DropDownList	Yes	Yes	08/06/2020	BRM	
Column:		Letter/Letters	Yes	Yes	08/06/2020	BRM	
Column Range:		Letter(s):Letter(s)	Yes	Yes	08/06/2020	BRM	
Row:		Number	Yes	Yes	08/06/2020	BRM	
Row Range:		Number:Number	Yes	Yes	08/06/2020	BRM	
Cell:		Letter:Number	Yes	Yes	08/06/2020	BRM	
Cells:		LetterNumber:LetterNumber	Yes	Yes	08/06/2020	BRM	
Fault:		Text	Yes	Yes	08/06/2020	BRM	
Circular fault:		Text	Yes	Yes	08/06/2020	BRM	
Cell needs unlocking:		Text	Yes	Yes	10/06/2020	BRM	
Suggestion:		Text	Yes	Yes	08/06/2020	BRM	
Request:		Text	Yes	Yes	08/06/2020	BRM	
Potential Improvement:		Text	Yes	Yes	08/06/2020	BRM	
Potential Development:		Text	Yes	Yes	08/06/2020	BRM	
Suggested Data Sources:		Text	Yes	Yes	08/06/2020	BRM	
Volunteering Datasets:		Text	Yes	Yes	08/06/2020	BRM	
Requesting Datasets:		Text	Yes	Yes	10/06/2020	BRM	
Contact Name:		Text	Yes	Yes	10/06/2020	BRM	
Contact Phone:		Numbers	Yes	Yes	08/06/2020	BRM	
Contact Email:		Email	Yes	Yes	08/06/2020	BRM	
Satisfied Customer Quotes:		Text	Yes	Yes	10/06/2020	BRM	
Permission to Quote you?:	?	Yes/No	Yes	Yes	10/06/2020	BRM	
Any Other Comments:		Text	Yes	Yes	10/06/2020	BRM	
If required will you email a faulty file to GBE to interrogate?	?	Yes/No	Yes	Yes	10/06/2020	BRM	
Would you like an introduction CPD?	?	Yes/No	Yes	Yes	10/06/2020	BRM	
Would you like training?	?	Yes/No	Yes	Yes	10/06/2020	BRM	
Would you like coaching?	?	Yes/No	Yes	Yes	10/06/2020	BRM	
How Zoom/MSTeams/In-house?		DropDownList	Yes	Yes	10/06/2020	BRM	

**NB: Please complete the User Survey on Version Development Order**

# User Survey:

- Invites Users to review and priorities development sequence and suggest desirable functionality



