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Green Building Calculator GBC & Firstplanit

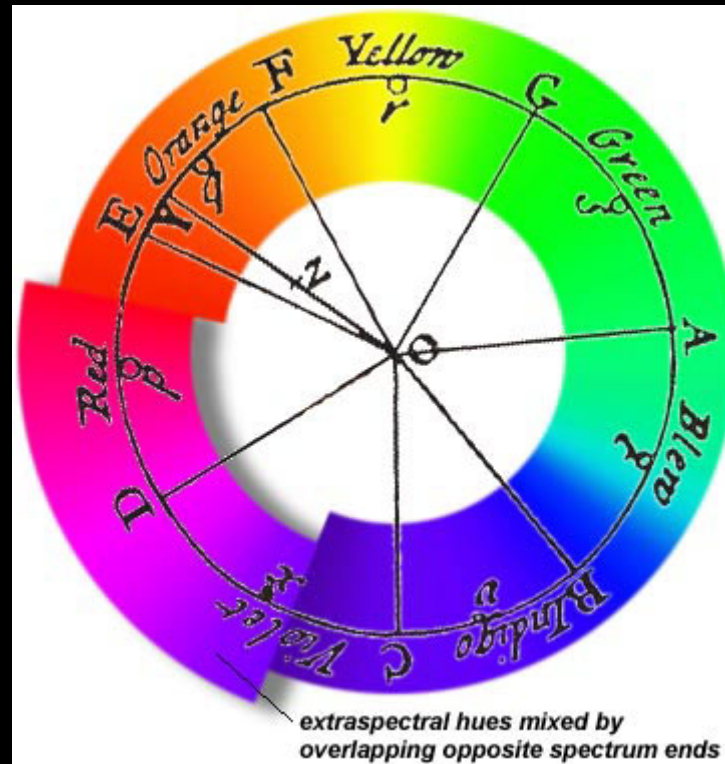
Potential Collaboration Opportunities

ASBP Tools 15th September 2022

PS Q&A Prompted Definition

Sustainable Environmental Eco Green

Violet
Violent
Violate



'Violet' Materials

- 'Violet' meaning:
- 'any material, construction product, construction method or building
- unfriendly to humans or the environment or adjacent materials
- whose performance diminishes in use or over time
- Deleterious materials might sum them up but many 'normal' materials are violet



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'Violet' Industry

- Clients/employers, self-builders, developers, designers, Quantity Surveyors, contractors, manufacturers, applicators/installers, advisory organisations, manufacturer associations
- anyone that does not care about the environment
- or anyone that does not act on its behalf
- Virtually the whole industry
- It has been changing, slowly driven by legislation
- But far too slowly, until XR, Greta, David Attenborough,
- Watch out: post-Brexit diminishing EU legislation in UK
- And a Government that has not got a clue how

Violet Materials

- **Non-renewable, finite**
 - Fossil derivatives, fuel, hydrocarbons, high embodied carbon
 - Petrochemical, chemicals, synthetics:
 - Paints (complex chemistry)
 - Plastics (from hydrocarbons)
- **Carbon dioxide release or produced**
 - Carbon based: e.g. Fuel used in manufacturing and transport
 - Release Carbon in manufacturing chemistry e.g. Cement & Steel
- **High embodied energy: e.g. energy intensive manufacture**
 - Metals: Aluminium (was made with renewable energy, today more gas and coal)
 - Plastics
 - Cement (UK uses more waste as fuel but tyres are fossil fuel based)
- **Hazardous materials and hazardous waste:**
 - Wet, sticky, gooey or flows:
 - resins, paints, sealants, chemicals,
 - Fine particulate: e.g. cement, asbestos, ceramic fibre, carbon black, paint, nano stuff
 - Corrosive: acidic, alkali,
 - Off-gassing: plastics, adhesives, paints, stains, oils, waxes,
- **Ozone depleting & Global Warming chemicals**
 - Foamed plastics CFCs, HCFCs, HFCs HFAs & Blended
 - Aluminium production PFCs



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Green Environmentally Materials

