GBC Green Building Calculator

https://GreenBuildingCalculator.uk

GBE

https://GreenBuildingEncyclopaedia.uk

GBE Learning

https://GBELearning.com

Risk-Free Carbon & Resource Efficient Retrofit

Useful Simple Trust

16th February 2021

This Presentation on GBE:

- Find this file on GBE website at:
  - https://GreenBuildingEcyclopaedia.uk/?P=39136
- PAS 2035 CPD
  - https://GreenBuildingEcyclopaedia.uk/?P=21613
- Product Passport
  - https://GreenBuildingEcyclopaedia.uk/?P=30129
- GBC Green Building Calculator
  - https://GreenBuildingEcyclopaedia.uk/?P=38491
- Go there for:
  - the latest updates
  - versions presented to different audiences
  - the whole presentation all of the hidden slides
  - The whole of other seminars extracted from to make this one
  - other file formats:
    - Handout, Show, PDF, PPTX
  - Links to other related GBE CPD and related GBE content

Scope

- PAS 2035: Risk-free Sustainable Retrofit
- Resource & Carbon Efficiency
- Carbon Counting
  - High and low carbon materials
  - ICE and outer Carbon data sources
  - Calculators: pre-requisite
- Product Data Sheets
- Product Passport: Reclaimed Materials

Retrofit UK With PAS 2035

Brian Murphy at DWF 11th June 2019

Extract 16th February 2021

Go back 9 years

- ...as the tsunami of GreenDeal and ECO were just over the horizon...
- ...GreenDeal just started to arrive...
- ...But came to nothing...
- ...whilst ECO spoiled a good many pre-1919 properties...
- ...extracts from a series of seminars presented to SusCon & RIBA S/SE, SmartLIFE in EofE, SBEE, TGR and others during 2010...

Unskilled Construction Industry for Retrofit

Construction Industry not ready for retrofit

Governance	Architects	Constructors	Education/Skills
No Regulation of Constructors	Philosophical Theory	New-Build College Knowledge	Out of Sync Syllabus
Weak Consumer Law	Graphic Design	Brick and Pitch know-how	New Build Only
No protection of term “Architect”	New Build College Knowledge	No Customer Interface Training	Trade by Trade
No Qualification for Builders needed	No Refurbishment know-how	Single Skills or Jack of all trades	Multi-skilling seen as Devils Work
Bankrupt Directors in business again in days	Little or no Building Physics	Not ready for MMC or IMC	No interdisciplinary understanding
Rely on word of mouth	Little or No Materials Science	Not trained in BREEAM driven building	No Refurbishment Know-how training
	Little or No Number Crunching	No refurbishment know-how	No Future proofing skills

PAS 2035: A New Standard for Domestic Retrofit

Dr Peter Rickaby

Each Home Counts Implementation Board

Chair, BSI Retrofit Standards Task Group

- **2 hours into 30 minutes won't go**
- **I have added more with lots of links**
- **So we will go fast and skip a lot**

Retrofit UK Scope:

- 27 m total homes
- 4 m homes in social sector housing
- 68% in private ownership
- 25-30% of total emissions
- 80% of buildings will still be standing in 2050
- 20-25 m homes to retrofit by 2050
- Current new Part L compliant buildings
  - Will be added to retrofit program later
  - Which year Part L are they built too (applications years prior to building)
  - Even current Part L is inadequate
  - Performance Gap leave them inadequate

Programme Current data:

- 2020-2050 30 years x 50 working weeks = 1,500 working weeks
  - 20m/1,500 = 13,333 completions per week
  - £333.3 m/week expenditure x 50 weeks = £1.666 bn/year
  - 13,333 No. * £25,000 = £333.3 m/week expenditure

  - 25 m/1,500 = 16,667 completions per week
  - 16,667 No. * £25,000 = £416.7m/week expenditure
  - £416.7 m/week expenditure x 50 weeks = £2.32 bn/year

Comparison:

- ‘Quantitive easing’
  - of 2008 banking crisis:
  - £1,500bn
  - in one go,
  - not spread over 30 years
- BEIS busy now spending £bn on other things:
  - BREXIT
  - COVID

Preston Estate 300 No. homes in private ownership

- Kate Selincourt wrote in Passivehouse+ magazine
- LA persuaded house owners to join
- Funding under CESP Scheme
- No Design, poor labour = Bad installation
- Rain penetration around terrible details
- Walls behind saturated, mould growth and uninhabitable
- Getting fixes is proving difficult
- Confronted Insulation Industry with this example
- Each Home Counts: Challenged

Grenfell over 18 m tower block

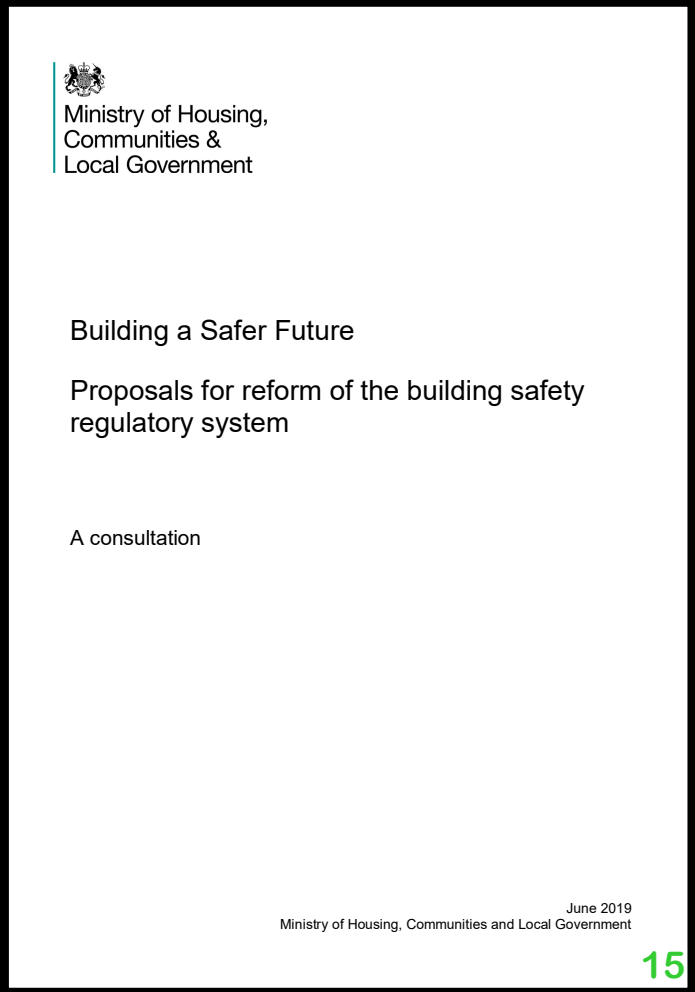
- Non-combustible concrete tower
- Insulated and clad in combustible materials
  - Manufacturer's false claims
  - Incompetent Certification
- Internal fridge fire escaped through
- Combustible window infill into
- Rainscreen cladding air gaps chimney effect
- Ineffective small fire stopping at floors
- Combustible Cladding ignited
- Fire passed back through window infill
- Burned out interiors above seat of fire
- 72 dead from toxic smoke and flames

Hackitt Review :

- 'Building A Safer Future: an implementation Plan'
  - https://www.gov.uk/government/publications/building-a-safer-future-an-implementation-plan
- Specification race to the bottom
  - Substitution with inferior products
  - Imported good, some from china, cheaper
- Slow response to correct:
  - Corner cutting culture
  - Cheapest is the only issue
  - Profit culture

Hackitt follow up Consultation

- Building a Safer Future: Proposal for reform of the building safety regulatory system
- A Consultation June 2019 – 31st July 2019
- MHCLG Ministry of Housing, Communities and Local Government
- https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/806892/BSP_consultation.pdf


Ministry of Housing, Communities & Local Government

Building a Safer Future

Proposals for reform of the building safety regulatory system

A consultation

June 2019
Ministry of Housing, Communities and Local Government

Technical Risks

- Putting the correct package of improvements in place
  - Right Insulation for the house
  - Not EWI on a ventilated cavity wall
- Managing:
  - Interaction between measures
  - Moisture
  - Indoor Air Quality (IAQ)
  - And delivering Ventilation
- Avoiding unintended consequences
  - E.g. stuff falling off
  - E.g. Insulation with wrong materials causing overheating
  - See Also: GBE issue Paper: Overheating

RE:NEW Technical Risk Matrix

	IWI	EWI	Cavity Wall	Loft Insulation	Roof Insulation	Underfloor Insulation	Window & Door Upgrades	Chimney balloons/baffles	Draft-proofing	MVHR	Boiler Replacement	Cylinder insulation & Plumbing lagging	Solar Thermal	Heating Controls	Heat Pumps (ASHP/GSHP)	Communal/District Heating	Solar PV
IWI	3	2	2	2	2	2	3	1	2	3	2	1	0	1	2	3	0
EWI	2	2	2	2	2	2	3	1	2	3	2	1	0	1	2	3	0
Cavity Wall	2	2	2	2	2	2	2	1	1	3	1	0	0	1	2	3	0
Loft Insulation	2	0	0	0	0	1	3	1	0	1	1	2	3	1			
Roof Insulation	2	0	0	0	1	3	1	0	1	1	2	3	1				
Underfloor insulation	2	0	0	1	2	1	0	0	1	2	2	0					
Window & door upgrades	2	0	2	1	0	0	0	0	2	1	0						
Chimney balloons/baffles	2	0	2	0	0	0	0	2	2	0							
Draft-proofing	1	2	2	0	0	1	2	2	0								
MVHR	3	0	0	0	0	2	3	0									
Boiler replacement	1	0	1	0	-	-	0										
Cylinder insulation & Plumbing lagging	1	1	0	1	2	0											
Solar Thermal	0	1	1	2	0												
Heating controls	0	2	2	0													
Heat Pumps (ASHP/GSHP)	3	-	1														
Communal/District Heating	3	0															
Solar PV	0																

Process Risks

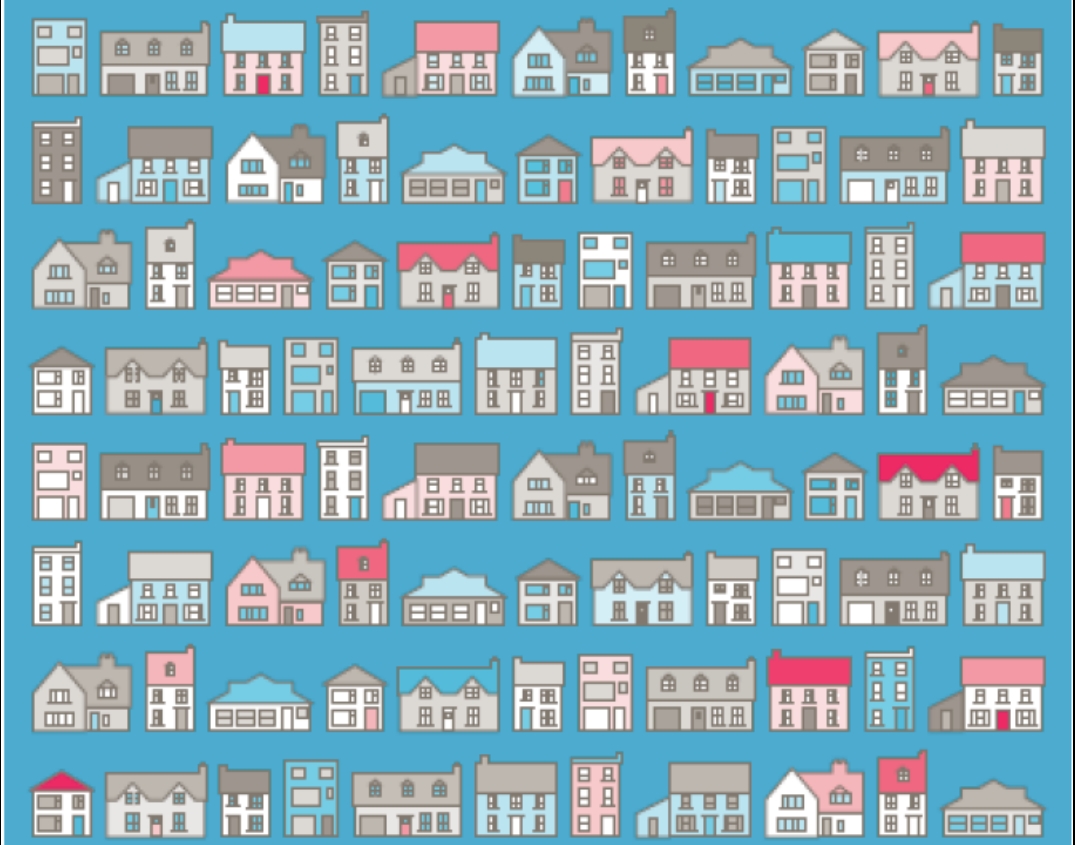
- Assigning tasks to right and competent people
- Ensuring Appropriate Qualifications, Skills, competence & Tools
- Auditing and Inspections of work
- Based on Risk Assessments
- Feedback loops in process for improvement
- In the Spirit of Safety

New Risks

- **New materials appropriate to retrofit**
  - **Not new-build materials in a Retrofit project**
- **A self-learning QA system for things we do not know yet**
- Assessment
- Design
- Install
- Operation
- Materials Products Details Processes
- Assess Specialisation & Deployment
- Retrofit Coordinator
- **Risk Assessment**
- **Rapid Feedback**
- Samples, Inspections & Monitoring

Each Home Counts

An Independent Review of Consumer Advice, Protection, Standards and Enforcement for Energy Efficiency and Renewable Energy



