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# GBE CPD Product Evaluation

LCA EPD, how to use them & Alternatives  
GBE CPD for HTA 09/10/20

This Presentation on GBE:

- Find this file on GBE website at:
- <https://GreenBuildingEcvclopaedia.uk/?P=38719>
- Go there for:
  - the latest update
  - versions presented to different audiences
  - the whole presentation, all of the hidden slides
  - other file formats:
    - Handout, Show, PDF, (PPTX in the shop)
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# Are you Green or Violet?



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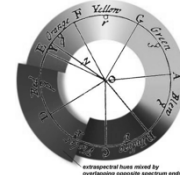
## Definitions: Green

- Otherwise: Environmental
- For most in Business: Sustainable
  - So they can compromise for profits
- For many they revert to energy efficiency
  - Others think its renewable energy and eco-bling
- many have their own definition
- many are unsure of its meaning
  - Environmental
  - Economic
  - Socially responsible
  - Natural Resources
  - Responsible Sourcing
  - Political: Green Party

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## Sustainable Eco Green



Violet  
Violent  
Violate

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## 'Violet'

- 'Violet' chosen as it is at the opposite end of the spectrum from 'Green'
- Not far from violent and violate
- Others prefer Green-Brown, Green-Red, Green-Black
- Not Purple

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## 'Violet' Materials

- 'Violet' meaning:
- any material, construction product, construction method or building
- unfriendly to humans or the environment or
- whose performance diminishes in use or over time

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## 'Violet' Industry

- Clients/employers, developers, designers, Quantity Surveyors, contractors, manufacturers, applicators/installers
- anyone that does not care about the environment
- or anyone that does not act on its behalf
- Virtually the whole industry
- But its changing
- Too slowly

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# Are you Green or Violet?

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## I am a shrinking Violet

a little green  
round the edges but  
less violet everyday

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## Definitions

- **Green**
- **Greenies: the people that do Green**
- Light or Dark Green or Greenies
- Greenie Points: Brownie Points + Green (all positive)
- **Violet: Opposite of Green**
- **Violets: the people that don't do Green**
- Light or Dark Violet or Violets
- cover-ups telling porkies
- **Greenwash: telling green porkies**

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## Green:

- But Corporate **Greenwash** prevails
- Large PV arrays are saying we spend a lot on gestures not a lot on actions
- Check what else they are doing

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## Violet Materials

- Non-renewable, finite
  - Fossil derivatives, fuel, Petrochemical, chemicals, synthetics:
    - Paints
    - Plastics
- Unsustainable
  - Carbon based: e.g. Fuel
  - Releases Carbon in manufacture or use: e.g. Cement
- High embodied energy: e.g.
  - Metals: Aluminium
  - Plastics
  - Cement
- Hazardous materials and hazardous waste:
  - Wet, sticky, gooey or flows: resins, paints, sealants, chemicals,
  - Fine particulate: e.g. cement, asbestos, ceramic fibre
  - Corrosive, acidic, alkali,
- Ozone depleting & Global Warming
  - Foamed plastics HFCs HFAs

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## Green: Environmentally Sustainable 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 not chipboard**
- **Carbon already out there:**
  - reclaimed bricks, slates, stone
- **Carbon sequestration: Carbon negative:**
  - Plant and timber based
- **Low embodied energy: Plant based**
- **Local: low transport miles: low transport emissions**

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## Social Sustainable Materials

- Socially responsible: Fairtrade equivalents
- Pay the right price v plunder the world
- Local: materials, crafts, companies, tradesmen
- v
- Cheap labour abroad where nobody sees or cares

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## Healthy Materials

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

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## Economic Sustainable Materials

- Long term economic to maintain
- Long term economic to run
- Reclaimable, reusable and resalable
- v
- Short term cheap to build
- Expensive to run
- Sometimes risky in use

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## General claims made in Greenwash

• <b>Sustainable</b>	• CFC free
• <b>Environment Friendly</b>	• HCFC free
• <b>Eco-friendly</b>	• ZODP
• <b>Recycleable</b>	• Water based
• <b>Recycled</b>	• Solvent free
• <b>Managed Forest</b>	• Low VOC
	• Energy saving