<https://GreenBuildingEncyclopaedia.uk>



Green Building Calculator

<https://GreenBuildingCalculator.uk>

# User Survey

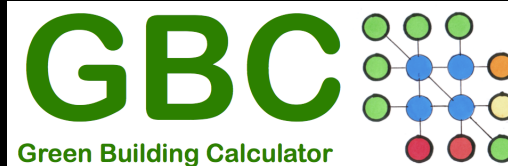
User Survey		Please arrange the numbers in your preferred order		
Please email the survey as a PDF or excel to <a href="mailto:BrianSpecMan@icloud.com">BrianSpecMan@icloud.com</a>		Preferred Version Order	Preferred sub-item order	Comment
<p>© GBE Green Building Calculator 2017-2020</p> <p>GBE thinks it knows what is needed and the right order for its development</p> <p>Some tasks are dependent on others being in place first to build upon</p> <p>GBE would like to know from users if they would like to see some parts developed sooner</p> <p>GBE would like to know from users if they would like to see other parts added to the tasks</p> <p>Please rearrange the numbers in columns E &amp; F into your preferred order and add any comments or requests in column G</p> <p>Please complete 'Your Requests' below</p>				
About	A description of what GBE Green Building Calculator is, how it started and how it has developed	Launch Version 1.1	1	
Features Benefits	What it does and how that helps users	Launch Version 1.2	2	
Development	Aid memoir for development	Launch Version 1.3	3	
Phased Development Prices	This page: What is included in the launch version of GBE Green Building Calculator and GBE's suggested development order: Subject to user survey	Launch Version 1.4	4	
Instructions	Read these if GBE Green Building Calculator is not intuitive (it probably won't be if you have not done a U value calculation before)	Launch Version 1.5	5	
Revisions	A record of updates to GBE Green Building Calculator to enable an audit trail through the development process	Launch Version 1.6	6	
Project Revisions	Not part of GBE Green Building Calculator For users record keeping on design projects	Launch Version 1.7	7	
Whole Building	Whole Building: The start of GBE Green Building Calculator Input page: Sizes, Areas and Volumes, hours of operation, design temperatures, inside and out	Launch Version 1.8	8	
Schedule of Accommodation	Schedule of Accommodation Room by Rooms Input page: more specific than whole building if required; Areas and volumes, hours of operation, design temperatures, inside and out	Launch Version 1.9	9	
Room By Room Heat Losses	Input and Put-put page: Room by room heat loss calculator to determine Boiler size, radiator or under floor heating requirements, Developed to help designer to make the insulation thicknesses or window specifications to match a boiler capacity when it's a tight fit	Launch Version 1.10	10	
Form Factor	Results page: Analysis of Form Factor and optimal U values to respond to them To help designers see the importance of compactness, or the consequence of fragmentation of the building volume, on the energy consumption See Update 2.3	Launch Version 1.11	11	
Building Elements	Input page: simple yes/no Building Elements and secondary-elements are selected from readymade lists of 29 Elements and 12 Secondary Elements to match the scope of the project	Launch Version 1.12	12	
Building Element Areas	Input and output page: Building Elements and secondary-elements: their dimensions are added by user and their areas are automatically calculated.	Launch Version 1.13	13	
Multiple Size Building Element Areas	Input and output page: Since windows and doors come in a multitude of sized then a GBE Green Building Calculator schedules allows you to incorporate them all	Launch Version 1.14	14	
U values Etc. Energy Targets	Results page: Allows the users to compare and choose between Building Regulations Part L, other national regulations or standards, LETI, AECB CarbonLite, Passivhaus, EnerPHit, EAMs, etc. including: U values, Airtightness, Form factors, Elevational window %.	Launch Version 1.15	15	
Insulation Thicknesses	Input and output table: Information Resource: Quick look up table Users apply the chosen U value targets from the previous worksheet GBE Green Building Calculator automatically displays the thickness of different k valued insulation materials needed to meet U values targeted in each element.	Launch Version 1.16	16	
Decrement Delay Insulation Thickness	Input and output page: (incomplete at launch) Automatically see what thickness of different k valued insulation materials is needed to avoid overheating on summer See Update 2.1	Launch Version 1.17 Version 3.1	3.1	
Legend	Information Resource: A list of terms used in GBE Green Building Calculator with some explanation of their meaning in a tabulated format Potential link to GBE Jargon Buster pages	Launch Version 1.18	18	
Elements	Input and output page: Yes/No then choose from drop down menu, followed by automatic cell population Allows the user to populate and assemble elements by choosing their combination of functional components and then choosing the materials for each component. Components are in the right sequence but it may needs some know-how to choose the right one (Update 3 will help with readymade assemblies) Costs of insulation and windows are added to the search results. Ready to view on screen and print and major performance windows and glazing	Launch Version 1.19	19	
Bill of Materials Quantities Costs	Input and output page: Allows user to cost plan their Building with a Bill of materials, quantities, labour and costs based on building fabric only so far. It will be reliant upon users interrogating recent tender rates or building price books Services are planned to be addressed in update 1.4-1.7 (unless users say otherwise) Non-external envelope components are planned to be developed in Phase 3.4 (unless users want it sooner) See Update 1.2 & 1.3	Launch Version 1.20	20	