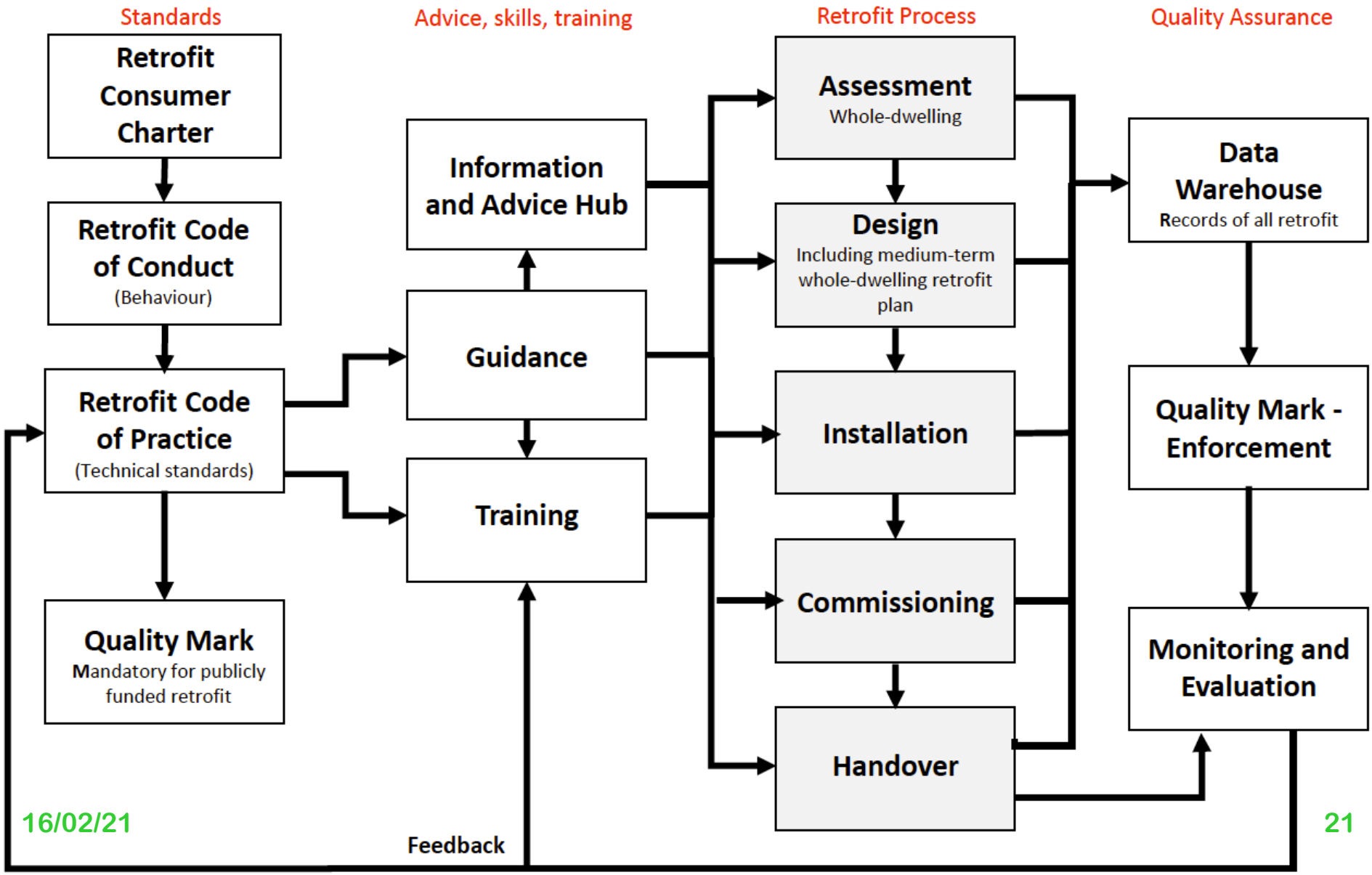
Dr Peter Bonfield, OBE, FREng

Department for Business, Energy & Industrial Strategy

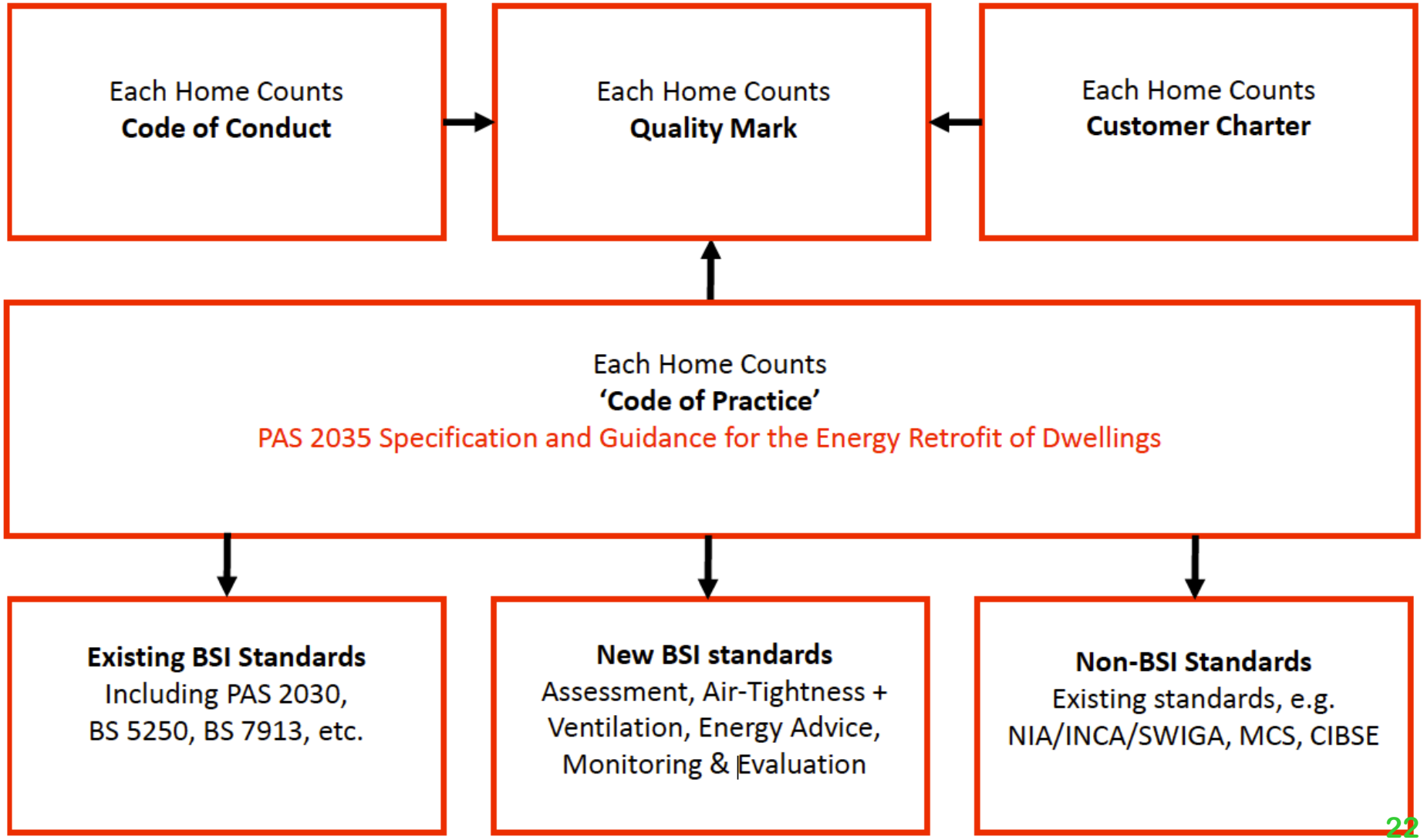
Department for Communities and Local Government

December 2016

Each Home Counts: Vision



The BSI Retrofit Standards Framework



PAS 2035 Risk Assessment Criteria

Average number of measures per dwelling

Inherent technical risk of highest risk measure

Highest risk combination of measures

Age of oldest building

Construction and built form of buildings

Criterion 1: Number of improvement measures per dwelling

Average number of measures per dwelling	Risk grade	Assessed grade
1	LOW	
2-4	MEDIUM	
5 or more	HIGH	

Criterion 2: Measures proposed

Inherent technical risk of highest-risk measure*	Risk Grade	Assessed grade
0	LOW	
1	LOW	
2	MEDIUM	
3	HIGH	

Criterion 3: Combination of measures

Highest-risk combination of measures*	Risk Grade	Assessed grade
GREEN	LOW	
ORANGE	MEDIUM	
YELLOW	MEDIUM	

Criterion 4: Age of buildings

Age band of oldest building	Risk Grade	Assessed grade
pre 1919	HIGH	
1919-1939	MEDIUM	
1946-1959	LOW	
1960-1976	MEDIUM	
post 1976	LOW	

Criterion 5: Construction

Construction and built form of buildings	Risk Grade	Assessed grade
Traditional (heritage pre-1919)	HIGH	
System-built (high-rise > 18m)	HIGH	
System built (medium-rise 1960-1976)	MEDIUM	
Traditional (low-rise post 1918)	LOW	

Aggregation

Highest assessed grade	PAS 2035 Path	Assessed Path
LOW	1	
MEDIUM	2	
HIGH	3	

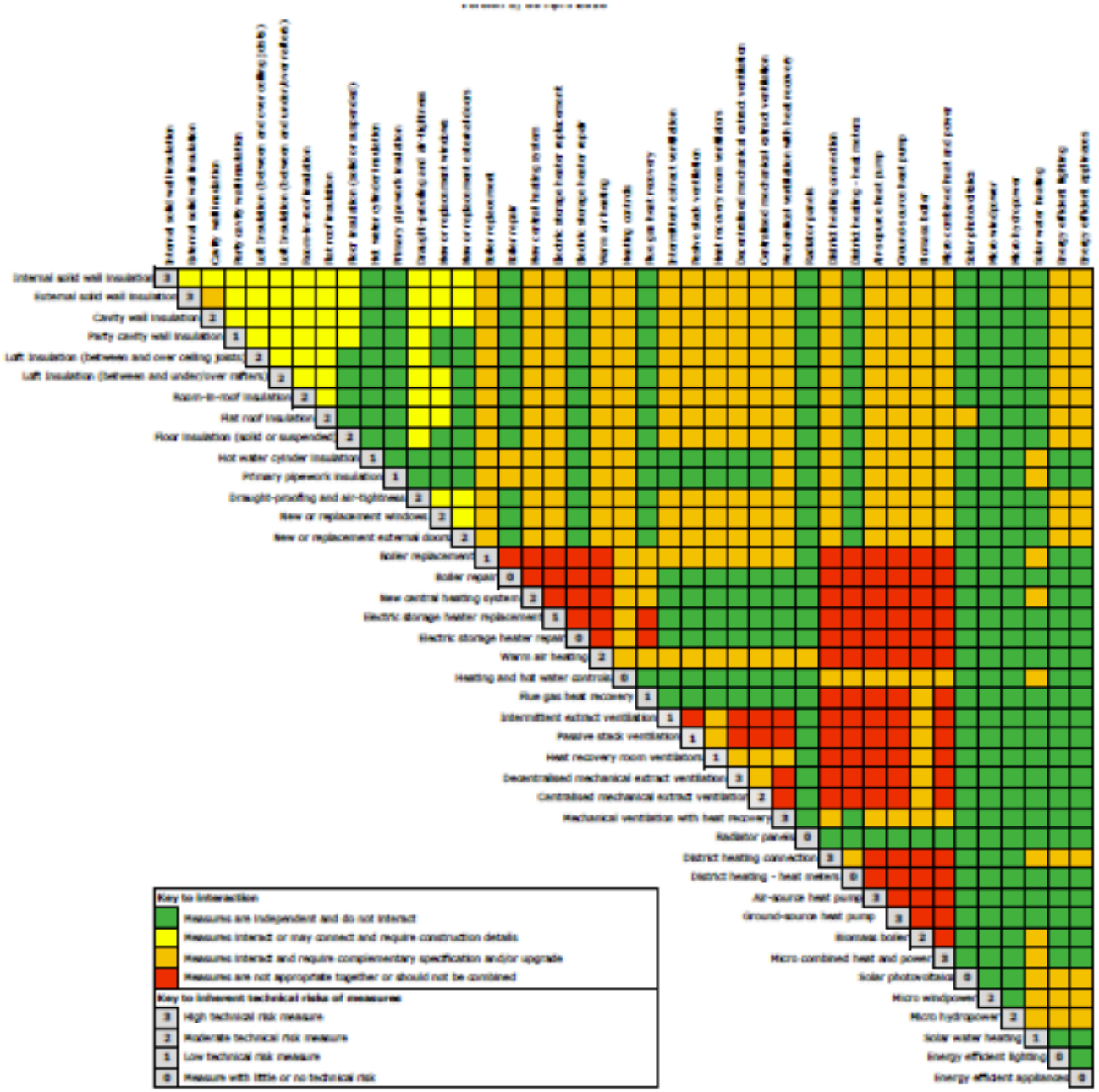
ITR Inherrant Technical Risk of the measures

- 1-4 (none have no risk)
  - High Rise 3
  - Flat roof Insulation 3
  - Room in Roof Insulation 3
  - Micro CHP 3
  - ASHP 3
  - MVHR 3
  - PIV 3
  - Insulation 1
  - Airtightness 1
- Modifications:
  - If Industry sector has good QA scheme – 1
  - Good details available – 1

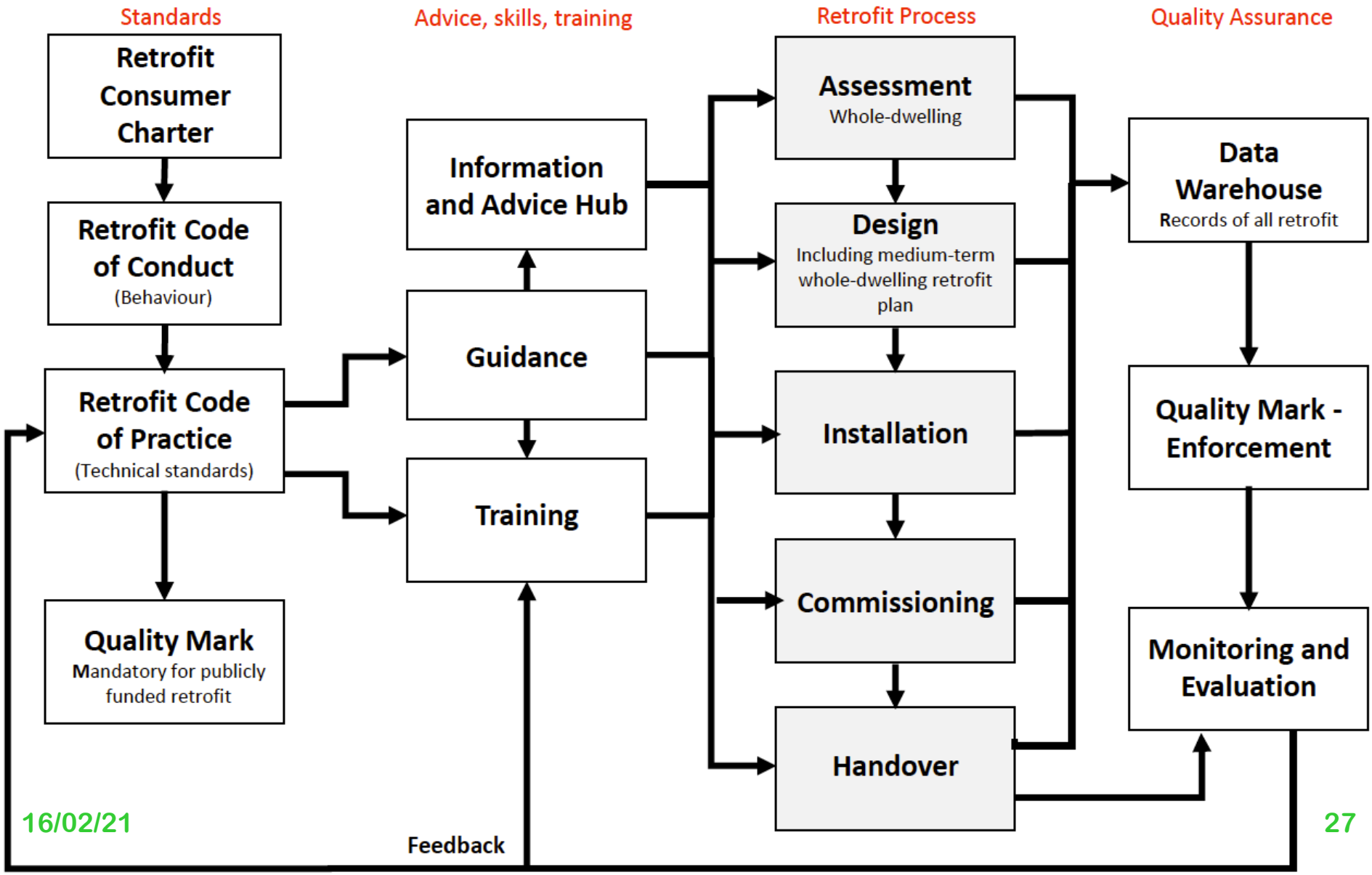
Matrix of measures interactions

- Green: No connection
  - Retrofit Designer: No other actions
- Yellow: Physical interaction Junction needs a detail
  - Retrofit Designer: Need to do detail
- Amber: non-physical interaction
  - Heating & boiler needs complimentary specifications
  - Retrofit Designer: Need to write and coordinate the specifications
- Red: do not do together
  - Retrofit Designer: Check design avoids these
- Crude, but better than nothing