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# How materials were chosen

Alternative to LCA & EPD  
GBE CPD for HTA 09/10/20

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# How materials were chosen

- Historically: Local (site) materials, hand made, self build, self maintain, local labour,
- Traditional:
  - Tried and tested, failed and forgotten, succeeds and adopted, long life, durable,
  - Earth, Clay, Brick, Stone, slate, Lime,
  - Timber and straw
  - sometimes combustible until Fire of London,
- Pre 1919: solid, brick or stone, lime mortar and plaster, moisture permeable, flexible, air leaky to feed open fires
- Post 1919:
  - Ventilated cavity construction, Moisture resistant, Brick or slate DPC,
  - Increasing cement content, stronger rigid construction, cavity uninsulated

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# How materials were chosen

- Date?: Merchantable Quality, Fit for Purpose
- 1956: Or Similar case law (weak words risk building competency)
- 1957: Treaty of Rome (not much influence until 1992 onwards)
- 1960s: Asbestos health risk
- 1970s: Oil Crisis added insulation to buildings (1980s in London)
- Price & thinness driven: mass production efficiency, chemistry intense, environmentally naive, combustible
- 1980's Ozone Holes identified, ODP no longer permitted
  - (but no outright ban)
- Following the Rules Competently:
  - BRAD, BS & CP, BSI Kitemarked & BRE Guidance and PI,
- Durability: Component Life Manuals,
- Breaking the Rules Competently:
  - BBA Agrément Certified (Price & Innovation driven)

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# How materials were chosen

- Client Brief, Developer Profits, User Needs
  - v Architect's aspiration
- Design & Build (reality B&D: Build then re-design re-specify)
  - Contractor specifiers, priority: cheap, result: Performance Gap)
- Procurement Methods:
  - Faster faster faster
  - GC > D&B > MC, CM, DMC, BOOT, GMP,
  - Chemistry intense solution to truncate conditioning and curing times
  - Collateral Warranties
  - PP1 PPP: BOOT 25 years
    - 25 year guarantees (warranty with premiums to pay)
- Post 1992: BRAD, Reg. 7, CPD/CPR, CEN, EuroCodes, Agrément, ETA European Technical Assessment, CE mark, or equivalent, EU Procurement Rules, 2<sup>nd</sup> Edition

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# How materials are chosen

- Recently (consciously, otherwise or not at all)
  - Local Climate >
  - Appropriate Elemental Assembly >
  - Functional Component >
  - Application Position >
  - Vapour open/closed > (Historic fabric is a spectrum)
  - Material Screening >
  - Product Selection >
  - Cost consideration
- Thermal mass,
  - de-materialisation, No Suspended ceilings
  - fair faced concrete soffits, acoustic issues?
  - resin bound, sealed, finished
  - Metal soffits do not work for thermal mass

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# How materials are chosen?

- Health and Safety:
  - mostly ignored, until REACH which has teeth, but nobody is biting
  - CHIP, CDM, COSHH, RoHS, REACH, SVHC, SIN Lists, Red Lists
  - Green Lists & Guides
- BRE Green
  - BREEM > Mat 1 > BRE GGIS or EPD, EP, GreenBookLive,
  - > then the 'Recently' above?
- Health and Wellness:
  - Sick-building syndrome, IAQ, Off-gassing, Chemistry content, VOCs,
  - materials choices: Well wash?
  - Biophilia, VOC Test evidence, EPD, Sika Good Practice measures
- Post Grenfell: Non-combustible & Insurers discretion
- Housing Crisis:
  - MMC, OSC, Lightweight, thinness, overheating, Decrement Delay, Thermal mass
- Climate Emergency Behaviour Change campaigns
  - Carbon Dioxide, Embodied Carbon, In use carbon, data from LCA & EPD
  - Sequestered Carbon, Bio-based materials and constructions
  - Earth based construction (Interreg: CobBauge; Tom Woolley Books

09/10/20 Post 2020: Brexit (no more EU rules!) Covid (Anti-bacterial finishes?) 24

