

**Risk-Free Carbon
& Resource
Efficient Retrofit**

Useful Simple Trust
16th February 2021

This Presentation on GBE:

- Find this file on GBE website at:
 - <https://GreenBuildingEncyclopaedia.uk/?P=39136>
- PAS 2035 CPD
 - <https://GreenBuildingEncyclopaedia.uk/?P=21613>
- Product Passport
 - <https://GreenBuildingEncyclopaedia.uk/?P=30129>
- GBC Green Building Calculator
 - <https://GreenBuildingEncyclopaedia.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

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Scope

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

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**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...

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**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 training
	GBE Resource Efficient Retrofit Number Crunching	GBE Resource Efficient Retrofit 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

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
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


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<https://www.building.co.uk>




<https://www.gbe.com.au>




<https://www.gbclearning.com>

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
 - See Also: GBE issue Paper: Overheating



<https://www.bulldozer.co.uk>



<https://www.bulldozer.co.uk>




<https://www.gbelearning.com>

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

Building a Safer Future


An Implementation Plan




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<https://press.hackittconsulting.co.uk>




<https://www.hackittconsulting.co.uk>



<https://GBC.learning.co.uk>

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/80882/BSP_consultation.pdf



Ministry of Housing,
Communities &
Local Government

Building a Safer Future

Proposals for reform of the building safety regulatory system

A consultation

[illegible]

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

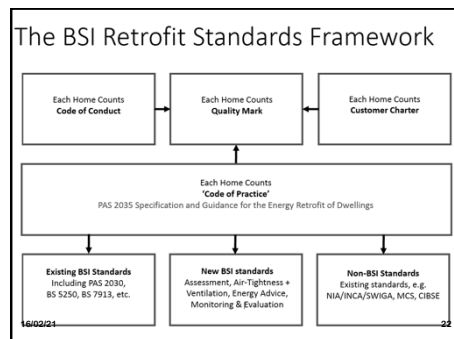
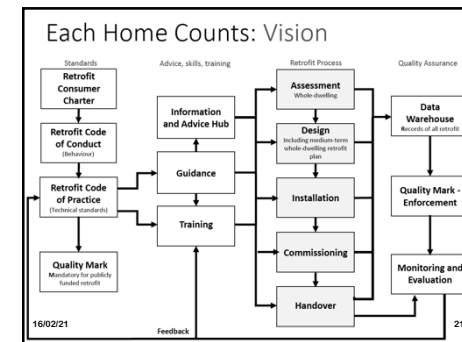
New Risks

- 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

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PAS 2035 Risk Assessment Criteria

Average number of measures per dwelling	Criterion 1: Number of improvement measures per dwelling	Risk grade	Assessed grade
→	Average number of measures per dwelling	1-4	Low
	5-10	Medium	Medium
Inherent technical risk of highest risk measure	Criterion 2: Measures proposed	Risk grade	Assessed grade
→	Inherent technical risk of highest-risk measure*	1-4	Low
	5-10	Medium	Medium
Highest risk combination of measures	Criterion 3: Combination of measures	Risk grade	Assessed grade
→	Highest-risk combination of measures*	1-4	Low
	5-10	Medium	Medium
Age of oldest building	Criterion 4: Age of buildings	Risk grade	Assessed grade
→	Age level of oldest building	1-4	Low
	5-10	Medium	Medium
Construction and built form of buildings	Criterion 5: Construction	Risk grade	Assessed grade
→	Construction and built form of buildings	1-4	Low
	5-10	Medium	Medium
	Aggregation	PAS 2035	23
	Highest assessed grade	PAS 2035	23

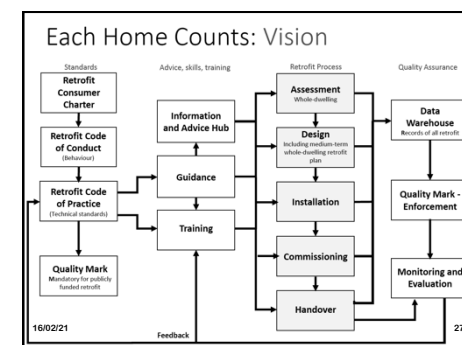
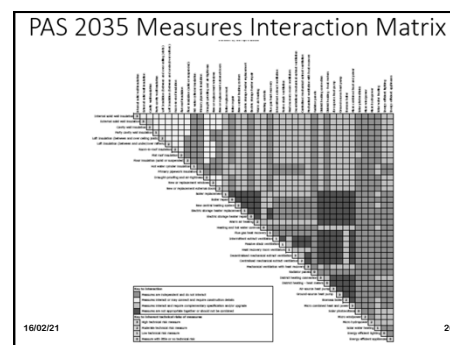
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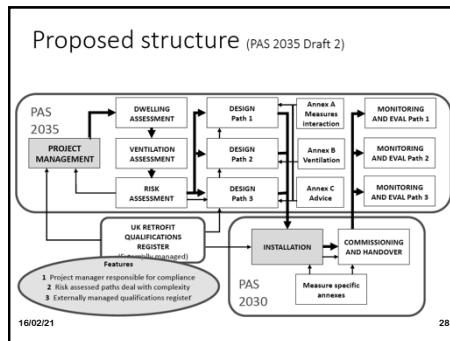
ITR Inherent Technical Risk of the measures