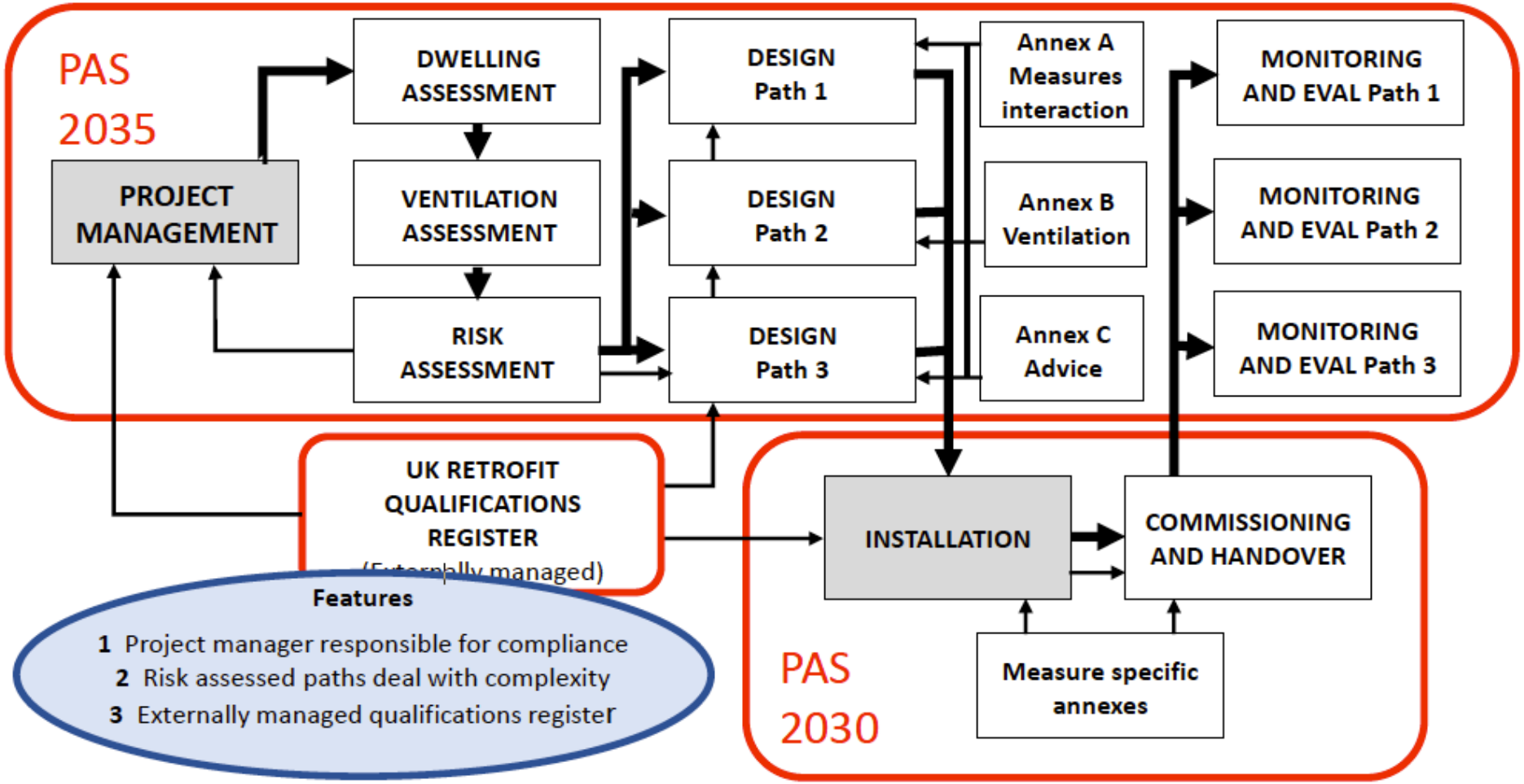
PAS 2035 Measures Interaction Matrix



Each Home Counts: Vision



Proposed structure (PAS 2035 Draft 2)



Features

1 Project manager responsible for compliance
2 Risk assessed paths deal with complexity
3 Externally managed qualifications register

Path A B or C separate

- Path A does not need SAP or PHPP (optional)
- ECO programme OFGEM dropped SAP
  - Used 'Deemed scores'
  - Dumbed down assessment
  - BSI RSTG Argued with OFGEM
  - SAP is back in here
- Suggests EPC needed at end to reassess
  - Improvement options is useful
- Full SAP not rdSAP
- SAP has many very Conservative Assessment
  - Design wants more details
  - IOE Improvement option evaluations useful
  - Need to add in Psi values
  - Needs a thorough survey to determine Psi values

BS 7913
Historic Significance Assessment

- Process: very simple
- Traditional Constructed
  - Pre-1919 (solid walls)
- Protected:
  - Listed Building
  - Conservation Area
  - ANOB Area of Outstanding Natural Beauty
  - WHS World Heritage Site
  - Planning restriction imposed for other reasons
  - Urban context contribution
- If any of these:
  - Assessment of Significance
  - To Retrofit Designer via RC to inform the design

Annex C Ventilation Assessment

- A B or C all need this
- "No Insulation without Ventilation"
- Assessment:
  - Is the existing ventilation is adequate: yes or no
  - Condensation or mould existing: yes or no
  - No working ventilation present: none or not working
  - Present but incomplete or partial or inadequate design (including air vents)
  - Airtightness may be inadequate
  - Upgrade the ventilation system
- To be uploaded to the data Warehouse

Upgrade Ventilation if:

- It is, or it might become:
  - (because of what is being done)
- Q50 > 5m2/m2h then
  - IEV Inter E Ventilation
  - PSV Passive Stack Ventilation
  - PVHR Passive ventilation with Heat recovery
- Q50 < 5m2/m2h then
  - CMV Continuous Mechanical Ventilation
  - MEV Mechanical Extract Ventilation

Upgrade Ventilation:

- Calculations to acknowledge number of beds
  - Has to assume full occupation numbers of bedrooms or beds
  - BRAD F allows minimum occupation capacity
  - Greater occupation level, intensive occupation
  - Higher moisture levels in the air from breathing
  - Tend to have condensation and mould
- Over provision
  - More ventilation
  - More fan power
  - More energy
  - More Noise
- Demand Control room by room
  - So only matches demand to actual occupation level
  - Only ventilates where it is needed

PAS 2035 Design

- Designer to Design
  - Irrespective of path
- Take account of:
  - Deliver the Client outcomes
  - Whole Dwelling assessment
  - Architectural Heritage context
  - Planning and Building Control constraints
  - Moistures management
  - Construction Details: cores, Junctions and edges
  - Interface between fabric, systems and occupants
  - Ventilation upgrade if required
  - Specify the testing and commissioning handover requirements
  - Specify Warranties Guarantees maintenance documents for all products are submitted
- Design
  - A proper job
  - To be uploaded to the data Warehouse
  - Inspected by the Trust Mark assessor
  - Occupier Access

Path A

- Single measure based on a systems
  - E.g. EWI, by manufacturer/installer
  - E.g. MVHR by engineer
  - Can be designed by specialist designer or engineer
  - Designer subject to approval by the RC
  - Check it fits the rest of the building and interacts with other parts
  - Avoid risk of standard product off shelf applied without consideration

Path B or C: also requires

- IOE Improvement Option Evaluation
- Based on SAP or PHPP
  - Look at effects of improvement measures
  - Provide Simple payback
  - Prior
- Discuss with the client
  - This house, this budges, these measures
  - Agree with client
  - This become the retrofit-plan
- Medium-term retro-improvement-plan
  - Future proofing up to 2050
  - If it can't be done now
  - Plan what is next and when
- Logged onto Data warehouse
  - Coexists with house
  - For owner/occupier and future owner/occupier access
  - Avoid doing things twice
  - Plays same role as HIP Home Information Pack
  - Previously dropped by government

Path C also requires:

- = RIBA Conservation Qualification
- = CIBSE List
- = RICS List
- = CITB List, etc.
- Right people for the design,
- who know what they are doing
- Who understand historic or protected buildings

Appendix A Qualifications

- RA Retrofit Energy Advisor
  - C&G City and Guilds 6176 Energy Awareness training
- RA Retrofit Assessor
  - Path A: Can be RC
  - Path B: DEA Domestic Energy Advisor
  - Path C:
    - DEA and some more ___
    - See RICS Guidance Note 'Surveys of Residential Properties',
    - Historic Building Qualifications
- RC Retrofit Coordinator
  - Level 5 diploma in Retrofit Coordinator and Risk management as standard
  - RPEL taken into accounts Rapid process CoRE or Retrofit Academy
  - 6 day training at CoRE or Retrofit Academy or online
  - Path A: qualified construction project management
  - Path B & C: qualified Retrofit coordinator
- RD Retrofit Designer
  - Path A: RC, Architects, Technologist
  - Path B: Architects, Technologist, Professional member of CIOB
  - Path C: +Conservation Course Historic Building Qualifications
- RE Retrofit Evaluators: RC until RE established
- RPEL Requires Prior Experience or Learning will apply to most of the above

Data warehouse

- Trustmark™ (TM)
  - Funded to develop the 'Data Warehouse'
  - Government Owned and Endorsed quality scheme
- Data warehouse: Records of all retrofits
  - Used by Trustmark Enforcement team
  - Pinpoint by risk assessment: building or measures to inspect
  - Monitoring and Evaluation
  - Lessons learning
- Whole House Assessment
  - To be uploaded to the data Warehouse
- PAS 2035 Design
  - A proper job
  - To be uploaded to the data Warehouse
  - Inspected by the Trust Mark assessor
- Design Logged onto Data warehouse
  - Coexists with house
  - For owner/occupier and future owner/occupier access
  - Avoid doing things twice
  - Plays same role as HIP Home Information Pack
    - Previously dropped by government
- Ventilation Assessment
  - Uploading to Data warehouse
- Installation:
  - Provision of Documents
  - Uploading to Data warehouse
- Feedback questionnaire
- Evaluations
- 27 m properties to be documented and stored there

Summary

- Retrofit Project Risk Assessment
  - Whole dwelling
  - Ventilation
  - Determines Path A B or C
- Qualification to suit Risk Path
- Design essential
- Ventilation essential
  - Assessment of existing
  - Upgrade subject to outcome airtightness
- Measures Interaction Matrix (Inherent and combined risk)
- Details of interfaces
- Installation
- Monitoring & Evaluation
- Documents
  - Data Warehouse
- Trustmark
- Funding
- All the ducks aligned