- Renewable: timber,
- Rapidly renewable: Plant based materials
- Abundant: Site subsoil, rocks, sand, gravel,
- Recycled & Recyclable:
 - post consumer content,
- Reclaimed & Reused:
 - on site materials, timber as timber not chipboard
- Energy and Carbon is already out there:
 - Reclaimed: bricks, slates, stone, timber
- Carbon sequestration: low, neutral or Carbon negative:
 - Plant and timber based
 - Grown aggregate by carbonation C8Systems
- Low embodied energy: Plant based, minerals
- Local: low transport miles, fuel, emissions and congestion

17/09/22

Deleterious Materials

- **Materials that are ineffective, incompatible incompetent within an application**
- **Hazardous materials to manufacturers, builders, maintainers, occupants or demolition teams: Carbon Black in rubber**
- **Unhealthy materials: in manufacture**
 - **Healthy outputs require unhealthy inputs:**
 - **titanium dioxide paint whitener and IAQ improver: LCA is worst impact possible**

Healthy Materials

- Low VOC Volatile Organic Compounds:
 - but not loads of other chemicals to achieve it
- No hazardous materials in application and use
- No hazardous waste
- Low allergy (ignored by BRE GG)
- Low to Zero toxicity
- Good IAQ Indoor air quality
 - (ignored by BRE GG)

A quick history lesson:

How we got here

For **ASBP** event

ASBP

- 2008 a group that eventually became **ASBP**
- Reacted to the BRE Green Guide to Specification
- A technical barriers to the growth of low impact, low carbon, bio-based materials in UK market.
- BREEAM and Code for Sustainable Homes forced designers to engage with BRE GGtS
- It excluded green and only compared violet materials and violet methods of construction
- Inadvertently cancelled Code for Sustainable Homes, helping developer's BAU
- Reduced the influence of, but not cancelled, Green Guide to Specification



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BRE GGtS

- **Calculated impacts of materials at average industry sector level**
 - **Violet Manufacturers could hide behind 'Generic materials' evaluation**
 - **No incentive to improve**
- **Evaluated elemental assemblies not components and not products**
 - **Ignored Accessories (metal and plastic)**
 - **Accessories can be >20% of an element's impacts**
- **Designers prevented from doing their job robustly**
- **Dumbed down ABC system should have read DEF**
 - **ABC were not invited to the playing field**
- **Despite 1200 assemblies GMV found no matches**
 - **400 other bespoke assemblies were added from projects**
 - **Still did not meet our needs**

17/09/22

“How Green is Green”

October 2009

- BRE’s event aimed at manufacturers and suppliers
- BRE extolled the merits of:
 - BRE’s Green Book Live: mostly violet bitumen or PVC backed carpets
 - BRE’s Environmental Profiles (Pre EN 15804 LCA Products)
 - BRE Green Guide to Specification (Generic materials, elemental assemblies)
 - BRE Impact software (UK Gov. funded D&DT)
- LCA only looks at the negative impacts
 - ignores the positive attributes of materials and products in their applications.
- Audience of ‘Solution Providers’
 - Look at relevant legislation and developed ‘state of the art’ solutions.
 - But Under BREEAM and Code for Sustainable Homes your products did not get a look in



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BRE Green V GreenSpec Green

- BrianSpecMan and GreenSpec argued for positive attributes to be considered by BRE
- Meetings were held with Jane Anderson et al
- Memorandum of Understanding was being prepared
- Jane left BRE, nobody picked up the MoU batten
- At an ASBP event Jane (no longer at BRE) was questioned about the weaknesses of BRE tools
- Jane agreed with the criticisms without challenge

LCA Stakeholders fight LCA principles

- Violet manufacturers associations/federations did not want their violet materials to look violet
- Aim:
 - Do not want individual materials or product be compared
 - Make EPD publishing not-mandatory
 - Comparison must be at 'building level' not 'component level'
 - Aggregated scores look less of a problem for violet materials
- Evaluate over a longer period:
 - Normal Life = 50/60 years. LCA stretched it to 100 years
 - Violet materials will look grey
 - Green materials will look grey