© GBE 2017-20 GBC Green Building Calculator





<https://GreenBuildingEncyclopaedia.uk>



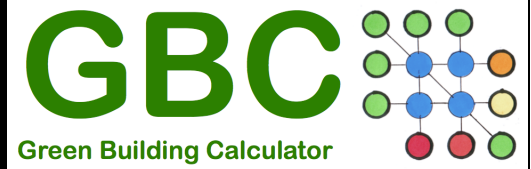
<https://GreenBuildingCalculator.uk>

# Capture National U values

	Regulations/Standards	Other National Standards			
	Winter heat loss © GBE Green Building Calculator 2017-2020				
	User Name:	Other National Regulation or GBC standards			
Chosen column:		New Build	Refurbishment	New Build	Refurbishment
	Target U values Yes/No	W/m2.K	W/m2.K	W/m2.K	W/m2.K
		Yes	Yes	Yes	Yes
Floor	Basement Floor Swimming Pool Basin Upper floors (including ground floor over basement) Ground floor over ground Ground floor over ventilated void Floor with underfloor heating External floor over air Compartment Floor Party Floor				
Wall	Basement Perimeter Wall Basement internal Wall/Partitions External wall External wall Insulated Cavity External wall Solid wall insulated (Int or Ext)or Ext) External wall Solid wall insulated (Internal) Internal partition/wall Compartment Wall Party Wall Solid Wall Unfilled cavity unsealed edges Unfilled cavity sealed edges thermal breaks Filled cavity sealed edges thermal breaks				
Roof	Roofs (includes opaque parts of dormers) Flat roof Shallow roof Pitched roof (insulation at rafter) Loft ceiling (insulation at ceiling) Barrel Vault roof Dormed Roof Eaves overhang Verge overhang Basement roof at site level Basement roof at subterranean level				
Glazing	Glazing (Maximum % of total area) Windows (whole window value) Glazed Pedestrian Doors Vehicle access and similar large doors High usage entrance doors Opaque Door Rooflights Roof windows Roof ventilation including smoke vents Glazed roof Glazed wall/Curtain walling Display windows Opaque Curtain wall Glazed pavement				



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

# Green Building Calculator

U Value To Watts To CO2									
User name: BrianSpecMan did this									
Element	Applicable Elements	U value W/m2 K	Area m2	Temperature Difference degree C	Heat loss Individual W	Heat loss Total W	Floor area m2	Total Areas m2	Area %
Basement	Yes/No	0.0819489	3	11	98				
Basement retaining floor	Yes	0.070965	14	11	419				
Basement perimeter wall	Yes	0.2512023	1	11	11				
Basement roof at or above mean level	Yes	0.044126	3	11	5				
Basement partition wall at or below mean level	Yes	0.0448912	3	11	10				
Basement floor	Yes	0.2032824	1	20	-12				
Basement ceiling	Yes	2	1	11	6				
Floor	Ground floor	0.0091849	26	20	100				
Floor	Ground floor over void	0.0589331	3	11	6				
Floor	Basement floor	0.0523647	3	20	6				
Floor	Basement floor over void	0.0528671	600	20	0				
Floor	Floor suspended over air	0.0585441	600	0	20	703	600	3090	37%
Floor	Compartment floor	0.0528671	90	0	20	95	90	Ratio: 1 to 0.32	
Floor	Party floor	0.0528755	900	0	20	952	900	3090	37% Area %
Wall	External wall	0.0642495	405	0	20	805	405	Ratio: 1 to 1.95	
Wall	External glazed wall/Curtain wall	0.81	175	0	20	2,835	175	Ratio: 1 to 1.95	
Wall	Opaque Curtain wall	2	20	0	20	800	20	Ratio: 1 to 1.95	
Wall	Compartment Party wall	0.125493	525	0	20	1,318	525	Ratio: 1 to 1.95	
Wall	Compartment Party wall	0.1255245	65	0	20	163	65	Ratio: 1 to 1.95	
Wall	Internal Partition/Wall	0.2032824	25	20	20	0	1265	15%	
Roof	Pitched Roof	0.0694608	1265	0	20	5,701	1265	29.5%	
Roof	Flat roof	0.0694608	471	0	20	873	471	29.5%	
Roof	Shed roof	0.0694608	30	0	20	0	30	29.5%	
Roof	Flat	0.0694608	30	0	20	521	30	29.5%	
Window/Door	Window	0.086	2	0	20	1,000	2	20.5%	
Window/Door	Glazed door	0.8	10	0	20	1,600	10	20.5%	
Window/Door	Glazed door	0.8	10	0	20	1,600	10	20.5%	
Window/Door	Vehicle entrance/Large doors	2	45	0	20	1,800	45	20.5%	
Window/Door	High usage entrance doors	2	20	0	20	800	20	20.5%	
Window/Door	Opaque Pedestrian Doors	2	12	0	20	480	12	20.5%	
Window/Door	Display window	2	25	0	20	1,000	25	20.5%	
Window/Door	Roof Vents/Smoke vents	2	25	0	20	1,000	25	20.5%	
Total areas			9043						
Total glazed areas			223						
Total areas minus glazed areas			8820						
Glazed areas % of Total areas			2.5%						
Total Conduction Heat Loss (TCHL)									
In Use Carbon									
Hours of operation/day									
TCHL									
Floor area									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									
KiloWatts/Floor area									
KiloWattHours/Floor area									
KiloWattHours/Floor area/annum									
TCHL									
Watts									
KiloWatts									
KiloWattHours									