GBC Green Building Calculator

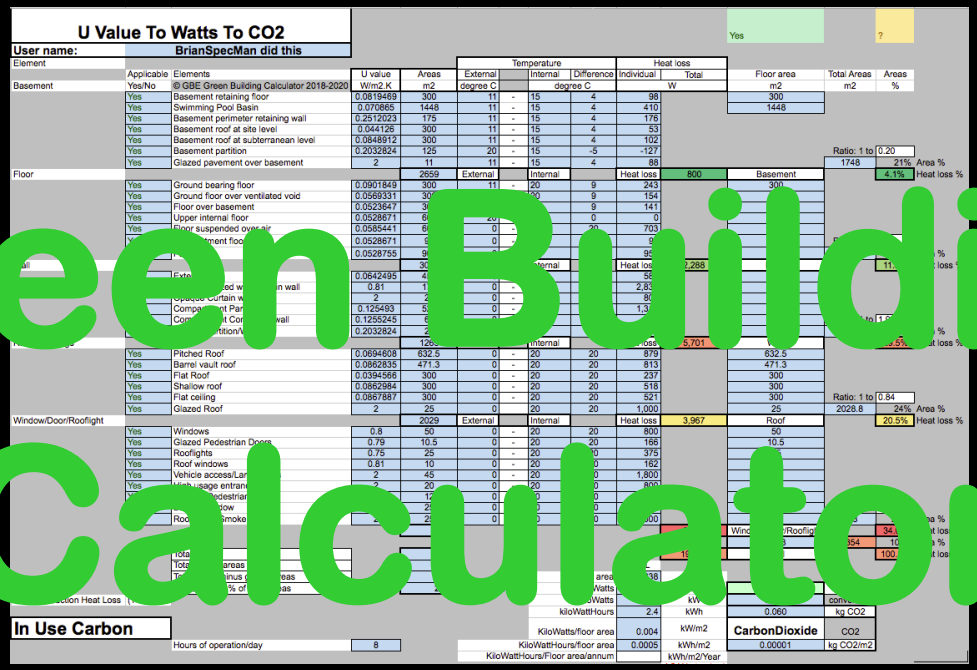
https://GreenBuildingCalculator.uk

GBE

https://GreenBuildingEncyclopaedia.uk

GBE Learning

https://GBELearning.com



Green Building Calculator

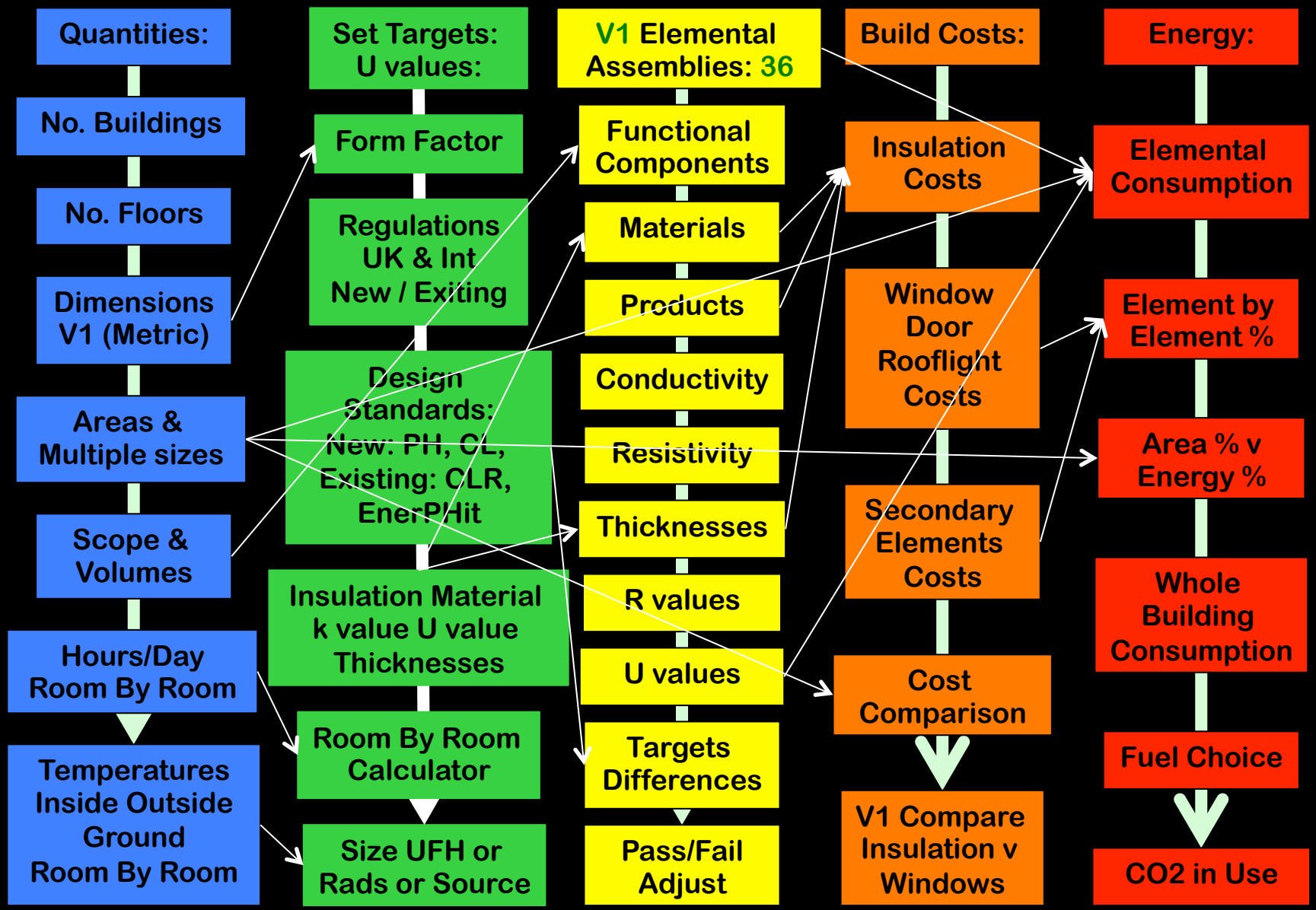
© NGS GBE GBC 2011-2021 BrianSpecMan

I am reminded to

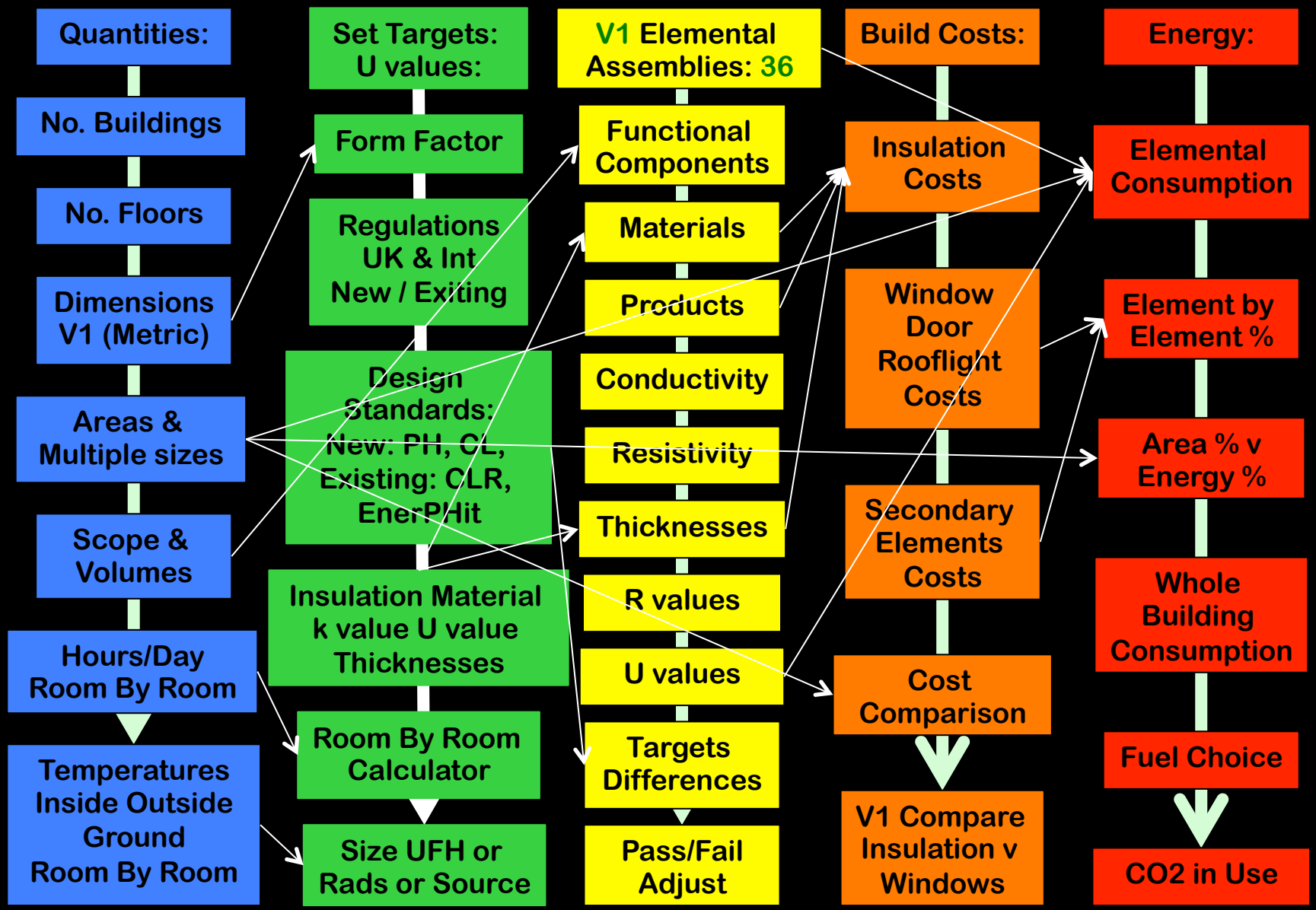
Be the change you want to see in the world

Mahatma Gandhi

V1 launched June 2020



V1 launched June 2020



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
  - 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

Version 2 (9 Months so far)

- Domestic Retrofit: development one off and community scale
- Bill of Materials, Quantities, Labour, Materials, Accessories, Costs; development: Building and Services
- Form Factor Calculator development (V2)
- Decrement Delay Calculator: (V2?)
- EE EC SC Calculator: (V2)
- ICE database 1.3 > 3 (V2?)
- Non-External Envelope Components (Foundations, Frame, Stairs, Partitions, Furniture, Interiors, Landscape)
- Services: systems of kit, appliances cables, pipes, ducts, conduits, accessories, insulation,
- Guidance on how to populate the Bill of Rates (BoR) Bill of Costs (BoC) (Tender document?)

V2 update additions combined

Quantities:

- Buildings
- Towers
- V2 Terraces Community
- Dimensions V1 (Metric)
- V2 Areas & Multiples
- V2 Scope & Volumes
- V2 Shapes & Protrusions
- V2 Hours/Day/Year Room By Room
- V2 Temperatures Inside Outside Ground Room By Room Summer/Winter

Targets: U values:

- Regulations UK & Int New & Exist
- V2 Design Standards: New: PH, CL, Exist: CLR, EnerPHit, ZCH, LETI, RIBA 2030,
- Insulation Material k value Thicknesses Density & SHC Decrement
- Room By Room Calculator
- Size UFH or Rads or Source
- V2 Form Factor

V2 Elemental Assemblies: >150

- V2 Existing Remove Add
- Functional Components
- V2 Products Autofill
- V2 Materials Autofill
- Conductivity
- Resistivity
- Thicknesses
- R values
- U values
- EE EC SC LCA
- Targets
- Pass/Fail Adjust Summary

Build Costs:

- V1 Compare Insulation v Windows
- V2 Bill of Materials
- V2 Bill of Products
- V2 Bill of Quantities
- V2 Bill of Labour
- V2 Bill of Costs
- V2 Cost Plan
- V2 Tender Schedule
- V2 Value Engineer not cost cut

Energy:

- Elemental Consumption
- Element by Element %
- Area % v Energy %
- Whole Building Consumption
- Fuel Choice
- V2 CO2 in Fuel 2020 data
- V2 CO2 in Use
- V2 Fuel Choice Costs
- V2 Fuel Cost in use

Future Development Versions

- V5 Thermal Bridge, Thermal mass calculator
- V6 Civils and Infrastructure
- V7 Waste Calculator Using WasteCost®Lite
- V8 Plastic free v Recycled Plastic
- V9 Interiors: Scope increase, Ska fit-out. refit
- V10 Circular Economy Reclaim Reuse
- V11 Self-build Interface links back to GBE Encyclopaedia
- V12 BIM App (conversations started)
- V13 Whole Project Budget calculations: Prelims and fees
- V14 EU, International & Regional versions (USA: Feet inches)
- V15 Services Design Module: Occupancy level, Energy Sources and uses,
- V16 Lighting Design Module: Health & Wellbeing
- V17 Biodiversity Inclusion
- V18 Local Climate Appropriate construction and materials
- V19 Vernacular, local: materials, trades, economy
- V20 GBPB Green Building Price Book
- V21 Value Engineering Opportunities
- V22 Design Life and Durability
- V23 Full Fee bid calculation based on cost plan
- V24 O&MM Operation & Maintenance Manuals
- V25 FM Specification

Version 11

- Waste Calculator
  - Waste Cost ® lite exists
- Modular design approach
  - off cut waste calculator
  - Matching product sizes to space sizes
- Embodied Energy and Carbon
  - in Waste
  - in Reclaim
- Sequestered Carbon
  - in Reclaimed and Reused Timber

GBC NGS WasteCost® *Lite* 2005 + new datasets

© 2005-6 NGS GreenSpec WasteCost® *lite*

Mouse over & Read

INPUTS

1	Number of buildings	1	No.
	Building Footprint	0	m2
	Number of floors	1	No.

2	Choose a construction type closest to your project		
	Average (All building types)	Yes	Type Yes in only one cell
	Average (Offices)	No	
	Average (Residential)	No	Make sure No appears in the remainder
	Innovative MMC Prefab Housing	No	
	Steel and Glass Office	No	

OUTPUTS

Cost of one skip system of mixed waste removal	£0.00	7
"Waste segragation will cost more money"	£0.00	
Revised cost of reduced one skip mixed waste system	£0.00	
"But look how much it can save!"	£0.00	
Predictable Volume of waste generated on Project	0	m3
Volume potentially diverted from landfill	0	m3
Volume diverted with chosen waste streams	0	m3
Predictable weight of waste generated on project	0.00	tonnes
Weight of waste potentially diverted from landfill	0.00	tonnes
Weight diverted with chosen waste streams	0.00	tonnes
Potental % diverted from landfill (by tonnage)	100%	

Potential Waste Segregation/Reclaim & Reuse/Recycling Streams WAS+ICE Colour system	3 Add Yes or No in each cell to indicate which	4 Add or replace rates with local collection rates £/tonne		5 Number of 8 CuYd skips for each waste stream		6 Potentially Reusable or recyclable m3	
No Segregation (Mixed incl. Hazardous)	Yes						
Inert	No	£15.00	£/tonne	0	No.	0	m3
Mixed metal	No	-£25.00	£/tonne	0	No.	0	m3
Mixed (non Hazardous)	No	£75.00	£/tonne	0	No.	0	m3
Timber	No	£25.00	£/tonne	0	No.	0	m3
Packaging	No	£15.00	£/tonne	0	No.	0	m3
Compactable	No	£15.00	£/tonne	0	No.	0	m3
Plasterboard	No	£25.00	£/tonne	0	No.	0	m3
Hazardous	No	£800.00	£/tonne	0	No.	0.0000	m3
	1			0	Total	0	Total
	Total number of waste streams proposed for contract	Local waste collection rates £/tonne		Total number of 8 Cu Yd skips		Potentially Reusable or recyclable m3	Mouse over & read

Version 12

- Plastic Free V Recycled Plastic Products
- Plastics & Recycled Plastic Content Dataset
- Avoiding plastics in:
  - historic fabric
  - Facades
  - Interiors
- Alternatives to Plastics Dataset
- Plastics Diverted from landfill
- Plastics Avoided
- Fossil Carbon in plastics: Consumed or Avoided
- 2 EU funded projects to learn from

Version 14

- Circular Economy
  - Reclaim & reuse
  - Reclaimable & Reusable
  - Value
- Paola Sassi Research:
  - Reclaim-ability, reusability & value scores
- BAMP
  - >400 products with Product Passports
- FCRBE futuREuse projects

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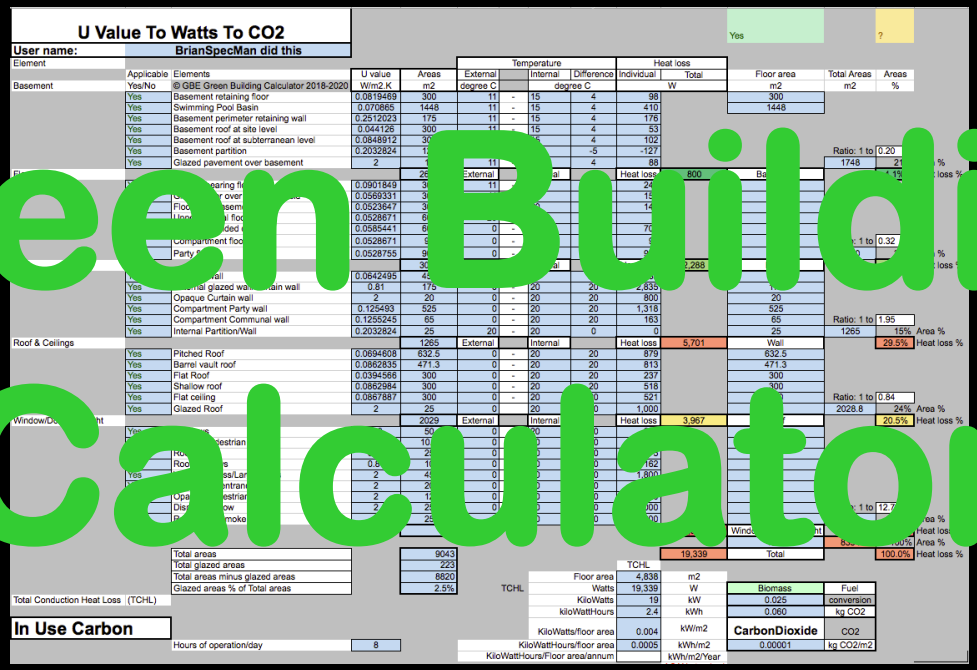
https://GBELearning.com



Green Building Calculator

Bespoke Development Opportunities

Historic Fabric Upgrades

- Compare upgrade measures: what do we really want to know?
  - e.g. single > double or triple glazed windows
  - Glass, spacers, gasses, LowE/SC coatings, frame profile, frame materials, weight, trickle vents
  - Embodied
    - Embodied Energy
    - Embodied Carbon
    - Sequestered Carbon
  - In-use
    - Energy savings: before and after
    - Carbon savings: before and after
  - Costs
    - Of upgrade measure
    - In-use energy cost saving: before and after
    - Financial comparison period? = life expectancy of measures
      - Temporary, Short, Normal and Long term
  - Value for money
    - Cost pay-back periods, profiteering at expense of performance or comfort
  - Value Engineering not just cost cutting
    - Carbon-back periods
  - But don't forget the other properties features, benefits, considerations
    - Thermal comfort (PH & EnerPHit), less condensation, vapour open/closed
    - Plastic content, plastic avoidance, recycled content, fire life risk
    - High recycled content may lead to bad choice of materials and properties

Window frame, Glass, Coating, Perimeter, Spacer, Gas, Finishes, Specifications Guesswork gut instinct Turn +, - & ? to numbers Evidence based design & specification	U value	Energy in use	Carbon In use	B1 Carbon saved in use	V2 Cost in use	Materials	Finishes	V1>V2 Profiles	Initial Cost	B1 Payback period	Embodied Energy	Embodied Carbon	V11 B1 Carbon in waste	Sequestered carbon	B1 Carbon back period
Existing Single glazing	-	+++++	+++++ +/-	0	+++++	0	+	0	0	?	+/-	+/-	0	0	?
Existing to Double glazing	--	++++	++++ +/-	+	++++	+	+	++	++	?	+/-	+/-	+	0	?
+Secondary Glazing	---	+++	+++ +/-	++	+++	++	+++	+++	+++	?	+/-	+/-	+	++	?
+Secondary Double Glazing	----	++	++ +/-	+++	++	+++	+++	+++	+++	?	+/-	+/-	+	++	?
Replace with double glazing	----	++	++ +/-	+++	++	++++	++	++	++++	?	+/-	+/-	++++	++	?
Replace with triple glazing	----	+	+ +/-	++++	+	+++++	++	++	+++++	?	+/-	+/-	+++++	++	?

B1 Evidence-based Guidance
Secondary Element Upgrades

Secondary-Element Upgrade

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Yes/No	Secondary Element	U value	Energy in use	Carbon In use	Carbon saved in use	Cost in use	Materials	Finishes	Profiles	Initial Cost	Payback period	Embodied Energy	Embodied Carbon	Carbon in waste	Sequestered carbon	Carbon back period
	Planned development Version	V1	V1	V1		V2	V1	V1	V1>V2	V1		V2	V2	V11	V2	
	Bespoke Version				B1						B1			B1		B1
Yes/No	Existing Single glazing	-	++++++	++++++ +/-	0	++++++	0	+	0	0	?	+/-	+/-	0	0	?
Yes	Existing to Double glazing	- -	+++++	+++++ +/-	+	+++++	+	+	++	++	?	+/-	+/-	+	0	?
No	+Secondary Glazing	- - -	++++	++++ +/-'	++	++++	++	++++	+++	+++	?	+/-	+/-	+	++	?
?	+Secondary Double Glazing	- - - -	+++	+++ +/-	+++	+++	+++	++++	++++	++++	?	+/-	+/-	+	++	?
?	Replace with double glazing	- - - - -	++	++ +/-	++++	++	+++++	+++	+++	+++++	?	+/-	+/-	++++	+++	?
?	Replace with triple glazing	- - - - - -	+	+ +/-	+++++	+	++++++	+++	+++	+++++	?	+/-	+/-	++++	+++	?