CAP'EM Cycle assessment Procedure for Eco Materials

- Created an LCA tool to compare materials and products
- Screening before LCA:
 - Application appropriate, competent, effective, suitable for self-build?
- Green materials comparable with violet ones at material level
- Green products comparable with violet ones at product level
 - An incentive to improve (Unlike BRE GGtS)
- Comparison at elemental performances: U values, etc.
- Compared and evaluated at:
 - component, element or building level
- A tool for specifiers, not favouring violet manufacturers/association's
- PEF stakeholders eventually pushed it out of financial viability and no longer exists

BrianSpecMan & GBE

- **Low Cost based on Violet cost plans was the only issues for QS:**
 - look at where that ended up:
 - Bankrupt industry, > 3 month payment delays, suicide epidemic
 - now add carbon: That won't go very well
- **Upfront costs is not the only issue for clients/investors**
- **LCA is not the only issue but we can address that too**
 - GBE Compare and GBE Screening system help to choose without LCA
 - Clings onto the detail, enables filtering by choices for site, client, designer
 - Behind it are 450 product property characteristics
 - 1200 cell data collection to analyses:
 - company, material, product, systems and application
- **Generates 25 output reports**
 - Including: Robust Specifications for build and FM
- **Needed a Design & Decision tool to engage this information**

Beyond BIM Paul Fletcher 2012

- We now have information technologies and a global data infrastructure that will accelerate us towards BIM *evolution*
- allowing us to remake the industry in novel, but desperately needed, ways;
- transforming an adversarial self-serving Construction Industry into a low cost, low carbon Built Environment industry that sustainably serves society.

So what is needed of a Design & Decision Tool?

- Designers do bespoke much of the time
 - Unlimited choice: emphasis on green with violet benchmark (unlike BRE violet only)
 - Promote low carbon alternatives over BAU
 - D&DT must be precise about materials and products,
 - Choose them and cells populated automatically
 - D&DT must be comprehensive about materials and products, accessories and systems
 - U Value envelop, structure, substructure, interior fit out, services, landscape, infrastructure (not all need to be engaged)
 - D&DT need to be able to do bespoke assemblies
 - Some designers need some help in doing that
 - Post-Grenfell golden-thread essential part of D&DT
 - Only offer competent materials in every location (elements and components in right order)
 - Option-eering is essential
 - Once building described: any change will automatically recalculate everywhere
 - Readymade re-tested assemblies would be useful (post Grenfell)
 - Regulations & Design Stds. change, D&DT need to keep up, option-eering between them useful
 - Essential data for calculations, other evaluations and reports
- QS's do bad cost planning, take time, cost money
 - Bill of quantities for cost collating or tender is essential, real value engineering not cost cutting
- Designers hate specification writing
 - D&DT could generate a robust specification
 - Robust FM Specifications too



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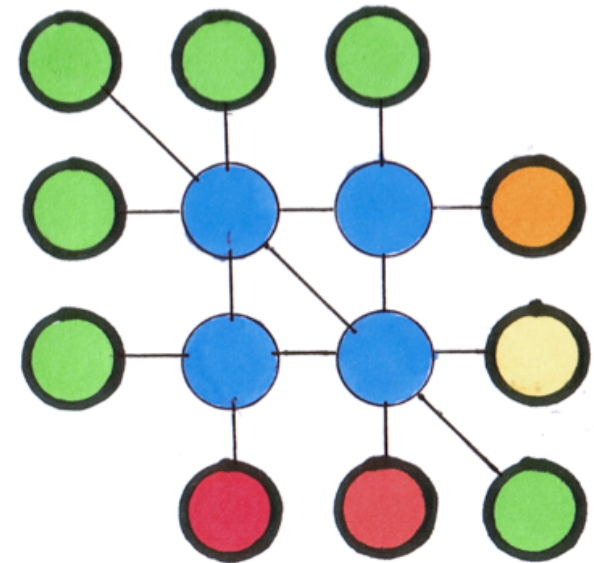
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GBC