# Version 2

- Carbon in use/annum
  - Hours of use per day
  - Days/week days/year
- Domestic Retrofit:
  - One off and community
- Bill of materials; add
  - Building Labour Rates
  - Materials Rates
  - Services Scope and quantities
  - Services Rates
  - Services Labour Rates
  - Services Costs

# Versions 3

- Decrement Delay Calculator
  - to avoid summer overheating
- Condensation check:
  - static to BS 5250
- GBE Product Datasets
- GBE Form Factor Calculator
  - Other Methods
  - Thicknesses of insulation to meet U values

# Decrement Delay GBE Green Building Calculator

Decrement delay FU : to give a decrement delay (d) of X hours (defined by the user) for 1 m² surface

Property 2: Decrement delay (d), Approach a: Specific Heat Value = Wh/kg.K

Needed data	DL	Design Life of Building	50	Years	Default	Choose this method not the next one
Needed data	CLE	Component Life Expectancy/Replacement period	50	Years	Default or PDS	
Needed data		Material				
Needed data	1	e thickness of material layer	0.3		PDS	
Needed data	2	ρ Rhô (volumic mass) [density]	700		PDS	
Default data	3	S surface area of wall considered	1		Default	
Needed data	4	λ thermal conductivity	1		PDS	Be careful with units
Needed data (option 1)	6	c Specific heat value	0.58	Wh/kg.K	PDS	See Converter if units are: J.kg/K
Defined by User	7	d Decrement delay (Hours)	12		LookUpTable	Could this be LUT/DDL with options?
Formulas		d Decrement delay (Hours)				
Formulas		a diffusivity				
Formulas		e thickness of material layer				
Formulas		Q Quantity				
Calculation		Q=(d/1.38*v(p*C/λ))*S*p*(DL/CLE)			Calculated	

Input from:	Product Data Sheets	Result
Specific Heat Value		
from	J/kg.K	to Wh/kg.K
2100		0.583333333