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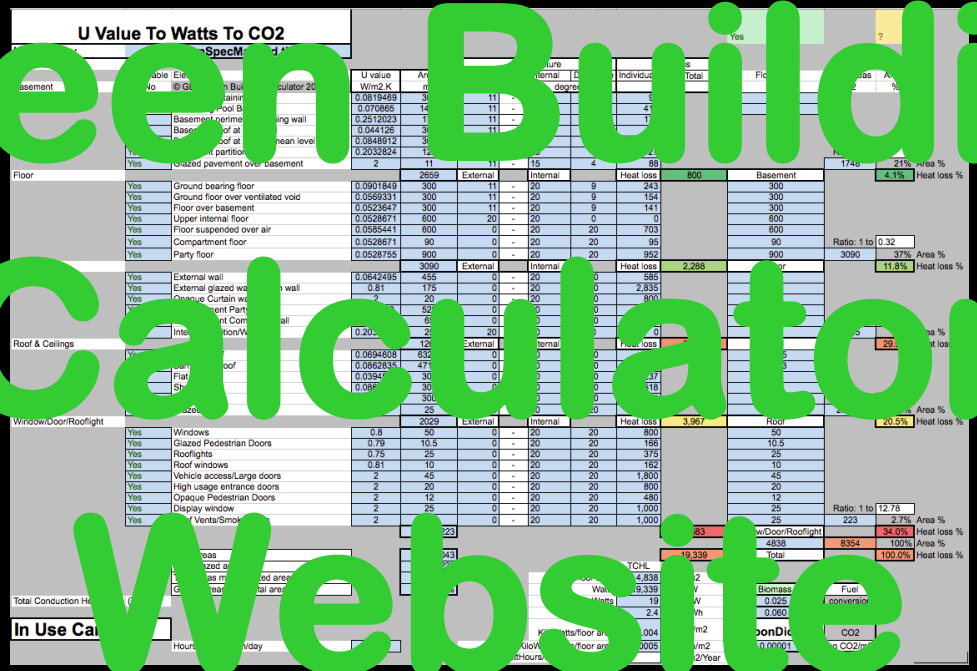
Green Building Calculator Website



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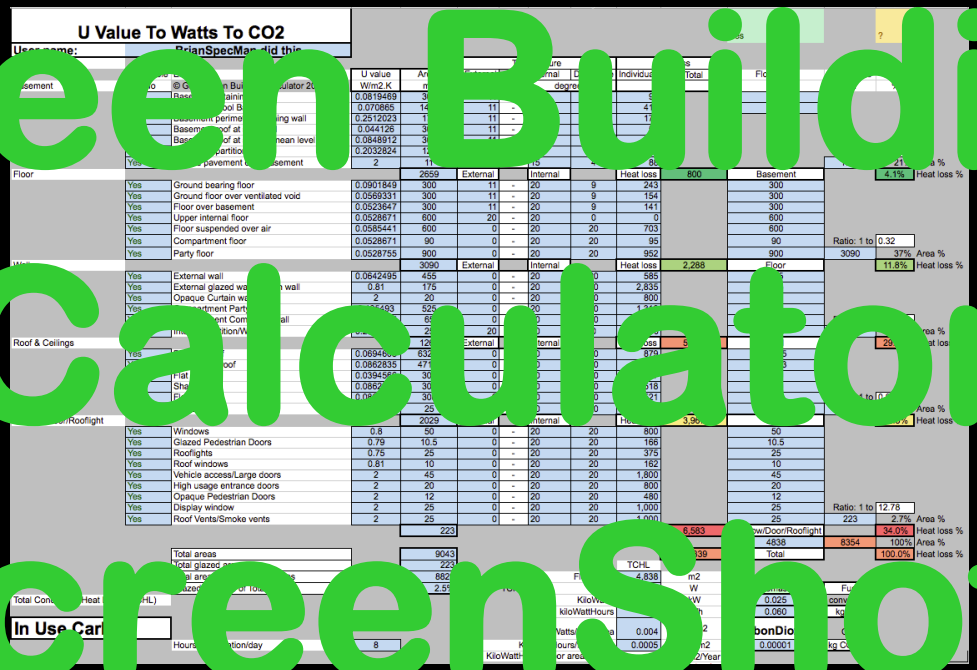
Green Building Calculator ScreenShots



Preview V2 relevant to retrofit

Future Development: Instructions

- Plan to add instructions
- for each cell/range
- into pop-up comments
- in relevant cells
- And add videos

Instructions

Legend

Green cells need the user to add, project specific information or replace default information with specific information
Red text in Turquois 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 THESE CELL CONTENT

File: Spreadsheet

- Using your dimensioned drawings
- Using the latest edition of file GBE Gre[illegible] BR[illegible] [illegible] know I will provide)
- Found in GBE Shop https://greenbuil[illegible]
- 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

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	012, O13, O14, O15, O16, O17
	O	13	O13
	O	17	O17

- 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: Q[illegible]tities, di[illegible]
- 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 temperat[illegible]
- Confirm subsoil temperature (below 1[illegible] in the UK [illegible] for other parts of globe
- Confirm or change externall temperature Metrological Office data for location (winter average) change for other parts of globe

Save your work

Worksheet Instructions: Schedule of Accommodation

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	

- Work sheet (tab) Schedule[illegible]commod[illegible]
- 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 roo[illegible] in a row [illegible] or parallel [illegible] 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.

Future Developments

- Cells will have their instructions added as popup text comments
- PPTX > PDF Show > PDF handout
- PPTX Videos
- Zoom Videos
- Zoom Training

V2 Cell colour codes & symbols

Legend	
Cell colour code/content	Explanation
Green	User Input cell, feeds into calculations througout GBC
Green with Red text	User input cells with sample entries to populate calculations (replace as required)
Turquise	GBC calculated results, that the user can overwrite. e.g. for variables
Turquise with red text	GBC example calculated results, that the user can overwrite. e.g. for variables, can be overwritten
Blue	GBC calculated results, applying user inputs in other cells or sheets
Violet	GBC totals up, User to check if correct
Red	User to select option from drop down list GBC will apply choice to calculations
Orange	Row or Column titles
Yellow	Information to be collected if readily available quickly
Yes/No	User input cell requiring user choice from drop down list
No	Not complete by GBC OR Users to ignore this row's cells. 'No' will turn red automatically
?	GBC awaiting information OR User to interrogate this row's cells and review decisions so far
Yes	Started by GBC OR To be completed by Users. 'Yes' will turn Green Automatically
%%%	In development incomplete
///	Pending development
>>>	Date related update
***	

V2 Singular/Multiple Function

User name:	BrianSpecMan did this
Project name:	Over type with Project name
Project address:	Over type with Project address
Building Facility:	Over type with Building User Activity or Purpose

Project Brief Employer Requirements or Architect's Proposal

Whole Building		No.	No.	m	m	m2	m	m3		Yes/No	Hours	Degrees C
Building(s)	One or many	Number of buildings	Number of floors	Length(s)	Width(s)	Floor Area Ceiling Area Roof Area	Room heights	Volumes		Confirm achieved in Design	Operation	Internal Temperature
© GBE Green Building Calculator 2017-2021		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'
Whole Building	All rooms	1	4	10	6	240	2.5	600	m3	Yes	8	20
Terrace(s)	One or many	Number of terraces	Number of units in terrace	Depth front to back in terrace	Party wall to party wall	Position of single unit in terrace	Number of party walls	Number of end walls		Confirm achieved in Design	Season (summer/winter)	Choose
© GBE Green Building Calculator 2017-2021		1 to 1000	1 to 100	1 to 25	1 to 10	N/A, End or Mid						
			51	10	6	Choose	FALSE	FALSE	No.	Yes		
Circular Geometry	To be developed (prompted by the Video V0)											

Singular/Multiple	When for example there are windows of a 'Singular' size or 'Multiple' sizes choose the appropriate item in the lists against each work section. They can be edited individually later.	Drop down list		All year	Swimming pool water 16
					Subsoil 11
	Schedule of Accommodation: Room Functions v Room by Room Heat losses	Choose	To be deployed, developed elsewh	Winter	Unheated Communal Space 10
	Building Areas: Singular v Multiple Size Building Elements	Choose	To be deployed, developed elsewhe	Winter	Basement 15
Element/Components	Windows, doors, rooflights, glazing as sub-elements v components	Choose	Deployed and developed elsewhere	Winter	Other Unheated Spaces 15
	Elemental/Component Bill of Materials v Elemental Cost Analysis	Choose	To be deployed and developed el	Winter	Winter outdoors 0
Seasons	Summer v Winter	Choose	To be deployed, developed elsewh	Summer	Attic Loft 50

1
4 Nominal Room 2
3

V1 Schedule of Accommodation

											Winter outdoors	0
	Schedule of Accommodation											
		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					25		63			
		Operating theatre	1				100		250			
		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

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V2 Form Factor

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User name:	BrianSpecMan did this
Project name:	Over type with Project name
Project address:	Over type with Project address
Building Facility:	Over type with Building User Activity or Purpose
Project Brief Employer Requirements or Architect's Proposal	

Form Factor

Building(s)	Room Functions	No.	No.	m	m	m2	m	m3		
		Number of buildings	Number of floors	Length(s)	Width(s)	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	1	4	10	6	240	2.5	600	m3	Volume
Terrace(s)	**One or many**	Number of terraces	Number of units in terrace	Depth front to back in terrace	Party wall to party wall	Position of single unit in terrace	Number of party walls	Number of end walls		
© GBE Green Building Calculator 2017-2020		1 to 1000	1 to 100	1 to 25	1 to 10	N/A, End or Mid				
		3	51	10	6	Not Applicable	150	6	No.	

	Number of buildings	Number of floors	Length(s)	Width(s)	Floor Area Ceiling Area Roof Area	Room heights
External wall	1	4	80	48	1280	2.5
Ground floor footprint	1		10	6	60	
Ground or upper Floor suspended over external air	1	1	10	6	60	

			Number of buildings	Number of floors	Length(s)	Width(s)	Roof Area	Roof height	Roof Volume	
Yes	Roof area, Roof shape and Attic volume	22 Flat Roof (FR)	1	1	10	6	60	0.25	0	m3
Yes		23 Shallow Roof (SR)	1	1	10	6	60	0.5	15	m3
Yes		24 Pitched Roof (PR)	1	1	10	6	60	3	90	m3
Yes		25 Barrel Vault Roof (BVR)	1	1	10	6	60	3	283	m3
Yes		26 Domed Roof (DR)	1	1	10	6	60	3	113	m3
Yes		27 Hipped/Pyramid Roof (HPR)	1	1	10	6	60	3	45	m3
Yes		28 Mono-Pitched Roof (MPR)	1	1	10	6	60	3	90	m3
Yes		29 Mansard Roof (MR)	1	1	10	6	60	0.25	14	m3
Yes		33 Other Geometry Roof (OGR)	1	1	10	6	60	3	121	m3

	No.	Number of floors	Depth	Width	Floor/Roof Area	Height	Volume		Heat Loss Surface Area	
Terraced House Rear Extension	1	1	5	3.5	17.5	2.5	43.75	m3	51	m2
Weather Porch	1	1	2	2	4	3	12	m3	25	m2
Conservatory/Sun Space	1	1	3	5.5	16.5	5	82.5	m3	73.5	m2
Bay window	1	1	1	3	3	2.5	7.5	m3	16.5	m2
Oriel Window (upper floor bay window)	1	1	1	3	3	2.5	7.5	m3	16.5	m2
28-30 Dormer roof/window	1	1	4	5.5	22	2	44	m3	37.5	m2

Heat Loss Surface Area	SA	1				1766	m2		797.25	m3	220	m2
Treated Floor Area	TFA	1	4	10	6	240	m2					

Form Factor (FF) range	0	1	2	3	4	5	6	7	8	9	10	
Form Factor (FF) =	SA/TFA					8.28	Used by Zero Carbon Hub's Designer's Manual					
	Typology/Shape ology					FF		Target U values	Y/N	Unit		
Target Form Factor FF	Apartment Block or uniform terrace					<2	1	0.2 to 0.15	N	W/m2.K	4	
	Semi-detached or compact detached houses					2 to 3	2	0.15 to 0.12	N	W/m2.K	3	
	Less compact detached houses or compact detached bungalows					3 to 4	3	0.12 to 0.10	N	W/m2.K	2	
	Complex shaped detached bungalows					>4	4	<0.1	Y	W/m2.K	1	

	Passivhaus Heat Loss Factor (HLF)	0.7	1.1	1.5	2	2.4	2.8	3	3.3	3.7	4	4.5	No.
0.038	Stone wool insulation (mm)	70	110	150	200	240	280	300	330	370	400	450	mm
K	Equals U values of:	0.5429	0.3455	0.2533	0.1900	0.1583	0.1357	0.1267	0.1152	0.1027	0.0950	0.0844	U
0.022	Polyurethane	64	87	116	139	162	174	191	191	214	232	261	mm

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V1 Scope: Building Elements

Building Elements

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	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 Fatility 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
Basemment 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 Entrace 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

V1 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		Basment 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 Subterranian Level (BRSL)						
	Number of basement roof at subterranian level	1	No.		Area of basement roof at subterranian level	300	m3
	Width of Basement roof at subterranian level	15	m		Total area of basement roof at subterranian level	300	m3
	Length Basement roof at subterranian 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

V2 Engage Singular/Multiple

Non-U-value Elements

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Basement External Entrance Well (BEEW)

Yes	54 Basement External Entrance Well Retaining Pavement (BEEWRP)					Singular	DropDownList
	Number of Buildings with Basement External Entrance Wells	1	No.		Area Basement External Entrance Wells	[illegible].000	m2
	Number of Basement External Entrace Well Retaining walls	1	No.		Total Area Basement External Entrance Wells	[illegible]8.000	m2
	Width of Basement External Entrance Wells (Across frontage)	6	m		Total Area multiple sizes of Basement External Entrance Wells	126.000	m2
	Depth of Basement External Entrance Wells (Footpath to Building)	3	m		**Total Area Basement External Entrance Wells (chosen single or multiple)**	18.000	m2
Yes	55 Basement External Entrance Well Retaining Wall (BEEWRW)					Singular	DropDownList
	No. of Buildings with Basement External Entrace Well Retaining walls	1	No.		Area of Basement External Entrace Well Retaining walls	17.100	m2
	Number of Basement External Entrace Well Retaining walls	1	No.		Total Areas Basement External Entrace Well Retaining walls	17.100	m2
	Width of Basement External Entrace Well Retaining walls	6	m		Total Areas multiple sizes of Basement External Entrace Well Retaining walls	132.000	m2
	Height of Basement External Entrace Well Retaining walls	2.85	m		**Total Areas Basement External Entrace Well Retaining walls (chosen single or multiple)**	17.100	m2
Yes	56 Basement External Entrance Well Staircase (BEEWS)					Singular	DropDownList
	No. of Buildings with Basements External Entrance Well Staircase	1	No.		Area Basements External Entrance Well Staircase	3.150	m2
	Number of Basement External Entrance Well Staircases	1	No.		Total Area Basement External Entrance Staircase	3.150	m2
	Rise of Basements External Entrance Well Staircase	2.85	m		Total Area multiple sizes of Basement External Entrance Staircase	252.000	m2
	Going of Basements External Entrance Well Staircase	3.5	m		**Total Area Basement External Entrance Staircase (chosen single or multiple)**	3.150	m2
	Lenght of Basements External Entrance Well Staircase	4.5	m		Thickness of Basements External Entrance Well Staircase	0.300	m
	Width of Basements External Entrance Well Staircase	0.9	m		Volume of Basements External Entrance Well Staircase	0.945	m3
Yes	57 Basement External Entrance Well Party wall (BEEWPW)					Singular	DropDownList
	No. of Buildings with Basement External Entrance Well Party Walls	1	No.		Area of Basement External Entrance Well Party Wall	8.550	m2
	Number of Basement External Entrance Well Party Walls	1	No.		Total Area of Basement External Entrance Well Party Walls	8.550	m2
	Width of Basement External Entrance Well Party Walls	0.315	m		Total Area multiple sizes of of Basement External Entrance Well Party Walls	504.000	m2
	Length of Basement External Entrance Well Party Walls	3	m		**Total Area of Basement External Entrance Well Party Walls (chosen single or multiple)**	8.550	m2
	Height of Basement External Entrance Well Party Walls	2.85	m		Total Volume of Basement External Entrance Well Party Walls	2.693	m3

