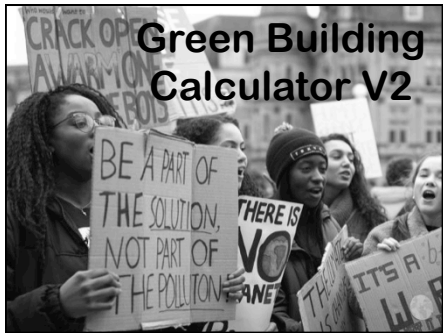
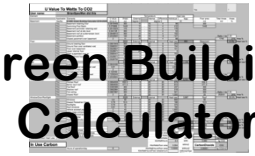


Green Building Calculator V2

Step by step guide to calculating and costing the embodied and in use carbon load of your building
CIAT Webinar 7-8pm 8th Dec 2021

Green Building Calculator



BrianSpecMan Murphy GBC Number-Cruncher
Version 2 launch 1st March @ FutureBuild 2022 Digital Arena Stand L68

Futurebuild 2022

- 1st 2nd 3rd March 2022
- Tuesday Wednesday Thursday
- Digital Futures Zone
- Stand L68
- Except:
  - Wednesday 12:15-13:00 On the Retrofit Stage presenting STBA HES Responsible Retrofit Carbon Calculator developed by GBC and STBA over past 4 months
- Demonstrations
- Private tour of GBC calculator Version 2
- Preview Versions 3 to 36
- Feedback form
- Sign Up to User group, steering group, newsletter
- Badge scan
- Purchase on-line

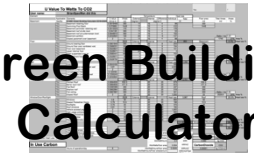
This Presentation on GBE:

- Find this file and event on GBE website at:
- https://GreenBuildingEncyclopaedia.uk/?p=40045
- https://GreenBuildingEncyclopaedia.uk/?p=40122
  - PDF Show: CIAT Webinar
  - Also find:
  - Full version of GBC CPD PDF (413 slides)
  - Links to all GBC related pages
  - Links to GBC website
  - https://GreenBuildingCalculator.uk

CIAT Programme

- 10 minutes intro to GBC V2 %%%
- 2 minutes case study in use
- 30 minutes tour and demonstration of GBC V2 %%%
- 18 minutes Q&A

Green Building Calculator



I want.. I want.. I want..

I am coming at this problem:

- Technician and Architect by training
- Specification Writer by choice
- Sideline frustrated spectator
- Observer of projects going wrong:
  - Briefing battens dropped at each interchange
  - Because of bad cost planning and layers of procurement complications
  - Lack of joined up management of it all
  - Loss of scrutiny of competency of anything

I don't want:

- A building Performance Gap
  - Started by philosophical, aesthetics and snappy-graphics education
  - Little or no technical, physics, science, numeracy, environmental education
  - Increasingly challenging Legislation Regulation interpretation and Administration
  - RIBA discouraged and shrinking supervision role
  - Insurance encouraged "don't approve anything"
  - Evolves into vulnerable technical design
  - Invited by "Or Similar" annotation of drawings ("Or Equivalent" is safer)
  - Undermined by surreptitious substitution
  - Brought on by inadequate tender
  - Manipulated by Dutch bargaining
  - Lubricated by power over supply chain
  - Facilitated by out of control & bespoke procurement methods
  - Muddied by misaligned perceptions
  - Encouraged by Constructing Excellence 10% year on year improvement
  - Compounded by 2013 Industrial strategy -33% cost, -50% emissions, -50% time
  - Cost cutting in disguise as "value engineering"
  - Driven by inadequately specific incompetent cost planning
  - All leading to: incapacity of construction sector to deliver:
  - Client's bespoke design, green brief & investment ambitions

I want clients

- with aspirations and objectives for a Healthy, Environmental, Useful building:
  - To know they can engage a building designer team who have the tools and skills to meet their brief
  - To be able to invest well and get what they want;
    - not be driven down the business as usual cost cutting route initiated by QSs bad cost plans and procurement that adds a fee to reduce quality
  - To know that their aspirations & objectives will survive all the way to completion on site

I want building designers to be able to:

- Do their own Cost Planning on small jobs not needing a QS
  - based on the real cost of doing it greener and better for client
  - not just cheapest-wins every time
  - Don't set yourself up for a fall
  - without a QS
    - that steers the project towards financial and performance gaps
    - Avoiding approximate elemental pricing rates
    - Avoiding non-representative labour rates
    - Avoiding incompetent violet price books
- Immediately understand the environmental impact
  - of their construction or refurbishment methods
  - Help make better informed choices of materials or produc
  - Become carbon literate

I want building designers to be able to:

- Compare alternative scenarios easily, quickly
  - to begin to build an understanding of the consequences of their choices
  - in time be able to intuitively choose lower impact materials and methods
- Intelligently interrogate the bill of materials
  - do environmental analysis on the fly.
- Access comprehensive generic materials and product datasets at their fingertips
  - adopt, apply and interrogate designs

I want building designers to be able to

- Know where a product was invented to be used
  - not risk its inappropriate application
  - 'Post-Grenfell golden thread' Version 3, started in Version 1
- Close the performance gap:
  - Energy now,
  - Airtightness, next
  - Fire, acoustics, indoor air quality, etc. later
  - Services design, lighting design, later
- Have access to competent elemental assembly datasets
  - 892 already for Version 3
  - For use in the absence of know-how to assemble their own
  - Choose from and adopt or adapt competently

I want building designers to be able to

- Have a low cost tool affordable by small practices
- Have a multi-functional tool that interrogates the same building model/dataset
  - That only has to be built once, to get many results
  - Unlike WRAP and BRE tools
- Submit to architectural competitions and awards
  - that insist on embodied energy, embodied carbon and sequestered carbon and energy and carbon in use,
  - as part of the criteria for success
  - with an appropriate weighting I hope.