# Build Light, Insulate Right, Solar Tight

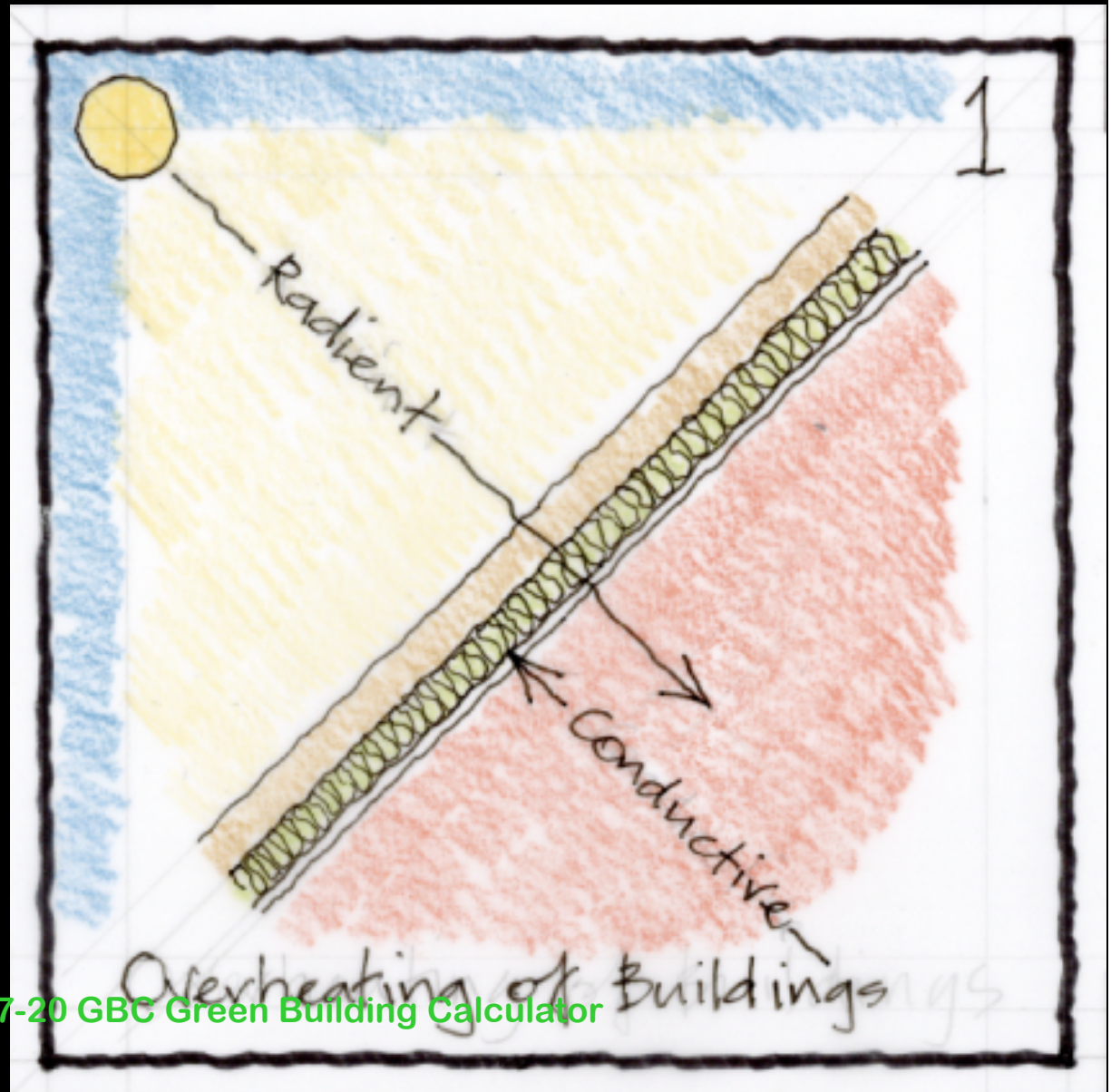


Or why buildings overheat

© 2015-2019



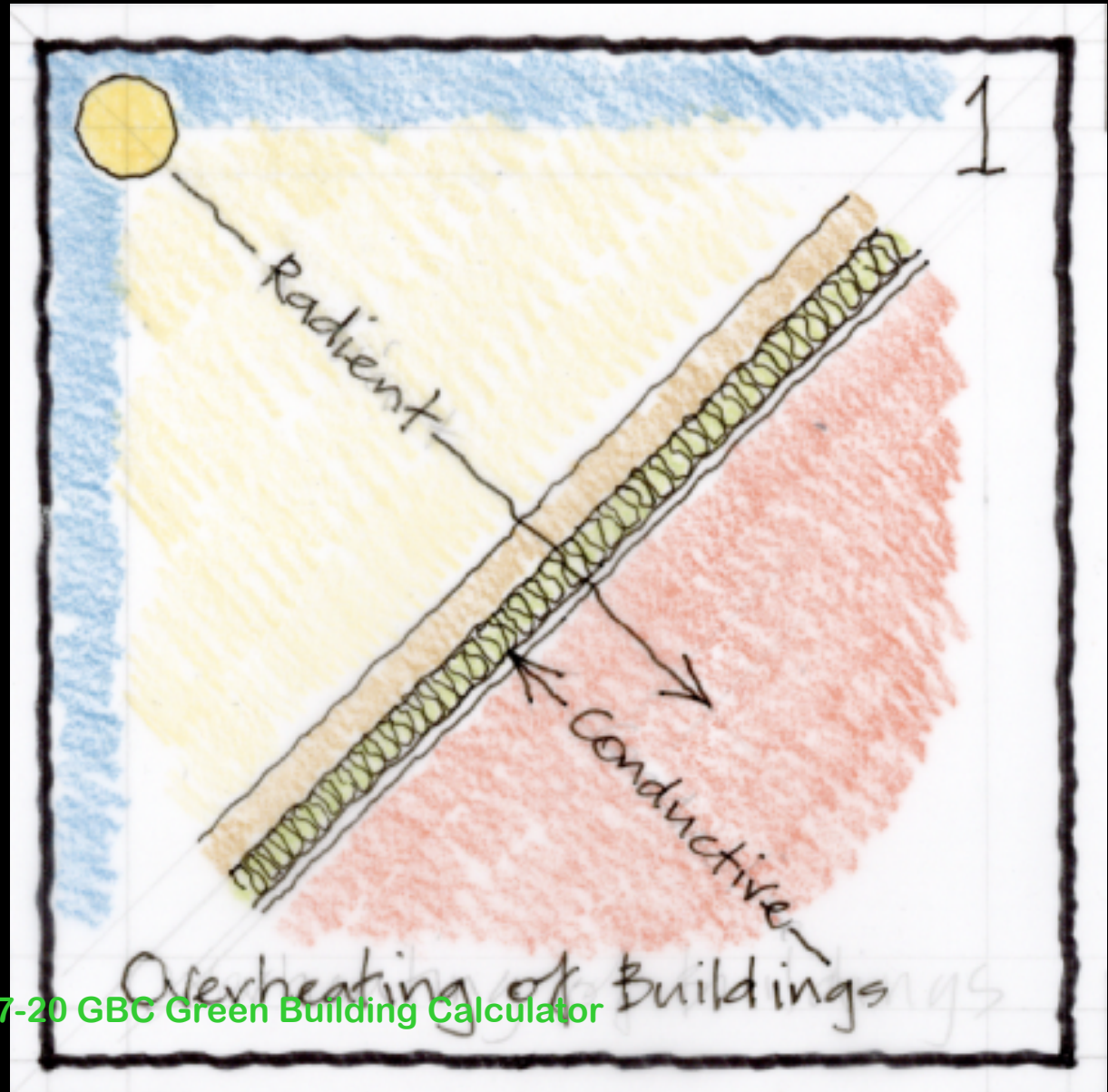
**Radiant  
verses  
Conductive  
heat flows  
Insulation  
needs to  
resist both or  
overheating  
occurs**





# Radiant v Conductive

**Thermal  
Insulation:**  
Once radiant  
heat gets in it  
warms the space  
and the warmth  
cannot get out  
through  
conductivity  
insulation



# Version 4

- **Building Section Coding**
  - Elements Sub-elements and Junctions
- **Material Appropriateness to Application**
- **Building Elemental Assembly Code Numbers**
  - Outer face-Core-Inner face
  - CAWS-CI/SfB-CAWS-Instance
  - 892 Readymade Competent Elemental Assemblies
  - Bespoke collection and incorporation
- **Specification Generator**

## Version 5

- More specific interfaces:
  - Non-Domestic Retrofit:
  - Domestic new build
  - Non-Domestic New build

## Versions 6

- **GBE EE EC SC Calculator**
  - ICE database: 1.3 > 3.0
  - Will provide Embodied Energy, Embodied Carbon and Sequestered Carbon data
- **Bill of Materials Quantities Costs**
  - Non-External Envelope Components
  - Landscape Assemblies