Internal Walls Partitions Cubicles

Yes	58 Basement Internal Walls (BIW)	(Probably loadbearing)				Singular	DropDownList
	Number of Buildings with Basements	1	No.		Area of Basement Internal Walls (BIW)	25.000	m2
	Thickness of Basement Internal walls (BIW)	0.215	m		Total Area Basement Internal Walls (BIW)	25.000	m2
	Length of Basement Internal Walls (BIW)	10	m		Total Area Basement Internal Walls (BIW)	504.000	m2
	Height of Basement Internal Walls (BIW)	2.5	m		**Total Area Basement Internal Walls (BIW) (chosen single or multiple)**	25.000	m2
					Volume of Basement Internal Walls (BIW)	5.375	m3
					Total Volume of Basement Internal Walls (BIW)	5.375	m3
Yes	59 Basement Internal Partitions (BIP)	(Probably non-loadbearing)				Singular	DropDownList
	Number of Buildings with Basements	1	No.		Area of Basement Internal Partition (BIP)	25.000	m2
	Thickness of Basement Internal Partitions (BIP)	0.1	m		Total Area of Basment Internal Partitions (BIP)	25.000	m2
	Length of Baement Internal Partitions (BIP)	10	m		Total Area of Basment Internal Partitions (BIP)	384.000	m2
	Height of Basement Internal Partitions (BIP)	2.5	m		**Total Area of Basment Internal Partitions (BIP) (chosen single or multiple)**	25.000	m2
					Total Volume of Basement Internal Partitions (BIP)	2.500	m3
					Total Volume of Basement Internal Partitions (BIP)	0.000	m3
Yes	60 Internal Walls (IW)	(Probably loadbearing, not in basement)				Multiple	DropDownList
	Number of Buildings with Internal Walls (IW)	1	No.		Area of Internal Wall (IW)	25.000	m2
	Thickness of Internal Walls (IW)	0.2	m		Total Area of Internal Wall (IW)	25.000	m2

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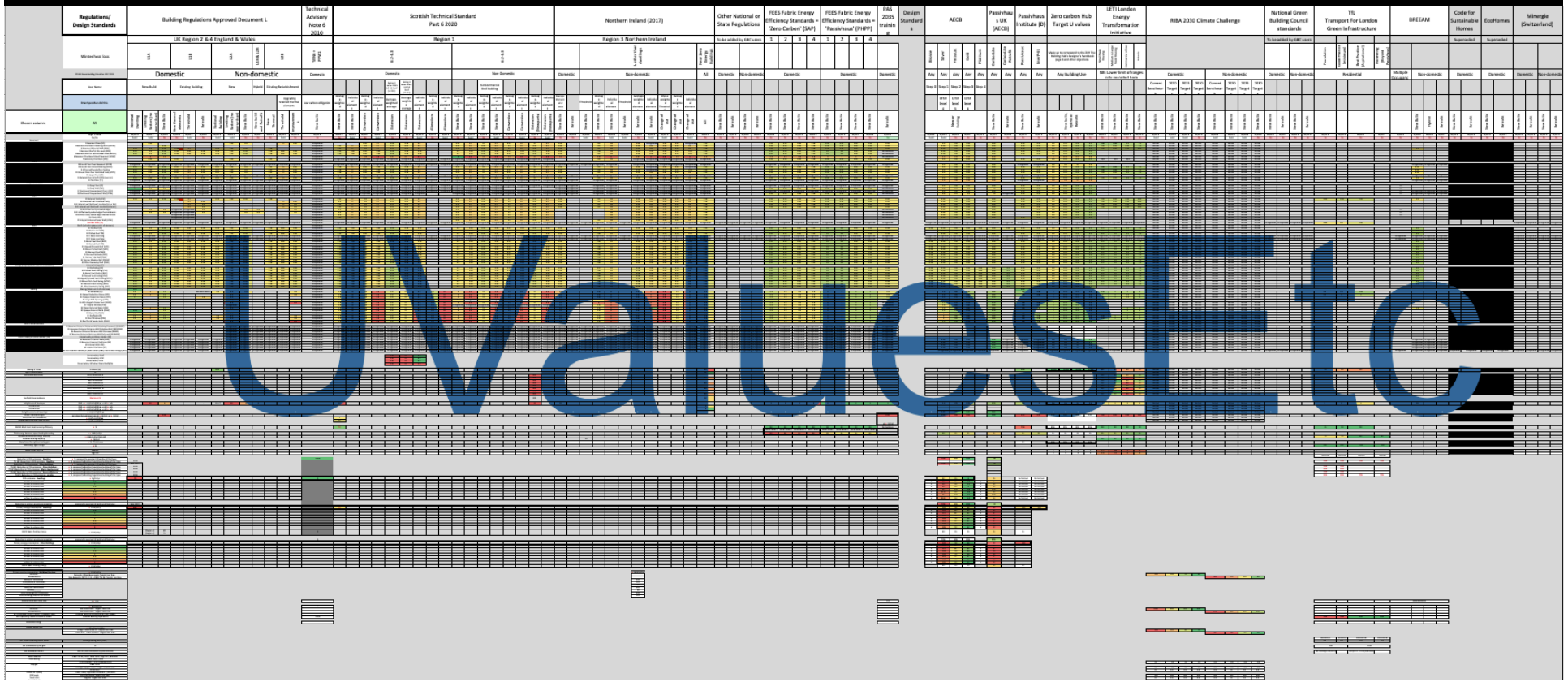
V2 U values Etc. Energy Targets Regulations & Design Standards



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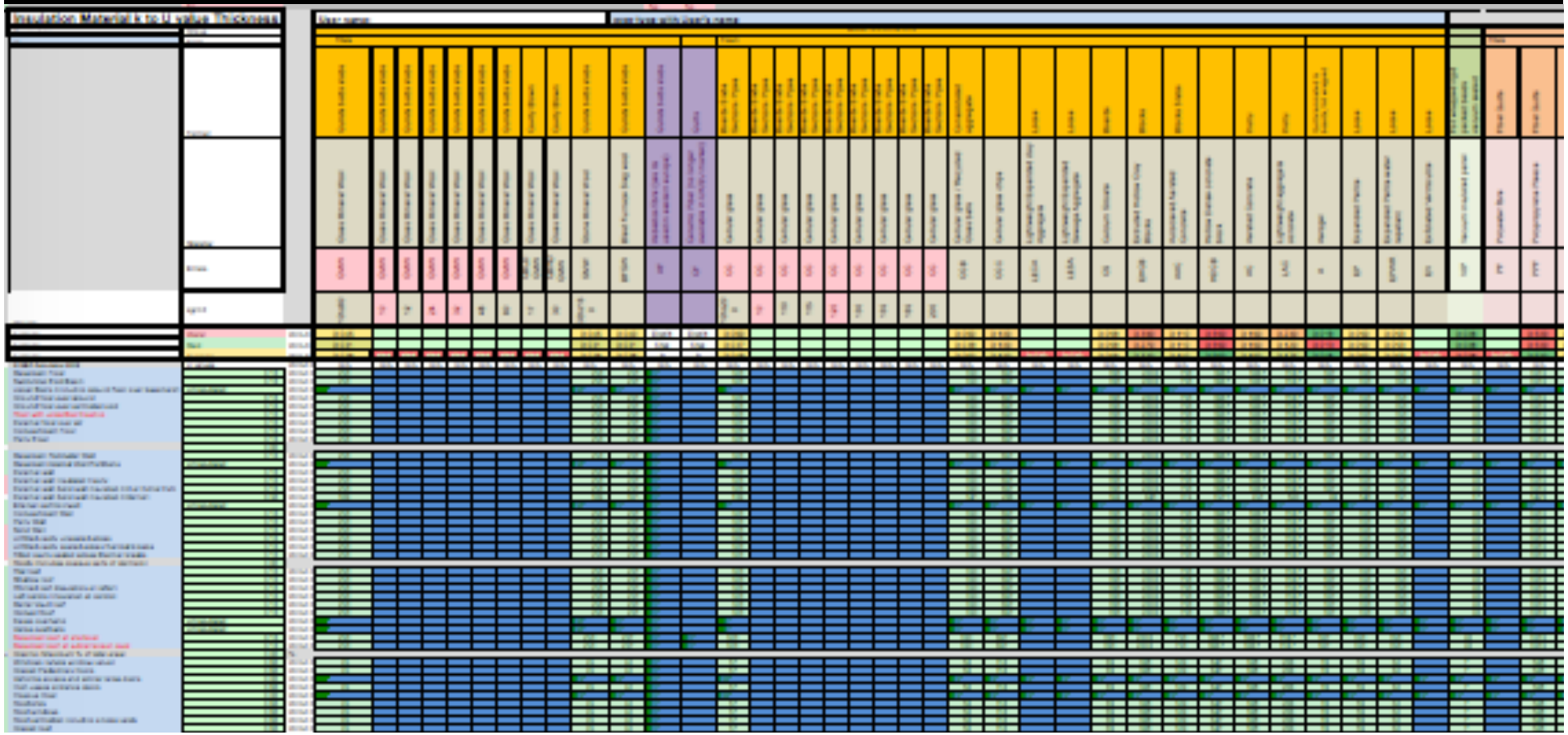
V1 Insulation Thicknesses

k values



Materials > k values > U values > Thicknesses

	Chosen column:	Group		Mainly mineral based															
	AB	Form		Fibre					Foam										
		Material		Glass 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	Lightweight aggregate concrete
		Initials		GMW	SMW	BFSW	AF	CF	CG	CGB	CGC	LECA	LESA	CS	EHCB	AAC	HDCB	AC	LAC
	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	0.550	0.160	0.230
	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	0.550	0.160	0.120
	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	0.110	0.550	0.160	0.175
Floor	© GBE Calculator 2018	U values	W/m2.K	mm	mm	mm	mm		mm	mm		mm	mm	mm		mm		mm	mm
Yes	Basement Floor	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Swimming Pool Basin	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Upper floors (including ground floor over basement)	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Ground floor over ground	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Ground floor over ventilated void	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Floor with underfloor heating	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	External floor over air	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Compartment Floor	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Party Floor	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Walls		0.00																	
Yes	Basement Perimeter Wall	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Basement internal Wall/Partitions	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	External wall	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
No	External wall Insulated Cavity	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
No	External wall Solid wall insulated (Int or Ext)	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Internal partition/wall	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Compartment Wall	0.30	W/m2.K	127	127	118			162	165	333			197	1100	367	1833	533	583
Yes	Party Wall	0.30	W/m2.K	127	127	118			162	165	333			197	1100	367	1833	533	583
No	Solid Wall	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
No	Unfilled cavity unsealed edges	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
No	Unfilled cavity sealed edges thermal breaks	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
No	Filled cavity sealed edges thermal breaks	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Roof	Roofs (includes opaque parts of dormers)	0.00																	
Yes	Flat roof	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Shallow roof	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Pitched roof (insulation at rafter)	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Loft ceiling (insulation at ceiling)	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Barrel Vault roof	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Domed Roof	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Eaves overhang	Unregulated	W/m2.K																
Yes	Verge overhang	Unregulated	W/m2.K																
Yes	Basement roof at site level	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Yes	Basement roof at subterranean level	0.15	W/m2.K	253	253	237			323	330	667			393	2200	733	3667	1067	1167
Glazing	Glazing (Maximum % of total area)	0.00	%																
Yes	Windows (whole window value)	0.95	W/m2.K	40	40	37			51	52	105			62	347	116	579	168	184
Yes	Glazed Pedestrian Doors	0.95	W/m2.K	40	40	37			51	52	105			62	347	116	579	168	184
Yes	Vehichle access and similar large doors	0.75	W/m2.K	51	51	47			65	66	133			79	440	147	733	213	233
Yes	High usage entrance doors	0.75	W/m2.K	51	51	47			65	66	133			79	440	147	733	213	233
Yes	Opaque Door	0.75	W/m2.K	51	51	47			65	66	133			79	440	147	733	213	233
Yes	Rooflights	0.95	W/m2.K	40	40	37			51	52	105			62	347	116	579	168	184
Yes	Roof windows	0.95	W/m2.K	40	40	37			51	52	105			62	347	116	579	168	184
Yes	Roof ventilation including smoke vents	0.75	W/m2.K	51	51	47			65	66	133			79	440	147	733	213	233
Yes	Glazed roof	0.95	W/m2.K	40	40	37			51	52	105			62	347	116	579	168	184

Instructions | ScheduleAccommodation | BuildingAreas | U values Etc | Insulation | Legend | Elements | UToWattsToCO2 | CostsPerm2 | MaterialCostThickness | Revisions | Resistances

V2 39 Elements

U or R value

12 secondary element U/R values

Refurb Actions

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Elemental U values Component k values & thicknesses User name: **BrianSpecMan did this**

Yes/Yes	RefurbActions	Component Function	Manufacturer	Product Reference	Material	Density	Thermal Conductivity	Thickness	Thickness	Thermal Resistance	size (solid)	Spacing or cavity (void)	Fraction of area or section	Thermal Resistances	Calculated Total U value	Target Elemental U value	Difference	Pass, PassU or Fail
Yes		**1 Basement Floor (BF)**	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
Yes		Resistance of Inside Surface (Rsi)								0.13				0.130				
Yes	Existing Prepared Overcoated	Inner decoration			lacquer	1000	1	1	0.001	0.001	1	1	100%	0.001				
Yes	Existing Unchanged	Floor finish			Hardwood flooring	[illegible]	[illegible]	[illegible]	0.025	0.139			100%	0.139				
Yes	Existing Unchanged	Inner floor lining underlayment			Gypsum fibreboard	[illegible]	[illegible]	[illegible]	0.048	0.133			100%	0.133				
Yes	Existing Unchanged	Inner levelling/wearing			Cement Screed	[illegible]	[illegible]	[illegible]	0.045	0.032			100%	0.032				
Yes	Existing Unchanged	Internal insulation			PIR Insulation	32	0.025	235	0.235	9.400	1	1	100%	9.400				
Yes	Existing Unchanged	Drainage filtration layer			HDPE		1	50	0.05	0.050	2	48	4%	0.002				
Yes	Existing Unchanged	Inner tanking			Polyethylene (PE)	0.4	0.230	1	0.001	0.004	1	1	100%	0.004				
Yes	Existing Unchanged	Retaining floor			Concrete	2300	2.300	150	0.15	0.065	1	1	100%	0.065				
Yes	Existing Removed Reapplied	Damp/Gas proof membrane			Polyethylene (PE)	0.4	0.230	1	0.001	0.004	1	1	100%	0.004				
Yes	Existing Removed Reapplied	Ground gas ventilation labyrinth			Expanded polystyrene EPS	15	0.040	100	0.1	2.500	50	100	50%	1.250				
Yes	New Added	Blinding layer			Sand		2.000	50	0.05	0.025	1	1	100%	0.025				
Yes	New Added	Insulating backfill			LECA		1	150	0.15	0.150	1	1	100%	0.150				
Yes	Existing Removed Reworked	Consolidated hardcore			Recycled masonry		1	150	0.15	0.150	1	1	100%	0.150				
Yes	Existing Removed Reapplied	Drainage layer			Sea shells		1	50	0.05	0.050	1	1	100%	0.050				
Yes	Existing Unchanged	Undisturbed subsoil			Clay		1.500	1000	1	0.667	1	1	100%	0.667				
Yes		Resistance of Outside Surface (Rso)								0				0.000				Check
							Potential	2056						12.203	0.082	0.15	-0.068	Pass
							Actual	2056	2.056									
								overall thickness mm	overall thickness m					Total elemental R value	Total elemental U value	Target elemental U value	Difference	Pass, PassU or Fail

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V2 Bill of Materials Quantities Labour Accessories Products Costs

Bill of Materials Quantities Costs

	Component Function	Refurb Actions	Material	Area GIFA	Labour rate	Labour Cost	Accessories rate	Accessories Cost	Products or Materials rate	Products or Materials Cost	Total Cost
Yes	1 Basement Floor (BF)			m2	£/m2	£	£/m2	£	£/m2	£	£
				60							
Yes	Inner decoration	New	lacquer	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Floor finish	New	Hardwood flooring	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Inner floor lining underlayment	New	Gypsum fibreboard	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Inner levelling/wearing	New	Cement Lime Screed	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Internal insulation	New	PIR Insulation	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Drainage filtration layer	New	HDPE	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Inner tanking	New	Polyethylene (PE)	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Retaining floor	New	Concrete	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Damp/Gas proof membrane	New	Polyethylene (PE)	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Ground gas ventilation labyrinth	New	Expanded polystyrene EPS	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Blinding layer	New	Sand	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Insulating backfill	New	LECA	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Consolidated hardcore	New	Recycled masonry	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Drainage layer	New	Sea shells	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
Yes	Undisturbed subsoil	New	Clay	60	£1.00	£60	£1.00	£60	£1.00	£60	£180
				£45.00	£15	£900	£15	£900	£15	£900	£2,700
				Elemental Cost/m2	Elemental Labour Rate/m2	Elemental Labour Cost	Elemental Accessories rate/m2	Elemental Accessories Cost	Elemental Material Rate/m2	Elemental Material Costs	Elemental Cost: Materials Accessories & Labour