I want Non-BIM'ers

- Who have no need for BIM
  - Who cannot afford to implement BIM
  - Not doing Government work, not needing BIM
  - Have not experienced the benefits of BIM
- To be able to do BIM-app-type analysis outside of BIM
  - Interrogate the data and get useful results
- In the future:
  - Enable seamless BIM adoption later
  - Two way flow of information between BIM and GBC and visa versa

I want Quantity Surveyors to:

- Become a useful part of procurement process again
  - Cost planning has to do better than it has done over last few decades
  - Pricing books are woefully inadequate
    - do not reflect what is going on out there
    - Tradesmen rates are wrong as far as we can tell
  - Elemental rates are limited in scope
  - Accurate Cost planning appears to be impossible
  - Don't propose D&B etc. if the client wants bespoke, quality and good Investment
- Be Quality Surveyors not Quantity Surveys
  - Why give the client a Violet cost plan for a green brief for a green building?
  - Why give them false expectations? And then fail from there onwards?
  - Be more accurate than +/- 10% measuring and worse estimating
- Create the 'Green Building Price Book'
  - Alistair McConnochie proposed 20 years ago
  - to become a reality, inside GBC
- Do Green, competent Cost Planning
  - not win the 'race to the violet bottom'
- Do real Value Engineering of green stuff into the project, not out of it
  - not cost-cutting disguised as Value Engineering;
  - but will they look at the bigger picture?
- Do Whole Life Value without charging an extra fee
  - TOTEX = CAPEX + OPEX

I want procurement to:

- Focus on the client expectations
  - No more novated designers without whistleblowing clauses
- Not focussed on low cost and fast delivery
- At the expense of performance & quality
  - Craft supervisors not QA box tickers
  - Not sub-contracted snagging
- Not create long supply chain barriers between designers and craftsmen
- Manage interfaces between packages
  - Deliver consistency of end results for whole building
  - Easy to maintain by client's FM
- Go back to General Contracting if that's good enough

I want manufacturers to:

- Make multi-functional materials, products and systems:
  - But avoiding composites and mixing natural with technical materials
  - To replace many singular function alternatives
  - That succeed in Value Engineering processes
    - Because they are difficult to substitute
- Make low impact materials and products
  - Not hide behind BRE GGtS Generic Materials Assessments
    - at industry sector level: aggregated average grey not green or violet
- Make their independently verified credible data available
  - as 'big open data' in 'consistent formats'
  - Readily interrogated by calculators with intelligent search functions
- Populate GBC Product Data Collection tables to create a single robust source and allow integration into GBC & bespoke Calculators
  - Share NBS Source datasets and add green data
  - Create Green Building Product Dataset & Green Building Price Book
- In BIM provide:
  - High Levels of Information (LOI)
  - Before High Levels of Detail (LOD)
  - Enable High Levels of Accuracy (LOA)

I want tenderers:

- To be able to use the built-in calculator
  - as the Bill of Quantities Tender Document
- To not have to price the job with every intention of making claims
  - Because retention moneys will never be paid without a fight
  - Dutch bargaining discounts will be expected
  - Main-Contractor levy or discounts will be expected
  - Payments will be late: 3 months is normal today
  - Especially on Guaranteed Maximum Price GMP domestic tenders
- To be able to price the job properly:
  - not chasing some false illusion cost plan,
  - to allow trades people to have the time to care
  - and do a competent job using proper materials
  - Accurate and complete tender documents can invite accurate and complete pricing
- I want Specification Substitution to be done:
  - Transparently with all the facts and figures available
  - about the consequence of every change,
  - other than just cost savings for the contractor or shared with the client

I want I want I want
I am reminded to

Be the change you want to see in the world

Mahatma Gandhi

Green Building Calculator

Case study:
International Timber Competition
28th May 2020

Design Review and Carbon Data

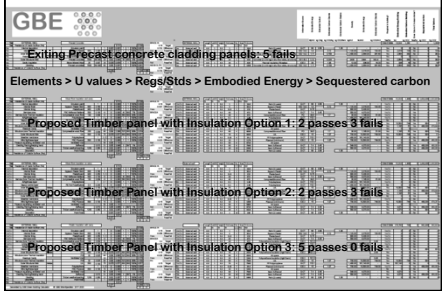
- Architectural Competition Entry
  - Metsa Timber Technology Competition 2020 Entry
- exStudent Samael Coco LSBU Post Graduate Architecture EREID Module
- Competition Entry requires carbon data
  - Samael needed help
  - Called on GBC to provide it

Int. Timber Competition Entry

GBC prepared and provided:

- U value calculations with each insulation option
- In use Energy & Carbon comparisons:
  - Building Regulations AD L
  - AECB Carbon lite,
  - Passivhaus
  - LETI U values
- Embodied Energy, Embodied Carbon and Sequestered carbon
- before and after calculations