Green Building Calculator



Manufacturer Remanufacturers	Importers Agents Distributors			Suppliers Builders Merchants			Installers Applicators	
Components: Products Data Sheet Products Accessories Windows, Glazing Accredited Elements & Systems	Primary Function	Building Application	Product Performances	Costs: Products	Costs: Accessories	Costs: Labour	Energy EE EC SC BC Carbon	LCA EPD A-D
Drop Down Lists: Materials Products	Look Up Tables: Product Data Sheet			Schedule of Accommodation: Quantities > Sizes > Areas > Volumes Protrusions Internal, External & Soil Temperature Hours of use			Form factor > Target U values	
Insulation k values Decrement values	Material k values Conductivities			Option Switches ++			Roof Geometry Protrusion Geometry Multiple Room Sizes Room by Room heat losses Multiple Glazing sub-element sizes	
Targets: U values Regulations v Design Standards Target Airtightness Target Glazing % EE EC SC BC Glazing orientation	Surface & Cavity Resistivity						Sub contractor Quotes	
Building Elements Yes/No	Building Elements Detail dimensions			BillofMat BofProd BofAcce BofQuan BofLab BofCost			Elemental Cost Plan	
Element Assembly: Components Exists or New Gen Mat or Product k, U or R value check & warn	Thermal Bridge Break	Condensation	Decrement Factor & Delay	BillofMat BofProd BofAcce BofQuan BofLab BofCost			Elemental Cost Plan	
Non Envelope EA Furniture Interiors Trades, MEP Landscape User Bespoke EA Ready-made EA Infrastructure MEP	GBC Users: Designer Engineer Specifiers FM PM CAD operators CP, QS & VE CDP & EPC Contractors			BillofMat BofProd BofAcce BofQuan BofLab BofCost			Elemental Cost Plan	
Energy EE EC SC BC Carbon	Energy EE EC SC BC Carbon			Energy EE EC SC BC Carbon			Energy EE EC SC BC Carbon	
Summary Sheet: Elements & Building U values In use Energy & %s Fuel Choice + Fuel Carbon factors = In-use Carbon	Summary Sheet: Elements & Building Embodied Energy Embodied Carbon Sequestered & Biogenic Carbon Life Cycle Assessm't			Summary Sheet: Elements & Building Cost £/m2 PaybackCarbonback In-use Energy + Fuel Costs = In-use Costs			With instantaneous results for any change in spec. Potential to do well-informed Value Engineering not dumb Cost Cutting	

Product Information Providers

Product Data Collection

Excel mechanisms

Data Sources

Data inputs

Generic Materials Datasets

Choosing targets & Data sources

Option Switches for more detail

Choosing

Price Information

Chosen Elements

Choosing Components

Choosing Materials or Products

Automatic Number Crunching

Checking Targets Met or warnings

GBC Users

Dashboard

Summary Sheets

Purpose of Green Building Calculator

Green Building Calculator V 2

<https://GreenBuildingCalculator.uk> V1 so far



Product Information Providers

**Product Data Collection
Elemental & Sub-elemental
Assemblies**

Specifications

Prices

Scope of Work

Other Disciplines

Choosing targets & Data sources

Impacts

LCA & design Life

Interiors

Waste

Plastics

Circular Economy

Self Build

Biodiversity

Preliminaries

MEP Services

Regional International Variations

Bespoke Modules

Local Procurement	Products/Materials: Factory gate to site	Products/Materials: Transport miles	Transport Emissions LCA
Products Data Sheet	Building Section Coding	Appropriate and Competent Application	Elemental Assembly Code Numbers
Readymade Competent Elemental Assemblies	Bespoke Elemental Assemblies	Manufacturers Accredited Systems	Secondary Element Calculator
Specification Generator	FM Specification Generator	GBP/B Green Building Price Book	Structures Calculator
Non-Domestic Retrofit	Domestic new Build	Non-Domestic New Build	Landscape Elements
ICE V3 Inventory of Energy & Carbon	LCA Database Datasets	Climate Appropriateness	Civils & Infrastructure
Embodied/Sequestered Energy & Carbon	LCA Calculator	Thermal Mass Calculator	Furniture Impact Calculator
EE EC SC Calculator	Design Life & Durability	Airtightness & Energy Loss	Furniture Dataset
Sequestered Carbon calculator	Waste Cost Calculator	Indoor Air quality Calculator	Interior Finishes Dataset
Carbon consumed or avoided	Plastics Diverted and recycled	Plastic free options database	Interior Finishes Dataset
EE & EC in Waste EE & EC in Reclaim	Reclaim Reuse Resource Audits	Circular Economy Resource Efficiency	Ska Fit-out Refit Interface
Self Build Construction Primer	Links to Green Building Encyclopaedia	Bird Box Bat Roost Integration Check	Biodiversity Net gain
Whole project Budget calculator	Overheads Profits Fees Preliminaries	Construction on-site Emissions	End of Life Solutions
Renewable Energy Calculator	MEP Services Calculator	Lighting Calculator	Light Nutrition Calculator
International Regional versions	Imperial Metric U v R values	Currency	Local Product Datasets