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V2 EE EC & SC

Grand totals	42,128	0	0	0	0

Embodied Energy Embodied Carbon Sequestered Carbon

Whole Building Embodied Energy Embodied Carbon Sequestered Carbon

	Component Function	Length	Width	Height	Element Thickness	Quantity	Areas	Volume	Primary or all Functions	Primary or all Components	Primary or all Materials	Information Source	Embodied Energy	Embodied Energy	Embodied Energy	Area or section	m2	Embodied Carbon	Embodied Carbon Dioxide	Embodied Carbon Dioxide	Embodied Carbon Dioxide	Density	Weight	Embodied Energy	Embodied Carbon Dioxide	Required in building?	Embodied Energy Building	Embodied Carbon Building	Is the material Bio-based or contain Biogenic carbon?	Sequestered carbon	Total Carbon
Yes	**1 Basement Floor (BF)**	m	m	m	m	No.	m2	m3					MJ/m3	MJ/m2	MJ/Item	m2	m2	kg C/kg	kg CO2/kg	kg CO2/m2	kg CO2/Item	kg/m3	kg/m2	MJ/m3	kg CO2/m3	Yes/No	MJ	kg CO2	Yes/No	kg CO2	Kg CO2
							60																								
Yes	Inner decoration				0.001	1	60	0.06	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Floor finish				0.025	1	60	1.5	Finish	Finish/wearing	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	336	0	No	0	0
Yes	Inner floor lining underlayment				0.048	1	60	2.88	Lining/Sheathing/Sarking	Interior lining	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	645	0	No	0	0
Yes	Inner levelling/wearing				0.045	1	60	2.7	Gap filler / Formation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	605	0	No	0	0
Yes	Internal insulation				0.235	1	60	14.1	Thermal Insulation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	3,158	0	No	0	0
Yes	Drainage filtration layer				0.05	1	60	3	Loadbearing capacity: Foundation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	672	0	No	0	0
Yes	Inner tanking				0.001	1	60	0.06	Ground water exclusion	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Retaining floor				0.15	1	60	9	Loadbearing capacity: Basement	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	2,016	0	No	0	0
Yes	Damp/Gas proof membrane				0.001	1	60	0.06	Ground gas exclusion	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Ground gas ventilation labyrinth				0.1	1	60	6	Cross ventilation (below floor)	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	1,344	0	No	0	0
Yes	Blinding layer				0.05	1	60	3	Gap filler / Formation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	672	0	No	0	0
Yes	Insulating backfill				0.15	1	60	9	Thermal Insulation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	2,016	0	No	0	0
Yes	Consolidated hardcore				0.15	1	60	9	Gap filler / Formation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	2,016	0	No	0	0
Yes	Drainage layer				0.05	1	60	3	Loadbearing capacity: Foundation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	672	0	No	0	0
Yes	Undisturbed subsoil				1	1	60	60	Loadbearing capacity: Foundation	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13,440	0	No	0	0

	Component Function	Length	Width	Height	Element Thickness	Quantity	Areas	Volume	Primary or all Functions	Primary or all Components	Primary or all Materials	Information Source	Embodied Energy	Embodied Energy	Embodied Energy	Area or section	m2	Embodied Carbon	Embodied Carbon Dioxide	Embodied Carbon Dioxide	Embodied Carbon Dioxide	Density	Weight	Embodied Energy	Embodied Carbon Dioxide	Required in building?	Embodied Energy Building	Embodied Carbon Building	Is the material Bio-based or contain Biogenic carbon?	Sequestered carbon	Total Carbon
Yes	**2 Basement Perimeter Retaining Walls (BPRW)**	m	m	m	m	No.	m2	m3	0	0	0	0	MJ/m3	MJ/m2	MJ/Item	m2	m2	kg C/kg	kg CO2/kg	kg CO2/m2	kg CO2/Item	kg/m3	kg/m2	MJ/m3	kg CO2/m3	Yes/No	MJ	kg CO2	Yes/No	kg CO2	Kg CO2
							200																								
Yes	Undisturbed subsoil				1	1	200	200	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Backfill				0.3	1	200	60	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Protection mat				0.01	1	200	2	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Drainage filtration layer				0.05	1	200	10	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Outer tanking				0.006	1	200	1.2	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	External retaining supporting wall				0.3	1	200	60	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Smoothing waterproof render				0.02	1	200	4	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Drainage layer				0.05	1	200	10	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Internal insulation				0.1	1	200	20	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Inner lining				0.0125	1	200	2.5	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Inner finish				0.003	1	200	0.6	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0
Yes	Inner decoration				0.001	1	200	0.2	Decoration	Decoration	Choose	E-CT	0.1	0	0	0	0	0.005	0	0	0	2240	0	224	0	Yes	13	0	No	0	0

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V2 LCA EPD

Whole Building Life Cycle Analysis

1 Basement Floor (BF)

Yes	Component Function	Length (m)	Width (m)	Height (m)	Element Thickness (m)	Quantity (No)	Area (m2)	Volume (m3)
							80	
Yes	Inner decoration	1	1	80			80	80
Yes	Floor finish	0.18	1	80			80	14.4
Yes	Inner floor screed	0.05	1	80			80	4
Yes	Inner waterproofing	1.4	1	80			80	112
Yes	Internal insulation	0.025	1	80			80	2.0
Yes	Drainage filtration layer	1	1	80			80	80
Yes	Inner tanking	0.23	1	80			80	18.4
Yes	Retaining floor	2.5	1	80			80	200
Yes	Damp/Gas proof membrane	0.23	1	80			80	18.4
Yes	Structural floor deck/slab	0.25	1	80			80	20
Yes	Blinding layer	0.1	1	80			80	8
Yes	Insulating board	1	1	80			80	80
Yes	Consolidated hardcore	1	1	80			80	80
Yes	Drainage layer	1	1	80			80	80
Yes	Ventilated subsoil	1.6	1	80			80	128

2 Basement Perimeter Retaining Walls (BPRW)

Yes	Component Function	Length (m)	Width (m)	Height (m)	Element Thickness (m)	Quantity (No)	Area (m2)	Volume (m3)
							200	
Yes	Ventilated subsoil	1.6	1	200			200	320
Yes	Backfill	1	1	200			200	200
Yes	Protection layer	0.25	1	200			200	50
Yes	Drainage filtration layer	1	1	200			200	200
Yes	Outer tanking	0.23	1	200			200	46
Yes	External retaining waterproofing	2.5	1	200			200	500
Yes	Retaining external wall	1	1	200			200	200
Yes	Structural wall/pile	0.6	1	200			200	120
Yes	Wall insulation	0.04	1	200			200	8
Yes	Inner tanking	0.45	1	200			200	90
Yes	Inner finish	0.18	1	200			200	36
Yes	Inner decoration	1	1	200			200	200

3 Basement External Wall (BEW)

Yes	Component Function	Length (m)	Width (m)	Height (m)	Element Thickness (m)	Quantity (No)	Area (m2)	Volume (m3)
							125	
Yes	Internal decoration	1.0889	1	125			125	
Yes	Internal finish	0.18	1	125			125	22.5
Yes	Inner tanking	0.23	1	125			125	28.75
Yes	Structural wall	0.45	1	125			125	56.25
Yes	Service zone Thermal insulation	0.025	1	125			125	3.125
Yes	Longitudinal stud	0.13	1	125			125	16.25
Yes	Air/gas/vapour layer	1	1	125			125	125
Yes	Wood cladding layer	0.25	1	125			125	31.75
Yes	Structure zone Thermal insulation	0.025	1	125			125	3.125
Yes	Structure	0.18	1	125			125	22.5
Yes	Longitudinal stud	0.13	1	125			125	16.25
Yes	Wood cladding layer	0.25	1	125			125	31.75
Yes	Cavity insulation	0.025	1	125			125	3.125
Yes	Partial Cavity insulation	0.025	1	125			125	3.125
Yes	Residual Cavity	0	1	125			125	0
Yes	Weather membrane	1	1	125			125	125
Yes	Wind tightness layer	0.13	1	125			125	16.25
Yes	Pressure equalising ventilated void	0	1	125			125	0
Yes	Cladding fixing/support	0.05	1	125			125	6.25
Yes	Cladding fixing/support/ventilated void	0.6	1	125			125	75
Yes	Outer leaf	0.12	1	125			125	15
Yes	Cladding	0.25	1	125			125	31.75
Yes	Finish	1	1	125			125	125
Yes	Decoration	1	1	125			125	125

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V2 LCA EPD (Dev)

Whole Building Life Cycle Analysis

	Component Function	Length (m)	Width (m)	Height (m)	Element Thickness (m)	Quantity (No.)	Areas (m2)	Volume (m3)	Product: Raw Materials Supply (A1)	Product: Transport (A2)	Product: Manufacturing (A3)	Construction: Transport (A4)	Construction: Installation (A5)	Use: Use (B1)	Use: Maintenance (B2)	Use: Repair (B3)	Use: Replacement (B4)	Use: Refurbishment (B5)	Use: Energy (B6)	Use: Water (B7)	EndOfLife: Deconstruction Demolition (C1)	EndOfLife: Transport (C2)	EndOfLife: Waste Processing (C3)	EndOfLife: Disposal (C4)	Beyong Building Life Potential: Reuse Recovery Recycling (D)	Global warming potential (GWP) (kg CO2 equiv)	Ozone Depletion Potential (ODP) of the stratospheric ozone layer (kg CFC 11 equiv)	Acidification potential (AP) of soil & water (kg SO2 equiv)	Eutrophication Potential (EP) (kg (PO4)3- equiv)	Photochemical Tropospheric Ozone creation: (POCP) (kg Ethene equiv)	Abiotic Depletion Potential for non-fossil fuls resources (kg Sb equiv)	Abiotic Depletion Potential of resources-fossil fuels (MJ, net calorific value)
									BS EN 15804:2012					A1	A2																
Yes	**1 Basement Floor (BF)**						0		A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	GWP	ODP	AP	EP	POCP	ADP Elements	ADP Fossil Fuels
									Yes	Yes	Yes	Yes	Yes									Yes		?	?							
Yes	Inner decoration				1	1	0	0																								
Yes	Floor finish				0.18	1	0	0																								
Yes	Inner floor lining underlayment				0.36	1	0	0																								
Yes	Inner levelling/wearing				1.4	1	0	0																								
Yes	Internal insulation				0.03	1	0	0																								
Yes	Drainage filtration layer				1	1	0	0																								
Yes	Inner tanking				0.23	1	0	0																								
Yes	Retaining floor				2.3	1	0	0																								
Yes	Damp/Gas proof membrane				0.23	1	0	0																								
Yes	Ground gas ventilation labyrinth				0.04	1	0	0																								
Yes	Blinding layer				2	1	0	0																								
Yes	Insulating backfill				1	1	0	0																								
Yes	Consolidated hardcore				1	1	0	0																								
Yes	Drainage layer				1	1	0	0																								
Yes	Undisturbed subsoil				1.5	1	0	0																								

V2 U value to Watts to CO2 In Use

U Values To Watts To CO2

User name: BrianSpecMan did this

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Yes | ? | ?

Basement

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	1 Basement Floor (BF)	0.082	60	11	-	15	4	[illegible]		[illegible]				
Yes	2 Basement Perimeter Retaining Wall (BRW)	0.051	200	11	-	15	4	20		[illegible]				
Yes	3 Basement Internal Partition (BIP)	0.[illegible]	125	11	-	15	4	22		125				
Yes	4 Basement Roof at Site Level (BRSL)	0.044	60	11	-	15	4	11		60				
Yes	5 Basement Roof at SubTerranean level (BRSTL)	0.085	60	11	-	15	4	20		60				
Yes	6 Basement Overhead Glazed Pavement (BOGP)	2.000	11	11	-	15	4	88		11				
Yes	7 Swimming Pool Basin (SPB)	0.071	2296	11	-	15	4	651		2296				
			2812						1,023	Basement	2812	22%	#VALUE!	#VALUE!

Floor

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	8 Ground Floor Over Basement (GFOB)	0.052	60	11	-	20	9	28		60				
Yes	9 Ground Floor Ground Bearing (GFGB)	0.090	60	11	-	20	9	49		60				
Yes	10 Ground Floor Over Ventilated Void (GFOV)	0.057	60	11	-	20	9	31		60				
Yes	11 Upper Floor (UF)	0.102	60	20	-	20	0	0		60				
Yes	13 External Floor & Soffit (EFS) (over air)	0.059	120	0	-	20	20	141		120				
Yes	14 Top Floor (TF)	0.118	60	20	-	20	0	0		60				
			420						248	Floor	420	3%	#VALUE!	#VALUE!

Compartmentation

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	15 Party Floor (PF)	0.053	180	0	-	20	20	190		180				
Yes	16 Party Wall (PW)	0.125	7500	0	-	20	20	18,824		7500				
Yes	17 Communal Compartment Floors (CCF)	0.053	180	0	-	20	20	190		180				
Yes	18 Communal Compartment Wall (CCW)	0.126	37.5	0	-	20	20	94		37.5				
			7898						19,299	Compartmentation	7897.5	61%	#VALUE!	#VALUE!

Wall

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	20 External Walls (EW)	0.064	80	0	-	20	20	103		80				
Yes	21 Integral Unheated Space Wall (IUSW)		0	0	-	15	15	0		0				
Yes	59 Basement Internal Partitions (BIP)	0.203	125	20	-	20	0	0		125				
Yes	60 Internal Walls (IW)	0.203	17.5	20	-	20	0	0		17.5				
			223						103	Wall	222.5	2%	#VALUE!	#VALUE!

Roof

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	22 Flat Roof (FR)	0.039	60	0	-	20	20	47		60				
Yes	23 Shallow Roof (SR)	0.086	60	0	-	20	20	104		60				
Yes	24 Pitched Roof (PR)	0.069	59	0	-	20	20	82		59				
Yes	25 Barrel Vault Roof (BVR)	0.086	68	0	-	20	20	118		68				
Yes	26 Domed Roof (DR)	0.049	31	0	-	20	20	30		31				
Yes	27 Hipped/Pyramid Roof (HPR)	Calculated Total U value	59	0	-	20	20	#VALUE!		59				
Yes	28 Mono-Pitched Roof (MPR)	W/m2.K	59	0	-	20	20	#VALUE!		59				
Yes	29 Mansard Roof (MR)	0.000	48	0	-	20	20	0		48				
Yes	30 Dormer Flat Roofs (DFR)	0.000	41	0	-	20	20	0		41				
Yes	31 Dormer Side Wall (DSW)	0.000	9	0	-	20	20	0		9				
Yes	32 Dormer Window Wall (DWW)	0.000	15	0	-	20	20	0		15				
Yes	33 Other Geometry Roof (OGR)	0.000	121	0	-	20	20	0		121				
			630						#VALUE!	Roof	630	5%	#VALUE!	#VALUE!

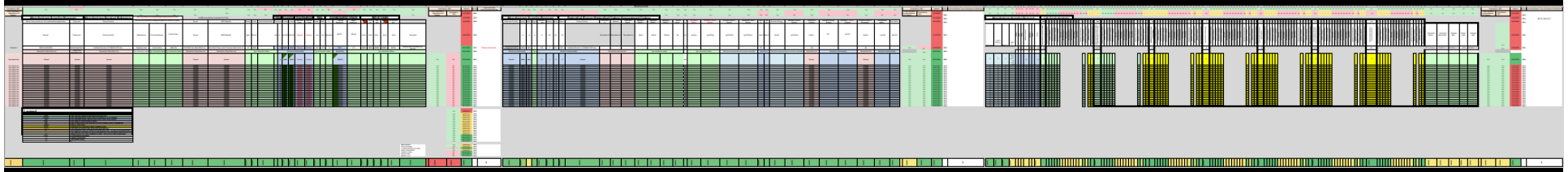
Ceilings

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	34 Flat Ceiling (FC)	0.087	60	0	-	50	50	260		60				
Yes	35 Pitched Vault Ceiling (PVC)		41	0		50	50	0		41				
Yes	36 Barrel Vault Ceiling (BVC)		131	0		50	50	0		131				
Yes	37 Domed Vault Ceiling (DVC)		31	0		50	50	0		31				
Yes	38 Hipped/Pyramid Vault Ceiling (HPVC)		59	0		50	50	0		59				
Yes	39 Mono-Pitch Vault Ceiling (MPVC)		41	0		50	50	0		41				
Yes	40 Mansard Vault Ceiling (MVC)		97	0		50	50	0		97				
Yes	41 Other Geometry Ceiling (OGC)		101	0		50	50	0		101				
			561						260	Ceilings	561	4%	#VALUE!	#VALUE!