Int. Timber Competition Entry



GBC Green Building Calculator

- Scope: V1 Completion:
- New Build, Domestic, Multi-storey, Multi-occupancy, Non-domestic (partial)
- Building Size:
  - Number of buildings and floors, heights, lengths, areas, volumes
- Temperatures: inside, outside, below ground and swimming pool
- Hours in use: per day (period temperatures maintained)
- 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, Passivhaus, EnerPHit, AECB: CL or CLR or others
- Winter Thermal Insulation Material Choices
  - R values/ 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

V2 Current Development

- Progress:
- Non-Domestic, Retrofit and Newbuild more elements;
- Terraces, Community level,
- Form Factor refinements: dormers, bays, porches;
- Decrement Delay, Condensation Check, > Version 3
- Embodied Energy, Carbon and Sequestered carbon;
- LCA Calculator & Materials Miles > Version 3
- External Envelope elements: 24 > 41
- Envelop Secondary Elements: 12
- Non-external envelope elements:
  - MEP Services: 20 Domestic,
  - Landscape: 20 elements
  - Interiors, Furniture: 25 elements
- Secondary Element Calculator:
  - U Glass, U Frame, Psi glazing bar, U Window, Psi Perimeter

https://GreenBuildingEncyclopaedia.uk
https://GreenBuildingCalculator.uk

This month's tasks

- 2107 materials/products (many thousands more to add)
  - reducing towards a more useful set
  - Version 2: Providing short dedicated applicable drop down lists to choose from
  - Version 4: Subdividing into application groups enabling Post-Grenfell Golden thread
- Merging datasets:
  - Insulation Conductivity
  - Products
  - Embodied Energy and Carbon
  - Environmental Product Declaration
- Filtering:
  - Duplicates
  - No construction application
  - Data missing in any of the 4 sets, for calculations to be comprehensive
  - General, Sector, UK, EU or Global averages
    - (that do not exist in the market)
  - Titles and subgroups
  - Replacing many sources with one Generic

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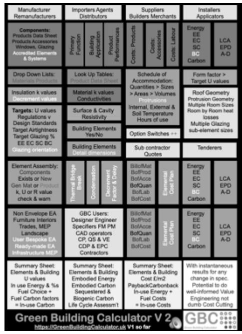
https://GreenBuildingCalculator.uk

Version 3

- Will learn from B2 Bespoke development
- Retrofit version for STBA and HES
- Includes:
  - Survey sheet:
    - to collect data, choose options, interrogate look up tables, calculate and report results
  - Ready made house types datasets
    - Choose to populate cells
  - Risk analysis based on location rain index, state of repair, existing and previous interventions



Product Information Providers

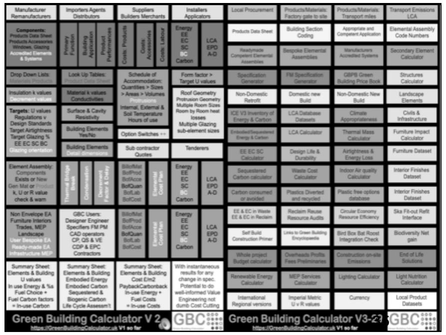
Product Data Collection

Excel mechanisms
Data Sources
Data inputs
Generic Materials Datasets
Choosing targets & Data sources
Option Switches for more detail
Choosing
Price Information

Chosen Elements
Choosing Components
Choosing Materials or Products
Automatic Number Crunching
Checking Targets Met or warnings

GBC Users

Dashboard
Summary Sheets
Purpose of Green Building Calculator



Product Information Providers

Product Data Collection
Elemental & Sub-elemental
Assemblies
Specifications
Prices
Scope of Work
Other Disciplines
Choosing targets & Data sources
Impacts
LCA & design Life
Interiors

Waste

Plastics
Circular Economy

Self Build
Biodiversity
Preliminaries

MEP Services
Regional International Variations
Bespoke Modules

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Green Building Calculator Website

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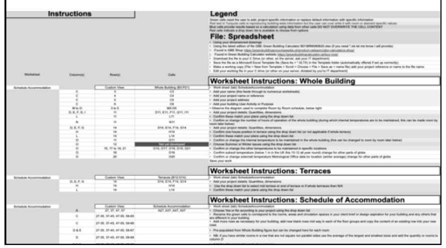
V2 Instructions