- 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 complementary 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





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

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**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

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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

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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

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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 ventilation flow
 - 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

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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

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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

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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 budget, 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
 - Consists with house
 - For owner/occupier and future owner/occupier access
 - Avoid doing things twice
 - Plays same role as NIP Home Information Pack
 - Previously dropped by government

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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

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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

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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
 - Prepared 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
 - Consists with house
 - For owner/occupier and future owner/occupier access
 - Avoid doing things twice
 - Plays same role as HPI 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

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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

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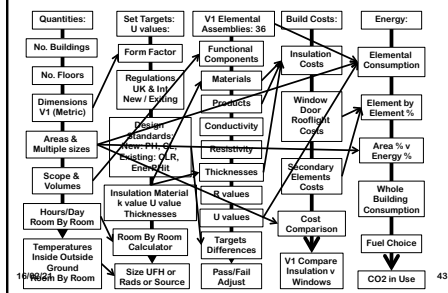
Green Building Calculator

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I am reminded to
**Be the change
 you want to see in
 the world**

Mahatma Gandhi

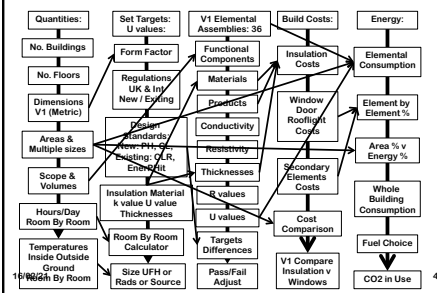
V1 launched June 2020



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V1 launched June 2020



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GBC Green Building Calculator

- Scope: V1 Completion:
- New Build, Domestic, Multi-storey, Multi-occupancy, Non-domestic (partial)
- Building Size:
 - Width, depth 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, Prescriptive, Energetic, AFGB, CL or CLR or others
- Winter Thermal Insulation Material Choices
 - U values v U values - Thicknesses
 - U values v U values - Thicknesses
- 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

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Future Development Versions

- V5 Thermal Bridge, Thermal mass calculator
- V6 Civils and Infrastructure
- V7 Waste Calculator Using WasteCostLife
- V8 Plastic Free v Recycled Plastic
- V9 Interior: Scope increase, S&P cut, retrofit
- V10 Circular Economy Reclaim Review
- V11 Self-built Interface with the GBCE Encyclopedia
- 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 GBPG Green Building Price Book
- V21 Value Engineering Opportunities
- V22 Design Life and Durability
- V23 Full Fee bid calculation based on cost plan
- V24 O&M Operation & Maintenance Manuals
- V25 FM Specification

GBC

The Building Greenhouse Gas Calculator

<https://www.buildinggreenhousegascalculator.nl>


GBC Learning

<https://gbclearning.com>


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


16/02/23 2 EU funded projects to learn from



<https://www.gbclearning.com>



<https://www.gbclearning.com>



<https://www.gbclearning.com>

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 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, proliferating at expense of performance or comfort
 - Value Engineering
 - Carbon pay-back periods
 - But don't forget the other properties/features, benefits, considerations
 - Thermal comfort (PM & EPM/PH), less condensation, vapour open/closed
 - Plastic content, plastic avoidance, recycled content, fire life risk
 - High recycled content may lead to best choice of materials and properties

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Window frame, Glass, Coating, Perimeter, Spacer, Gas, Finishes, Specifications	U value	Energy in use	Carbon in use	Carbon saved in use	V2 Cost in use	Materials	Finishes	V1-V2 Profiles	Initial Cost	B1 Payback period	Embodied Energy	Embodied Carbon	V1 B1 Carbon in walls	Sequestered carbon	B1 Carbon back period
Existing Single glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+	+
Existing to Double glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+	+
+Secondary Glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+	+
+Secondary Double Glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+	+
Replace with double glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+	+
Replace with triple glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+	+

B1 Evidence-based Guidance Secondary Element Upgrades														
Secondary-Element Upgrade														
Secondary Element	U value	Energy in use	Carbon in use	Carbon saved in use	V2 Cost in use	Materials	Finishes	Profiles	Initial Cost	Payback period	Embodied Energy	Embodied Carbon	V1 B1 Carbon in walls	Sequestered carbon
Existing Single glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+
Existing to Double glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+
+Secondary Glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+
+Secondary Double Glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+
Replace with double glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+
Replace with triple glazing	+	+++++	+++++	+	+	+	+	+	+	+	+	+	+	+

Green Building Calculator Website

<https://GreenBuildingCalculator.uk>

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

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 throughout GBC
Green with red text	User input cells with sample entries to populate calculations (replace as required)
Turquoise	GBC calculated results, that the user can overwrite, e.g. for variables
Turquoise 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														
Whole Building														
Building	One or many													
Tenanted	One or many													
Building Geometry														
Building Materials														
Building Systems														