Green Building Calculator V3-29

<https://GreenBuildingCalculator.uk> V1 so far

36



The challenge for all D&DT

- Datasets exist that address singular issues
 - Calculators can do okay with them
- D&DT need datasets addressing many issues
- Collating and merging datasets is not entirely satisfactory
- We need to start again, **post-Grenfell**
- We have ambitions to address this:



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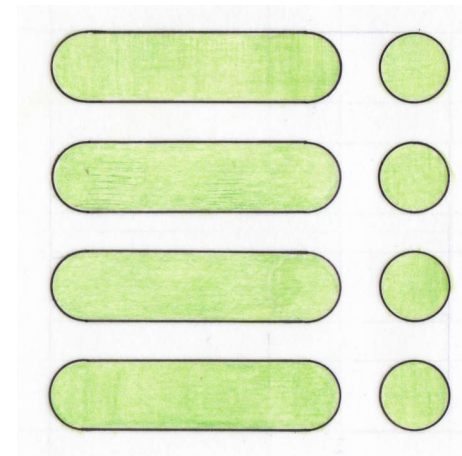
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GBP B

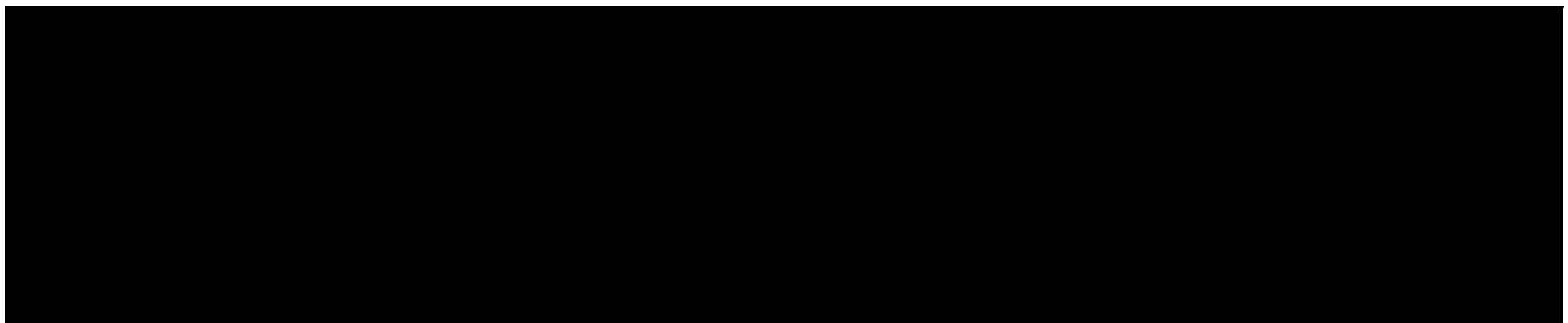
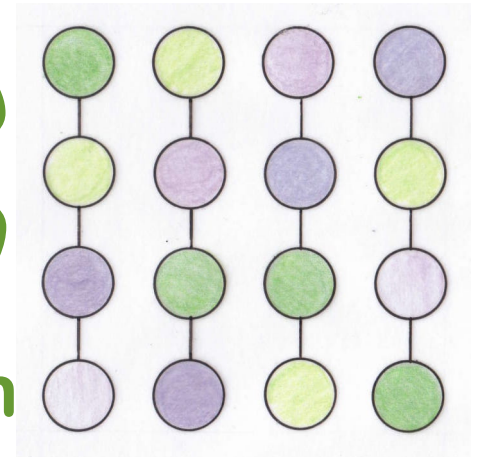
Green Building Price Book