V2+V12 Cell colour codes & symbols Excel and BIM

- Was on every page
- Now on it own page
- Updated by B2 Bespoke developments

Legend	In Excel		In BIM
Cell colour code/content	Explanation	Examples	
Orange	Row or Column titles	Complete	n/a
Pale Green	Multiple cells require different responses by user	Multiple	
Green	User input cell, feeds into calculations throughout GBC	Yes	From Bill of Materials
Green with Red text	User input cells with sample entries to populate calculations (replace as required)	0,00	By User if required
Red	User to select option from drop down list GBC will apply choice to calculations	Choose	From Bill of Materials?
Blue	GBC calculated results, applying user inputs in other cells or sheets	0	From Bill of Materials
Brown	GBC delivers results from Look Up Tables triggered by choice from Drop Down Lists		
Turquoise	GBC calculated results, that the user can overwrite. e.g. for variables	0	From Model?
Turquoise with red text	GBC example calculated results, that the user can overwrite, e.g. for variables, can be overwritten	0	By User if required
Violet	GBC totals up, User to check if correct OR use the information elsewhere in the calculator	Check	By User if required
Yellow	Information to be collected if readily available quickly		n/a
Yes/No	User input cell requiring user choice from drop down list		By User from list
No	Not complete by GBC OR Users to ignore this row's cells. 'No' will turn red automatically		n/a
Review	GBC awaiting information OR User to interrogate this row's cells and review decisions so far		User to interrogate result
Yes	Started by GBC OR To be completed by Users. 'Yes' will turn Green Automatically		By User if required
%%%	In development incomplete		GBC Aide memoir
///	Pending development		GBC Aide memoir
>>>	Date related update		GBC Aide memoir
***	Seperator in Drop Down Lists		GBC Aide memoir
Grey cell no text	Cells not containing calculations nor containing text or other information		

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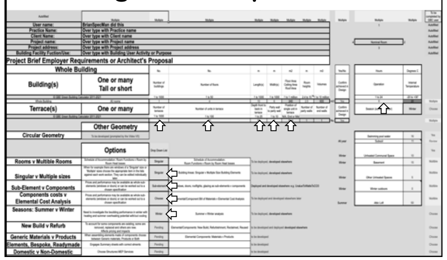
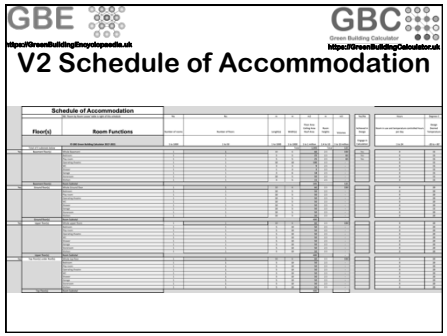
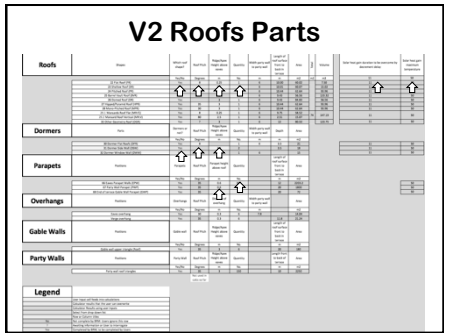
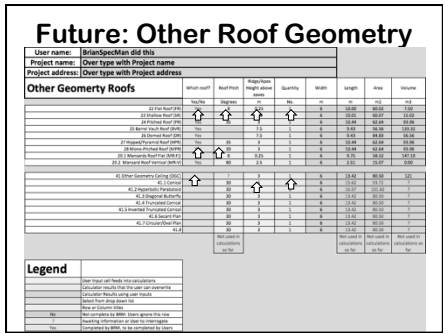
https://GreenBuildingCalculator.uk