Window/Door/Rooflight

Applicable Yes/No	Elements	U value W/m2.K	Areas m2	Temperature: External degree C		Temperature: Internal degree C	Temperature: Difference degree C	Heat loss: Individual W	Heat loss: Total W	Floor area m2	Total Areas m2	Areas %	Heat loss %	Ratio: 1 in x
Yes	42 Windows (W)	0.8	50	0	-	20	20	800		50				
Yes	43 Glazed Pedestrian Doors (GPD)	0.79	10.5	0	-	20	20	166		10.5				
Yes	44 Opaque Pedestrian Doors (OPD)	2	12	0	-	20	20	480		12				
Yes	45 Large Wall Opening (LWO)	2	45	0	-	20	20	1,800		45				
Yes	46 High Usage Entrance Door (HUED)	2	20	0	-	20	20	800		20				
Yes	47 Display Window (DW)	2	25	0	-	20	20	1,000		25				
Yes	48 Glazed External Walls (GEW)	0.81	80	0	-	20	20	1,296		80				
Yes	49 Opaque External Walls (OEW)	2	20	0	-	20	20	800		20				
Yes	50 Glazed Roof (GR)	2	25	0	-	20	20	1,000		25				
Yes	51 Rooflights (RL)	0.75	25	0	-	20	20	375		25				
Yes	52 Roof Windows (RW)	0.81	10	0	-	20	20	162		10				
Yes	53 Roof Air & Smoke Vents (RASV)	2	25	0	-	20	20	1,000		25				
			348						9,679	Window/Door/Rooflight	348	3%	#VALUE!	#VALUE!
									#VALUE!		12891	100%	#VALUE!	#VALUE!
									#VALUE!		12543	97%	#VALUE!	#VALUE!

V2 Manufacturer Supplier Request Product Data Sheet



	Manufacturer Supplier Request:		Manufacturer Product Reference	NB This Schedule can be downloaded directly from the Green Building Calculator website Https://GreenBuildingCalculator.uk			© GBE Green Building Calculator 2017-2021					Size		Insulation		Overheating		Size		Condensation Check			Bill of Costs					
	Add as many rows as you have products/sizes/applications	Component	Primary Function	NB as more functionality is added this table will develop to capture more information			Format	MSR Materials	Density	k value	SpecificHeatCapatity	Thickness		R value	U value	Decrement Value	Decrement Delay	Length	Width	iv	Thermal Resistance R layer	Vapour Resistance Rv layer	Labour rate	Product rate	Item rate	Material rate	Accessories rate	
	Element	Component	Primary Function	Manufacturer	Product Reference	Product Code	Format	MSR Materials	kg/m³	W/m.K		mm	m	m2.K/W	W/m2.K	Pending	Pending	mm	mm	MN s/g.m	m2K/W	MN s/g	£/m2	£/m2	£/No.	£/m2	£/m2	Comments
Example >	Wall/Floor/Roof/Etc.	Position/Application	Insulation/Structure/ VCL/BM/ATL/WTL/etc.	Company name	Product Name	Model No.	Quilt Batt Foam Board Block etc.	Wood fibre Sheep's wool Fired clay Straw board, etc.	20	0.160		150	0.15	0.938	1.067	Pending	Pending	1000	450	25	0.938	3.75	£25.00	£30.00	£25.00	£56.00	£20.00	anything else to be taken into account
	Choose from Drop Down List	Choose from Drop Down List	Choose from Drop Down List	Type information below	Type information below	Type information below	Choose from Drop Down List	Choose from Drop Down List	Type information below				Worked out automatically					Type information below			Worked out	Type information Below						
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V2 Manufacturer Supplier EE EC SC & LCA datasets

Manufacturer Supplier Request: Embodied Energy Embodied Carbon Sequestered Carbon

Component Function	Length	Width	Height	Component Thickness	Quantity	Areas	Volume	Primary Function	Components	Materials	Information Source	Embodied Energy	Embodied Energy	Embodied Energy	Area or section	m2	Embodied Carbon	Embodied Carbon Dioxide	Embodied Carbon Dioxide	Embodoed Carbon Dioxide	Density	Weight	Embodied Energy	Embodied Carbon Dioxide	Required in building?	Embodied Energy Building	Embodied Carbon Building	Is material timber or Bio-based?	Sequestered carbon	Total Carbon
	m	m	m	m	No.	m2	m3		Drop down list	Drop down list	Drop down list	Mj/m3	MJ/m2	MJ/Item	No.	m2	kg C/kg	kg CO2/kg	kg CO2/m2	kg CO2/Item	kg/m3	kg/m2	MJ/m3	kg CO2/m3	Yes/No	MJ	kg CO2	Yes/No	kg CO2	Kg CO2
Insulation/Structure/ VCL/BM/ATL/WTL/etc.	1.000	0.450	1	0.15	1	0.45	0.0675	Insulation/Structure/ VCL/BM/ATL/WTL/etc.								m2					20				Yes			No		
Worked out automatically			Type	Worked out automatically					Choose from drop dowl list			Type information below					Type information below		Worked out automatically but can be overwritten		Worked out		Worked out automatically but can be overwritten		Choose from list	Worked out automatically		Choose from list	Worked out automatically	
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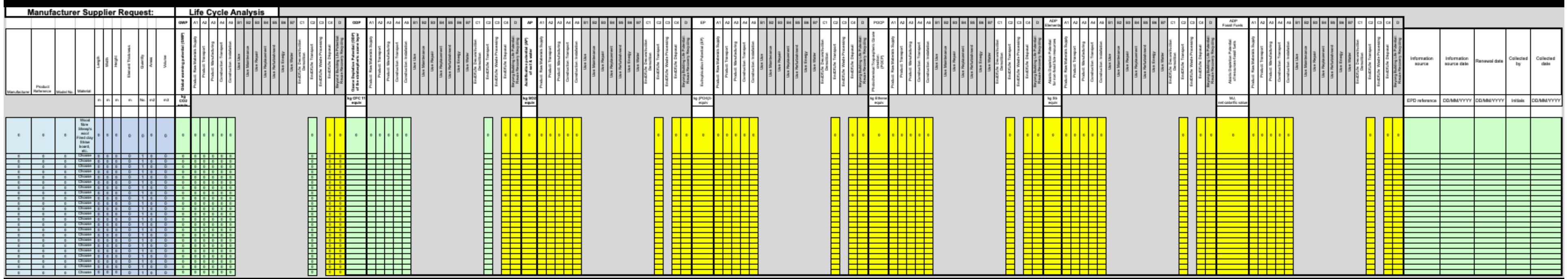

V1 Awards/Shortlists

- 3 months after V1 launch
  - Green Apple 2020-21 Award Winner
    - Category and metal to be announced
  - Central England Prestige 2020-21 Winner
    - November announcement
  - Construction Computing 2020 Awards Shortlisted but no award
    - Innovation of the year 2020
    - One to watch Company 2020
    - Too new, no results, collect results & reapply

GREEN APPLE ENVIRONMENT AWARDS

CorporateLiveWire
CENTRAL ENGLAND PRESTIGE AWARDS
2020/21 WINNER

Construction Computing AWARDS
THE HAMMERS 2020
FINALIST

GBC Green Building Calculator
https://GreenBuildingCalculator.uk

GBE
https://GreenBuildingEncyclopaedia.uk

GBE Learning
https://GBELearning.com

Reclaimed Product Material Passports

ZWS & SEDA Circular Economy Event
24th October 2019
BrianSpecMan Murphy

EU Initiative

- Directives
- Innovation driver
  - O Product Passports
    - (over a decade ago?)
- O Circular Economy Drive
  - ‘Still in its infancy’
  - October 2019
- O White goods reparability Directive
  - October 2019

Complimentary Directives or initiatives

- H&S: CHIP, CDM, COSHH, RoHS, REACH,
  - Blatant breaches: UK H&S and REACH have no teeth
- LCA: Life Cycle Assessments
  - Manipulated by stakeholders (Manufacturer Associations)
  - To make violet materials look grey or even green
- PEF: Product Environmental Footprinting
  - Being manipulated by stakeholders to act like LCA
- OEF: Organisation Environmental Footprinting
- LCC: Life Cycle Costing
  - In the hands of expensive consultants
  - Or in expensive software
  - We need to make our own calculators
    - They are not easy
    - Have you seen the equations?

EU Funded projects

- Horizon 2020
  - BAMB Buildings as Materials Banks (recent)
  - includes database of 428 O products
  - But has platform disappeared?
    - (I am trying to obtain to publish on GBE)
- Interreg
  - MF&H Makers, Fixers and Hackers (recent past)
  - FCRBE Facilitating Circulation of Reclaimed Building Elements (current 2019)
  - SB&WRC Sustainable Bio and Waste Resource for Construction (2019 finished)

Global awareness has risen

- 1, 2, 3 or 4 decades late (never too late)
- Trashed Film (to invited professionals and MPs 2013)
  - If you have an audience get the CD to show
- David Attenborough Blue Planet
  - Ocean Plastics, straws in particular 2019
- Greta Thunberg (started 2018 – Embraced Globally 2019)
  - Unite behind the Science
  - Behavioural Change campaign
    - Government, Business & Individuals
  - SchoolStrike4Climate
    - Asked the Adults to join them
      - Declare Architects (Rejected a problem solver)
        - Still accept holiday resort airport commissions
      - Declare Construction
      - Declare Education
    - Architects CAN Climate Action Network
      - Architects Can't, they don't have the know-how
- TGR facilitating CPD by PHT TRA BBA AECB ASBP CL CLR etc.
  - To fill the knowledge gap

RIBA Plan of Work

- Circular diagram
  - O Circular information-only flow
- 0-7 = --- Linear Building
- 8 = Repurposing and Reuse of existing
- 9 = Deconstruct, reclaim, reuse, reassembly
- 0-9 = O Circular Building

RIBA Education Committee

- Out of touch with Climate Emergency
  - Universities not leading the way
  - Few unite behind the science
  - Very few being taught science of building
    - Campaign coming to challenge ARB & RIBA
- Aspiration: Architectural Association
  - Philosophical BS
  - Fantasy Graphics
- Never engage with reality
  - let alone solve the problems

Post-Declare Initiatives

- Aecom
- Ambitions to create materials exchange website
- But some already exist
- What will be different?

Product Passports? Materials Passports?

- Wrong name?
  - ‘Products’ in first life
  - With a Specification or certificate and delivery ticket
- Materials Passport?
  - ‘Materials’ or ‘Resources’ in second life
  - With a reclaim materials passport and delivery ticket
  - Avoiding a waste transfer note
- Unless EPR applies

Extended Producer Responsibilities (EPR)

- Loan or leasing of products or materials
  - Never owned, just borrowed for a while
  - Electric Vehicle (EV) batteries
  - More and more cars and therefore EVs
  - Eventually building parts too
    - Or houses built like caravans: Craig White
- Returned for redeployment
- Remanufactured by original manufacturer or a dedicated specialist
- Segregated for recycling

Purpose of Materials Passports (MPs)

- Help improve EU wide Resource Efficiency
- To help reduce excessive waste in Construction Sector
- Divert materials from Landfill
- To facilitate reuse of materials in Construction
- Provide a level of confidence that products are fit for purpose in 2nd use
- Of merchantable quality: may/not be relaxed
  - Frost damaged roof tiles more valuable that pristine
- Provide guidance on their properties and application
- Provide a great deal of information about original materials
  - Probably more than the OEM or OPM ever did
    - Original Equipment Manufacturer (OEM)
    - Original Product Manufacturer (OPM)

Goals & Benefits of MPs

- About:
  - Circular materials, components and building products (CM,C&BP)
  - which might also be healthy, environmental (HE)
- Keep or increase residual value of CM,C&BP over time
- Create incentives for manufacturers, processors, suppliers to offer HE CM,C&BP
- Enable circular product design, materials recovery (MR) and chain of possession (CoP) partnerships (CoPP)
- Support materials choices in reversible building design projects
- Reduce eco-footprints
- Make it easier for developers, facility manager, and renovators to choose HE CM,C&BP
- Facilitate reversed logistics of reclaim CM,C&BP
- Assessment of future materials flows
- Management of supply and demand
- Assessment and forecast of potential secondary raw materials
- Systematic recovery and utilisation strategies can be identified and further developed
- Strategic positioning of plants (e.g. recycling, materials traders, material exchanges, etc.)
- Strategic supply chain management
- Link and make relevant data available for assessment on various hierarchy levels
- Reduce the cost by managing resources rather than managing waste
- Develop a sustainable life cycle management of CM,C&BP and buildings
- Eliminate waste and reduce the use of virgin resources
- Improve the quality, value and security of materials supply
- Provide a tool to move from linear system to a circular system
  - (BAMB, MH & WL, ‘19)(GBE BRM ’19)

Other benefits of MP on Circular Economy

- Helps convert from Linear Economy
  - Via a Segregating for Recycling Economy
  - To a Reclaiming for Circular Economy
- Where we value stuff (e.g. natural materials)
- Where we waste nothing
  - Were nothing ends up in landfill
- Everything is upgraded, repaired, refurbished, to extend its first life and subsequent lives
- Everything is remanufactured and returned to use or repurposed for other uses

Material Passport contains:

- Physical Properties
- Chemical Properties
- Biological properties
- Material Health
- Unique Products & System Permutation Identification
- Design and production
- Transportation and Logistics
- Construction: Identify materials and Product locations in buildings and in elements
- Use and Operate Phase maintenance information
- Disassembly and Reversibility
- Reuse and Recycling
- >330 data points suggested including ‘many others’

Industry Sector Response to Material Passports

- Manufacturer Association (UK) Federations (EU)
- Looking after Business as Usual
  - Rejected Reclaim Product Materials Passports
  - In case they erode profits *f*rom sales of new goods
    - Its already happened with the remanufactured carpet sector
- Just like the oil and plastic sector threatening
  - The plastics recyclers
  - Ocean plastics collectors

Design Profession Response to Material Passports

- Silence?
- Didn't event know it was being discussed?
- Architectural education wrong focus:
  - Philosophical BS
  - Fantasy Architecture
- College Knowledge
  - Out of date
  - Learning Curve followed by Forgetting Curve
  - Few opportunities to apply knowledge, so forget

Material Passport: SWOT

- Strengths:
  - More data to allow Appropriate and Competent Reuse
- Weaknesses:
  - Reused aesthetic still a turn off for some
  - Reuse structural competency in doubt
  - Data stored in MPs needs to be kept up to date
  - Dead data in Excel files not maintained:
    - blocked the development from 3D CAD to BIM
- Opportunities:
  - Enable others to engage
  - 900 timber visual inspectors in sector
  - Some Structural Engineers will visual inspect steels
  - Steel looses shape in fire before loosing strength
- Threats:
  - Manufacturers do not want to reduce sales of new

Material Passports: Features & Benefits

Features	Benefits
Product/Material Properties	Reapplication Confidence
Application properties	Reapplication Competence
Manufacturer's Reputation enhanced	Satisfied Customers

Another GBE CPD/Lecture to download
And https://greenbuildingencyclopaedia.uk

Sampler

- This is a cut down version of the original file to give you a sample of the whole
- It's the front end of the file with the middle and rear end deleted
- Go to https://GreenBuildingEncyclopaedia.uk
- to down load the whole file
- You will find a large number of other files there too

© GBE Resource Efficient Retrofit

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

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  - Specification Writer by Choice
  - Environmentalist by Actions
  - Writer and Educator as a Calling
  - Number Cruncher by Necessity
- Greening up my act since 1999
- Founded National Green Specification 2001
- Launched www.greenspec.co.uk 2003
- Created: GBE at https://greenbuildingencyclopaedia.uk 2012 – 2021
- Created: GBL Learning: https://GBELearning.com 2020 - 2021
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- GoogleMyBusiness: National Green Specification
- Pinterest: Brian Murphy • GBE Green Building Encyclopaedia
- Pinterest: https://www.pinterest.co.uk/bmurphy1390/
- National Green Specification