GBPDC

Green Building Product Data Collection





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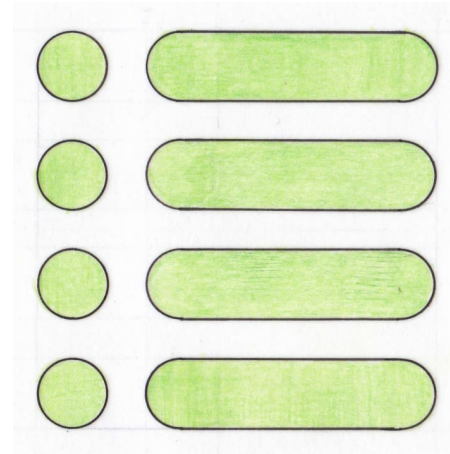
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GBS

Green Building Specification



GBE 
<https://GreenBuildingEncyclopaedia.uk>

GBC 
Green Building Calculator
<https://GreenBuildingCalculator.uk>

 **GBE**
Learning
<https://GBELearning.com>

GBREAIzi

Green Building Readymade Elemental Assemblies 

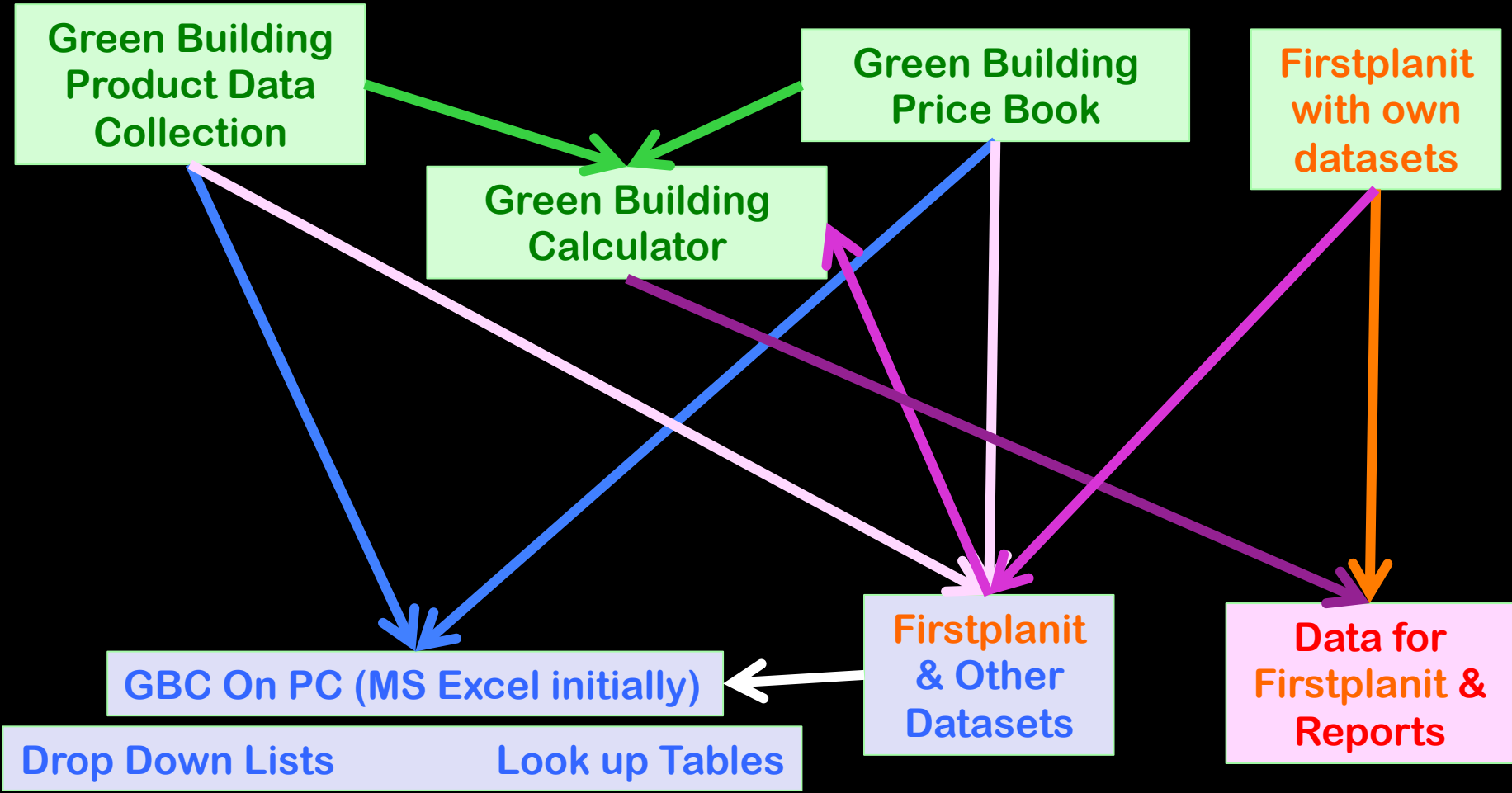
GBC V2-GBC V36 Development

Firstplanit Prioritised

- **GBC V1**
 - In use energy, carbon and costs
 - Any Building use, new build
 - **GBC V2**
 - Retrofit, Terraces, Community level, MEP Services,
 - Non-Domestic, Retrofit and Newbuild more refinement
 - Embodied Energy, Carbon and Sequestered carbon; Non-external envelope elements
 - **GBC V3**
 - GBPB Green Building Price Book
 - GBPDC Green Building Product Data Collection
 - GBRMA Green Building Ready Made Assemblies
 - Building Section Coding, Competent Application
 - 892 ready made elements, Bespoke Assemblies, Accessories, Specification Generator
 - Manufacturers Accredited Assemblies
 - CAD BIM App
 - Screening Priorities
 - **GBC V4 LCA EPD EBD Calculator**
 - Local Procurement, Transport to site,
 - Distance search facility
 - On Site Construction Emissions
 - **GBC V5 Air tightness & Energy Loss**
 - **GBC V6 Decrement Delay, Form Factor refinements:**
 - **GBC V7 Condensation Check, Thermal Bridge,**
 - **GBC V8 Secondary Element Calculator, Thermal mass calculator**
 - **GBC V9 Landscape**
 - **GBC V10 Civils and Infrastructure**