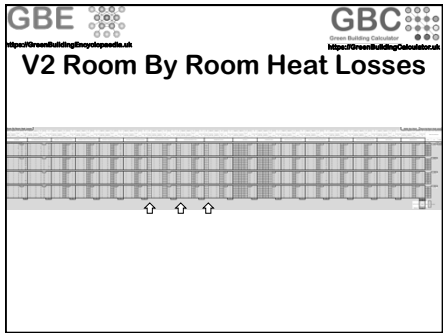
V2 Singular/Multiple Switches

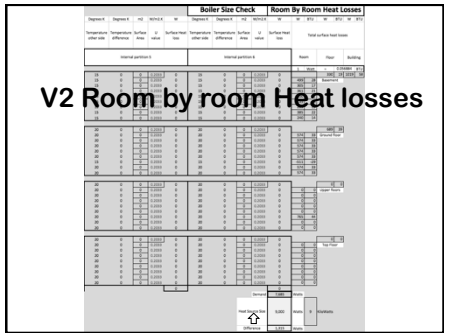


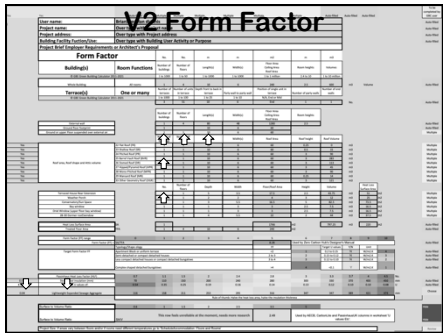


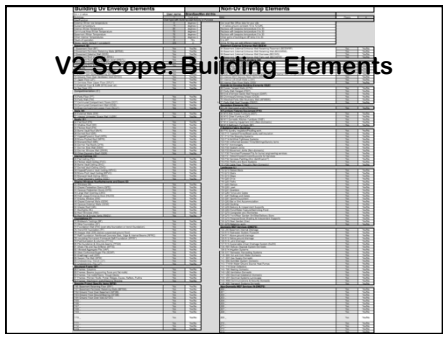


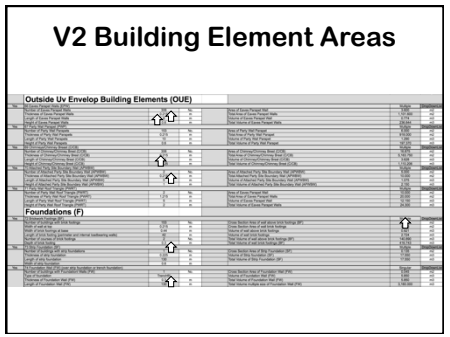


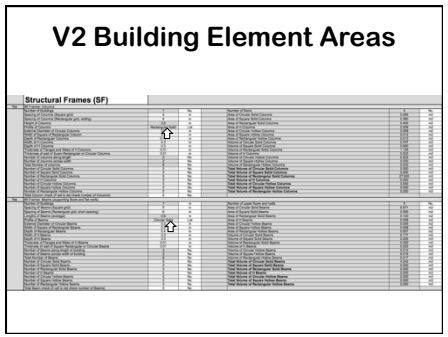




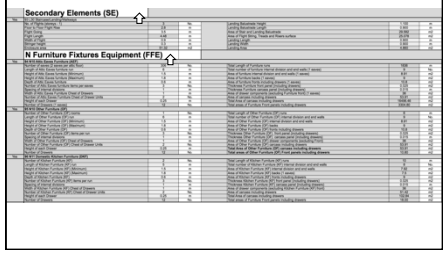




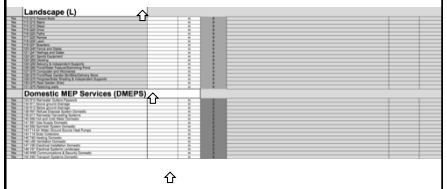




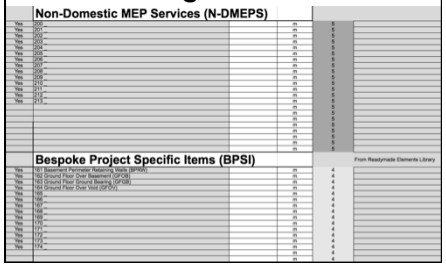
V2 Building Element Areas



V2 Building Element Areas (V9 Landscape Pending) MEP in development



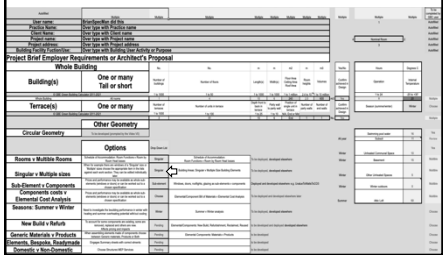
V5 Services Systems V4 Building Element Areas



Future Development

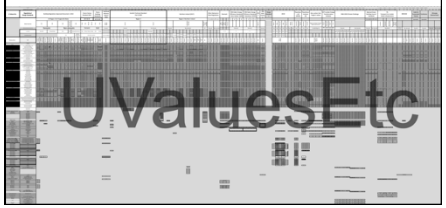
- Windows Doors Rooflights
- Rooms
- Daylight factors

V2 Singular/Multiple Switches

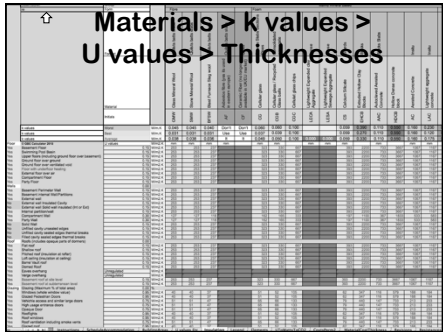


V2 U values Etc. Targets

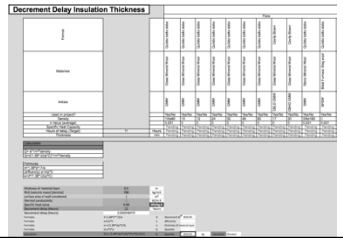
Regulations, Public Consultations, Design Standards, Campaigns



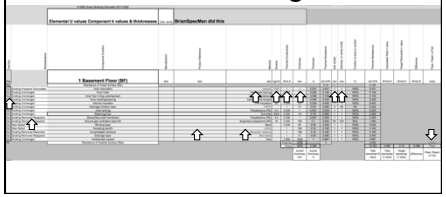
Materials > k values > U values > Thicknesses



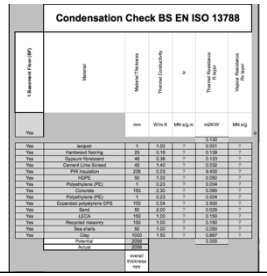
V3 Decrement Delay Insulation Thickness (Dev)



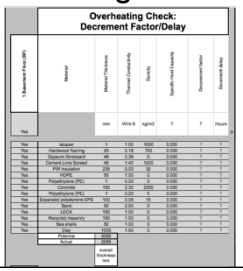
V2 39 Elements U or R value 12 secondary element U/R values Refurb Actions including demolition



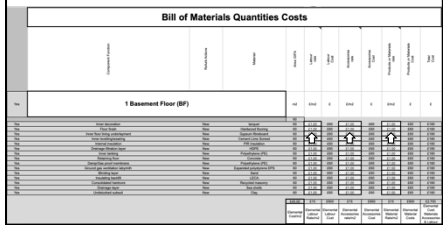
V3 Condensation Check



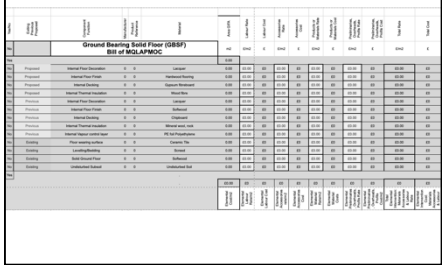
V3 Decrement Delay Overheating Avoidance