## Version 7

- Condensation Check
- Thermal Bridge Calculator
- Secondary Element Calculator
  - Glazing and framing specifications
  - $U_g$   $U_f$  &  $U_w$  and  $\Psi$  perimeter and spacers

# Version 8

- Life Cycle Assessment (LCA)  
Whole Building Calculator
- LCA Dataset

## Version 9

- Landscape
  - (using some of GBE 862 Readymade Assemblies)
  - Landscape Materials Rates
  - Landscape Labour
  - Landscape Costs



# Version 10

- **Civils & Infrastructure**
  - (using GBE 862 Readymade Assemblies)
- **Civils & Infrastructure Rates**
- **Civils & Infrastructure Labour**
- **Civils & Infrastructure Costs**

# Version 11

- Waste Calculator
- Embodied Energy and Carbon in Waste
- Embodied Energy and Carbon in Reclaim
- Sequestered Carbon in Reclaimed Timber

# Version 12

- Plastic Free V Recycled Plastic Products
- Plastics & Recycled Plastic Content Dataset
- Alternatives to Plastics Dataset
- Plastics Diverted from landfill
- Plastics Avoided
- Carbon Consumed or Avoided

# Version 13

- Interiors Fit out, Refit Furniture Dataset
- Finishes Products Dataset
- Furniture Impact calculator

# Version 14

- Self-build Interface
- Wales Technical Advisory Note 6
- One Planet Development
- Zero Carbon evidence requested
- Town & Country Planning

# Version 15

- BIM Building Information Management
- CAD Computer aided Design
- BIM App to interrogate Building Model and extracting physical and dimensional information
- BIM interrogate BOM to feed the calculator

# Energy and related design standards

- **Building Regulations Approved Document L**
  - Will eventually meet carbon targets but not now
  - Most new buildings will need to be retrofit by 2030-2050
- **Energy (exceeding Building Regulations)**
  - AECB Bronze, Silver, Gold and Platinum Standard
  - Super E (Canadian; means to sell their softwood)
  - Passivhaus (German) PHPP Software
    - Indoor Air Quality and Thermal Comfort conditions driven
    - Minimise air leakage, minimise thermal bridges
    - EnerPHit (Passivhaus Retrofit)
  - Minergie (Swiss)
  - Carbon Lite (UK AECB)
    - Passivhaus interpretation for UK climate and energy mix
    - Carbon Lite Retrofit (CLR)

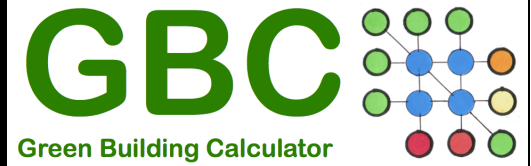


# Feedback

- These files are created by generalists with a big dollop of green flavour
- These files are updated from time to time
- We are not experts so from time to time these file may get out of date or may be wrong.
- If you feel that we have got it wrong please let us know so we can put it right



<https://GreenBuildingEncyclopaedia.uk>



<https://GreenBuildingCalculator.uk>

© GBE 2017-2020

- **Brian Murphy BSc Dip Arch (Hons+Dist)**
  - Architect by Training
  - Specification Writer by Choice
  - Environmentalist by Actions
- Greening up my act since 1999
- Founded National Green Specification 2001
- Launched [www.greenspec.co.uk](http://www.greenspec.co.uk) 2003
- Created: GBE at <https://greenbuildingencyclopaedia.uk> 2015
- Launched: GBE Learning <https://GBELearning.com> 2020
- Green Building Calculator <https://GreenBuildingCalculator.uk> 2020
- E [BrianSpecMan@aol.com](mailto:BrianSpecMan@aol.com)
- Twitter: <http://twitter.com/brianspecman>
- LinkedIn: [BrianSpecMan](#)
- Facebook: [BrianSpecMan](#) Facebook: <http://www.facebook.com/brianspecman>
- Slide Share:
- Pinterest: [Brian Murphy • GBE Green Building Encyclopaedia](#)