 - **GBC V11 Waste Calculator using WasteCost@Lite**
 - **GBC V12 Plastic free v Recycled Plastic**
 - **GBC V13 Interiors: Scope increased, Ska fit-out. refit**
 - **GBC V14 Circular economy: Reclaim Reuse**
 - **GBC V15 Self-build Interface**
 - **GBC V17 Whole Project Budget Calculations, full Fee bid calculation based on cost plan**
 - **GBC V18 EU and International versions**
 - **GBC V19 Services Design Module: Occupancy level, Energy Sources and uses,**
 - **GBC V20 Lighting Design Module: Health & Wellbeing, Light Nutrition**
 - **GBC V21 Biodiversity Inclusion, Biodiversity Net Gain**
 - **GBC V22 Local Climate Appropriate construction and materials**
 - **GBC V23 Vernacular, local: materials, trades, economy**
 - **GBC V25 O&MM Operation & Maintenance Manuals**
 - **GBC V26 FM Specification**
 - **GBC V29 Design Life, Durability and Competent Products**
 - **GBC V31 Value Engineering Opportunities: in not out**
 - **GBC V32 Healthy Building**
 - **GBC V34 Indoor Air Quality**
 - **GBC V35 Natural Lighting Levels**
 - **GBC V36 Demolition Embodied carbon in waste**
- B Bespoke**
- **GBC B1 Retrofit Window & Insulation Calculator**
 - **GBC B2 Responsible retrofit Carbon Calculator**
 - **GBC B3 Window Calculator**
 - **GBC B4 Screeds Calculator**
 - **GBC B5 NRM4 QS interface**
 - **GBC B6 Interreg Energy Pathfinder with HES**

GBC (On-line ASAP)

(On-line already)





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 - Technician and Architect by Training
 - 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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