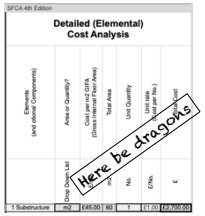
V2 Bill of Materials Quantities Labour Accessories Products Costs



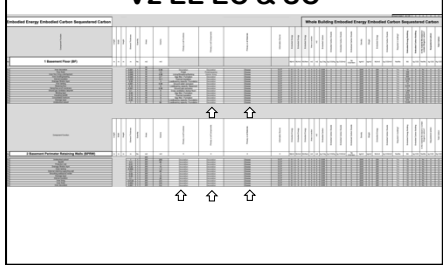
B2 Elemental Assembly > 4 Bill of Materials Quantities Costs



V2 Elemental Costing



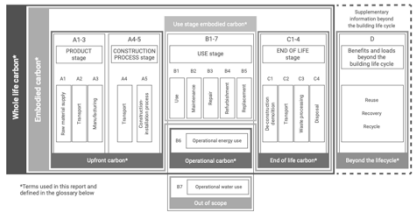
V2 EE EC & SC



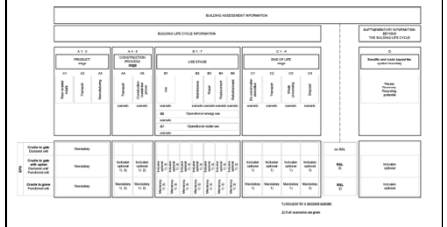
ICE 3.0 database carbon reporting options

Mass/Declared Unit	kg/Declared Unit
Embodied Energy only	
Embodied CarbonO2 (only)	kgCO2/kg
Embodied CarbonO2 (only)	kgCO2/m2
Embodied CarbonO2 equivalent	kgCO2e/kg
Embodied CarbonO2 equivalent	kgCO2e/tonne
Embodied CarbonO2 equivalent	kgCO2e/m2 per 1 mm
Embodied CarbonO2 equivalent	kgCO2e/m2 per 100 mm
Embodied CarbonO2 equivalent	kgCO2e/unit
Module A1-3, Embodied Carbon	kg CO2e/kg
Module D, Carbon	kg CO2e/kg
Module A-D, Embodied Carbon	kg CO2e/kg

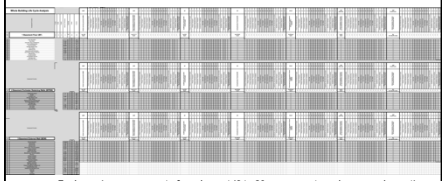
EN 15978



EN 15804



V3 LCA EPD

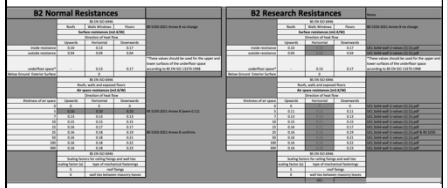


- Each row is a component of an element (3 to 20 components make up an element)
  - (framing insulation lining)
- Each group of components makes an element (up to 39 make up a building)
  - (partition, wall, floor, roof)
- Each column is an EN 15804 stage A-D or subdivision column
- Each group of columns is an environmental impact (7 groups 7 impacts 1 is carbon=)

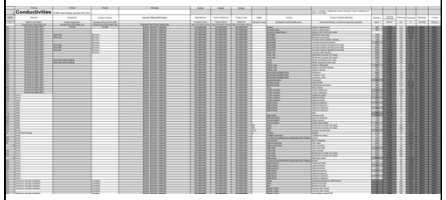
V1 Resistances V2 no change

	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	*These values should be used for the upper and lower surfaces of the underfloor space according to BS EN ISO 13370:1998
Below Ground Exterior Surface		0		
	BS EN ISO 6946			
	Roofs, walls and exposed floors			
	Air space resistanes (m2.K/W)			
	Direction of heat flow			
thickness of air spae	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			

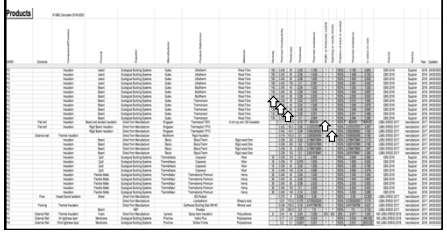
V3 Research paper options



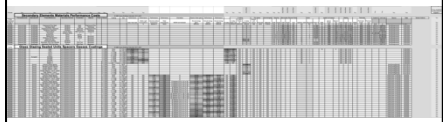
V2 Conductivities



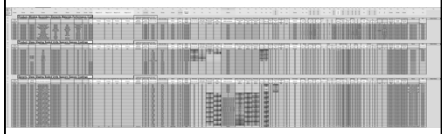
V1 Properties of Products



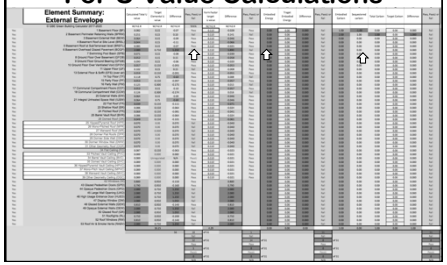
V2 Secondary Elements Windows & Glazing options