V1 Schedule of Accommodation														
Schedule of Accommodation														
Floor(s)	Room Functions													

The screenshot shows a form titled "V2 Form Factor" with a header section containing logos and a URL. The form is divided into several sections: "Building Information", "Room Functions", "Room Details", and a large table for "Room Details". The "Room Details" table has columns for "Room Name", "Room Number", "Room Type", "Room Size", "Room Color", "Room Shape", "Room Material", "Room Location", "Room Status", "Room Notes", and "Room Image". The table is filled with data for various rooms, including "Room 1", "Room 2", "Room 3", "Room 4", "Room 5", "Room 6", "Room 7", "Room 8", "Room 9", "Room 10", "Room 11", "Room 12", "Room 13", "Room 14", "Room 15", "Room 16", "Room 17", "Room 18", "Room 19", "Room 20", "Room 21", "Room 22", "Room 23", "Room 24", "Room 25", "Room 26", "Room 27", "Room 28", "Room 29", "Room 30", "Room 31", "Room 32", "Room 33", "Room 34", "Room 35", "Room 36", "Room 37", "Room 38", "Room 39", "Room 40", "Room 41", "Room 42", "Room 43", "Room 44", "Room 45", "Room 46", "Room 47", "Room 48", "Room 49", "Room 50", "Room 51", "Room 52", "Room 53", "Room 54", "Room 55", "Room 56", "Room 57", "Room 58", "Room 59", "Room 60", "Room 61", "Room 62", "Room 63", "Room 64", "Room 65", "Room 66", "Room 67", "Room 68", "Room 69", "Room 70", "Room 71", "Room 72", "Room 73", "Room 74", "Room 75", "Room 76", "Room 77", "Room 78", "Room 79", "Room 80", "Room 81", "Room 82", "Room 83", "Room 84", "Room 85", "Room 86", "Room 87", "Room 88", "Room 89", "Room 90", "Room 91", "Room 92", "Room 93", "Room 94", "Room 95", "Room 96", "Room 97", "Room 98", "Room 99", "Room 100".

[illegible]

V1 Building Element Areas

V2 Engage Singular/Multiple

V1 Insulation Thicknesses

k values

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[illegible][illegible]



THE INSTITUTE OF BUILDING COSTS
<https://www.bimbi.co.uk>



THE INSTITUTE OF BUILDING ESTIMATES
<https://www.bimbi.co.uk>



THE INSTITUTE OF BUILDING ESTIMATES
<https://www.bimbi.co.uk>

V2 Bill of Materials Quantities Labour Accessories Products Costs

Bill of Materials Quantities Costs											
No.	Description of Work	Unit	Rate	Qty	Total	Rate	Qty	Total	Rate	Qty	Total
1 Basement Floor (B1)											
1	Excavate and backfill 1:1	m ³	10.00	100	1000.00	10.00	100	1000.00	10.00	100	1000.00
2	Reinforce concrete 1:2:4	m ³	15.00	50	750.00	15.00	50	750.00	15.00	50	750.00
3	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
4	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
5	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
6	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
7	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
8	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
9	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
10	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
11	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
12	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
13	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
14	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
15	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
16	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
17	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
18	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
19	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
20	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
21	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
22	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
23	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00
24	Formwork 1:2:4	m ²	5.00	200	1000.00	5.00	200	1000.00	5.00	200	1000.00
25	Concrete 1:2:4	m ³	12.00	100	1200.00	12.00	100	1200.00	12.00	100	1200.00
26	Reinforcement bars	kg	0.50	1000	500.00	0.50	1000	500.00	0.50	1000	500.00</

V2 EE EC & SC

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V2 LCA EPD

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V2 LCA EPD (Dev)

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V2 U value to Watts to CO2 In Use

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V2 Manufacturer Supplier Request Product Data Sheet

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V2 Manufacturer Supplier EE EC SC & LCA datasets

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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

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Reclaimed Product Material Passports

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

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EU Initiative

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

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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?

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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)

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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
 - SchoolStrikesClimate
 - 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

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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**

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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

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Post-Declare Initiatives

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

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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

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Unless EPR applies

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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**

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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 than 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)

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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

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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

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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'

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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 from 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

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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

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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 loses shape in fire before losing strength
- Threats:
 - Manufacturers do not want to reduce sales of new

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Material Passports: Features & Benefits

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

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

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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

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<https://GreenBuildingCalculator.uk>
<https://GreenBuildingEncyclopaedia.uk>
<https://GBELearning.com>

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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<https://GreenBuildingCalculator.uk>
<https://GreenBuildingEncyclopaedia.uk>
<https://GBELearning.com>

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 - Specification Writer by Choice
 - Environmentalist by Actions
 - Writer and Educator as a Calling
 - Number Cruncher by Necessity
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- Founded National Green Specification 2001
- Launched www.greenspec.co.uk 2003
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