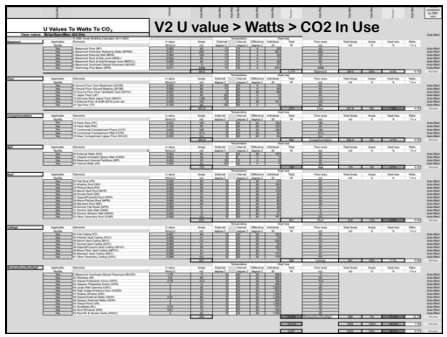
V3 Secondary Elements Windows & Glazing options



V2 Element Summary Ext Env For U Value Calculations



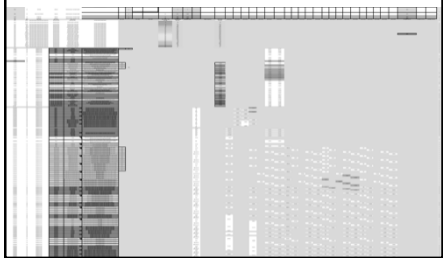
V2 U value > Watts > CO2 In Use



V2 Carbon Mains Electricity EU

2020 Provisional Data YTD	Wartsila Energy Transition lab	
Europe	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
Romania	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
Czechia	430	0.43
Netherlands	530	0.53
Poland	700	0.7

V2 UK Fuel Carbon Factors 2020



V2 In-use Energy Carbon Costs

Total Conduction Heat Loss

	Areas		
Total Envelope Area Conducted Heat Loss (TEACHL)	5395	m2	Total
Total Transparent Area Conducted Heat Loss (TTACHL)	359	m2	Window/Door/Roof/light
Total Opaque Area Conducted Heat Loss (TOACHL)	5036	m2	Walls Roof Floor
Transparent area as % of whole	7.12%	%	Window/Door/Roof/light

In-Use Energy

Floor area	5,395	m2
Volume	14,114	m3
Air/Hourly	8	air
Kw/Net/hourly	112.9	kWh
Kw/Watts/floor area	0.003	kWh/m2
Kw/WattHours/floor area	0.0209	kWh/m2
Kw/WattHours/Floor area/annum	80.9464	kWh/m2/Year

In-Use Carbon Dioxide

Fuel Choice	Mains Electricity Late 2020	Drop Down List
CO2 equivalent		kg CO2eq/kWh
CO2 conversion	#REF!	kg CO2/kWh
kg CO2	#REF!	
CO2	Carbon Dioxide	CarbonDioxide
kg CO2/m2	#REF!	

In-Use Hours

Hours of operation/day (Spaces thermally conditioned)	8	hrd
Days Per week	7	d/wk
Weeks per year	52	wky
Hours/Year	2912	hy
Hours/Year maximum potential	8736	hy
Percentage of maximum potential	33.33%	%

Change at Schedule/Accommodation N11 or edit here

In-Use Costs

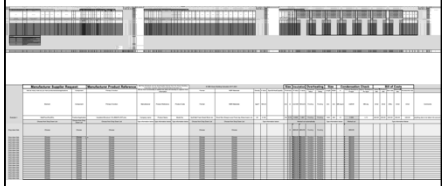
Fuel Choice	Mains Electricity Late 2020	Drop Down List
£ costs/unit of fuel		£/-----
£ costs/Building		£/-----
£ costs/m2		£/-----
£ costs/annum		£/-----
£ costs/hour		£/-----

V2 Then add:
Carbon targets
Pass or Fail

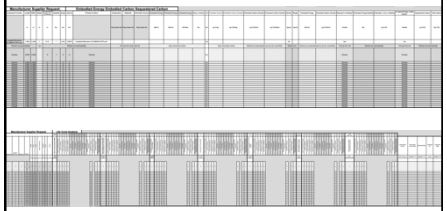
LETI Standard
ACAN standard
RIBA Challenge

V2 Then add:
Cost Pay Back
Carbon Pay Back
Value Engineering

V2 Manufacturer Supplier Intelligent Product Data Collection



Manufacturer Supplier V2 EE EC SC & V3 LCA datasets



V2-V36 Planned Development

Priorities to bring forward:

- V2 Retrofit, Terraces, Community level, MEP Services,
- V3 Decrement Delay, Form Factor refinements: dormers, bays, porches
- V4 Building Section Coding, Competent Application,
- 892 ready made elements, Bespoke Assemblies, Accessories, 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: scope Increased
- V11 Waste Calculator using WasteCost8Life
- V12 Plastic free v Recycled Plastic
- V13 Interiors: Scope increased, Ska fit-out. refit
- V14 Circular economy: Reclaim Reuse
- V15 Self-build Interface
- V16 CAD BIM App
- V17 Whole Project Budget Calculations, full Fee bid calculation based on cost plan
- V18 EU and International versions
- V19 Services Design Module: Occupancy level, Energy Sources and uses,
- V20 Lighting Design Module: Health & Wellbeing, Light Nutrition
- V21 Biodiversity Inclusion, Biodiversity Net Gain
- V22 Local Climate Appropriate construction and materials
- V23 Vernacular, local: materials, trades, economy
- V24 GBPB Green Building Price Book
- V25 O&MM Operation & Maintenance Manuals
- V26 FM Specification
- V27 Local Procurement, Transport to site, distance search facility
- V28 On Site Construction Emissions
- V29 Design Life, Durability and Competent Products
- V30 Air tightness & Energy Loss
- V31 Value Engineering Opportunities: in not out
- V32 Healthy Building
- V33 Screening Priorities
- V34 Indoor Air Quality
- V35 Natural Lighting Levels
- V36 Demolition Embodied carbon in waste

B Bespoke

- B1 Retrofit Window & Insulation Calculator
- B2 Responsible retrofit Carbon Calculator
- B3 Window Calculator
- B4 Screeds Calculator
- B5 NRMM QS interface

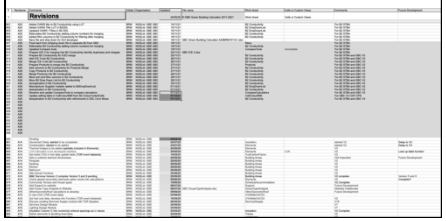
UKGBC NetZeroCarbon market's ambitions

- **Verification of carbon needed asap**
  - Tools need to be Quick, flexible first and improve over time
- Accessible for mass uptake
  - Low cost
  - GBC V2 £4.88 students-£88.88 bigger practices/businesses, per annum
- Wide access
  - https://GreenBuildingCalculator.uk
- No monopoly
  - Competition in market, many tools, datasets could be offered in exchange for information or know-how
  - GBC also offer consultancy
- **Global Valliancy**
  - Applicable in many countries
  - GBC V2 Metric and SI so not everywhere yet, but willing to develop
  - GBC V2 UK focus but will expand in future: EU & International
- **Independent & Transparent**
  - GBC V2 emphasizes plant-based but includes others for comparison
  - GBPB Green Building Price Book is essential for competency, but will be low cost to enter and maintain
  - Visible open book calculators to enable learning
- **Everything must be measured**
  - Bill of Quantities, Elements, Components, Accessories
- Not just design stage
  - GBC V2 enables checks at all stages VE,
  - Cost cutting and substitutions Verification
- Not Certification =
  - Not a rating tool, private and slow to launch
- Standards
  - Verification, lower cost and quick

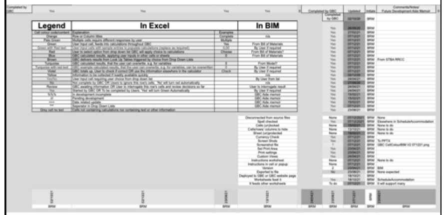
Quality Control

- Progressive development inevitable
- Revision table recording all types of changes on a task and daily basis
  - Pending rows added as aid memoir
- Recording revision dates against rows and columns in every worksheet with aide memoir
- Author(s) initialing each revision
- Worksheets preparation to publish checklist and record
- Internal audit trails possible
- List and links to data sources
- Merged data sources get unique GBC reference

V2 Spreadsheet revisions record for audit trails Pending list as an aide memoir

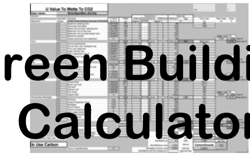


Worksheet revisions record



https://GreenBuildingEncyclopaedia.uk https://GreenBuildingCalculator.uk

Green Building Calculator



Demonstration

file://localhost/Users/BrianSpecMan/Documents/GBC Green Building Calculator/GBC Green Building Calculator Working PC.xlsx

https://GreenBuildingEncyclopaedia.uk https://GreenBuildingCalculator.uk

File Updates 1

Rev No.	Comments	Author	Date
A00	Created for CPD Whole Building Calculator	BRM	30/06/2012
A01		BRM	11/09/2020
A02	Update for STBA SPAB event with EH Bespoke	BRM	06/10/2020
A03	Update after STBA SPAB Event	BRM	07/10/2020
A04	Update for WiSR CIOB Event Infrastructure	BRM	27/05/2021
A05	Update for LSI RISE awards 2021 poster file	BRM	18/06/2021
A06	Update for COINS Awards 2021 V32 & 33	BRM	26/06/2021
A07	Funding Enquiry	BRM	16/09/2021
A08	GBC Expansion BQ Enquiry Diagram	BRM	28/09/2021
A09	Update for TGR TT reduce for short presentation	BRM	03/10/2021
A10	Update after TGR TT	BRM	11/10/2021

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File Updates 2

Rev No.	Comments	Author	Date
A11	Update Versions 1 to 36 and Bespoke List	BRM	01/11/2021
A12	CIAT updates and tweaking add V34-36 add B2 screenshot slides & B5 NRM4	BRM	06/12/2021
A13	Added B5 NRM4, UKGBC criteria & Quality Control post-CIAT update for CIAT and websites	BRM	09/12/2021
A14		BRM	
A15		BRM	/2021
A16		BRM	/2021
A17		BRM	/2021
A18		BRM	/2021
A19		BRM	/2021
A20		BRM	/2021
A21		BRM	/2021

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  - Environmentalist by Actions
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- Founded National Green Specification 2001
- Funded and Launched www.greenspec.co.uk 2003
- Created: GBE at https://greenbuildingencyclopaedia.uk 2015
- Launched: GBE Learning https://GBELearning.com 2020
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