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# We need step-changes

- We need rapid changes in behaviour
- We need good easy to use guidance
- We need to have confidence in it
  - to be able to trust it
- It needs to facilitate change
  - And not to discourage
- It needs to look at materials first
  - and then look at them in the context of construction
  - Competent construction assemblies
  - that we may be unfamiliar with
  - To give us confidence to go there

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# GBE Position

- Technician & Architect by training & Specifier:
  - 45 years experience
- Serving Architects & Specifiers
- Look at environmental issues as if Architects & Specifiers serving clients
- 20 years of dedicated environmental specialism
- Aware of GreenWash, WellWash and ask more detailed questions
- LCA specialist in our team

09/10/20 CAPEM LCA & EPD Interreg Funded project under our belt

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# Architect's Basic needs:

- Basic Product Information
  - Intended purpose, Advantages/Disadvantages, properties
- Right or wrong for project to add to shortlist
- Avoidance of Liability
  - Competent construction assemblies
- All the parts
  - In the right order
- Complying with:
  - Building & Environmental Regulations
  - Code of Practice
  - Manufacturer's recommendations and requirements
  - BBA Certificate requirements
  - Industry Best Practice

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**Architect's basic wants**

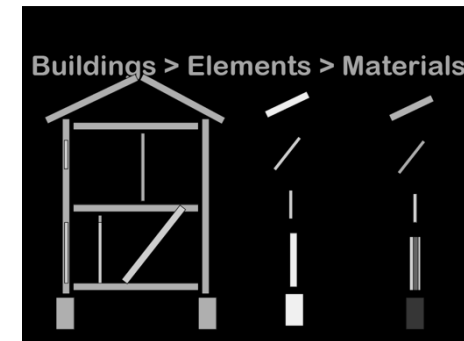
- Application Specification
  - For contract documents
- CAD files of assemblies or products
- Eco-System/Label with quick overview
- Positive attributes taken into account
- Not just least-negative impacts
- Results compare well with gut instinct
- Confidence in the system/label
- Eco scores for materials/products
  - Enable unique elemental assembly and building scores

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**If interested in more:**

- Access to the data source
- Comprehensive declaration of content of substances
  - (not like MSDS)
- LCA Life Cycle Assessment
  - (confidential)
- EPD Environmental Product Declaration
  - Public Declaration
  - (until associations prevent it)
- Ability to interpolate between results
  - Unlike BRE Green Guide to Specification

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**Deconstruction & Reconstruction**

- GBE consider the contribution of each individual part
- Just like any specifier does
- GBE do not ignore any part of the whole
- GBE look at all issues and tries to find greener products for every part
- If you can make an environmental choice in every part, why wouldn't you?
- GBE then looks at them in elemental assemblies & then in buildings
- GBE aims to promote competent assemblies and avoid compromising materials within their assembly

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**Traffic Light Systems**

- When you put all the issues on a traffic light system it's actually very useful in order to make a decision
  - BDP have done something similar for interior design products 2006
  - Ska (Elina Grigoriou) uses a screening system for office fit-outs which include: does it have an EPD?
  - OneEcoHome (2 ladies) website had one but the site and shop is closed 2008, until better times perhaps.
  - Betternest (Edith Colomba) were developing a sustainability easy screening system for refurbishment, finding ways to make it lightweight to use.

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**Top Trumps**

- A card game where the players choose between characteristics hoping to find one that is higher scoring than their opponent
- The same game that manufacturers play in advertising
  - Promoting only one characteristic over all others (thinness of insulation, ignoring fire, micro-plastics)
- LCA & low price is also used by D&B Contractors to choose products,
  - with little consideration for other characteristics
  - BRE Green Guide C > A rated PVC Windows
  - High recycling in PVC but very little into windows

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**Level Playing Field?**

- LCA provides an opportunity for comparison of all materials on an equal basis
- LCA and EPD are done for any ingredient, material, product
- Creating a level playing field
- But only if all materials are processed and included
- And only if all are compared on an equal basis
- Its unfair to only have one team on the pitch
- If one team is missing the other team look good on their own

09/10/20 BRE Green Guide to Violet Specification = one team 38

**GBE Screening**

▶ Jump to LCA EDP

▶ Jump to GBC Calculator

**Alternative to LCA & EPD**

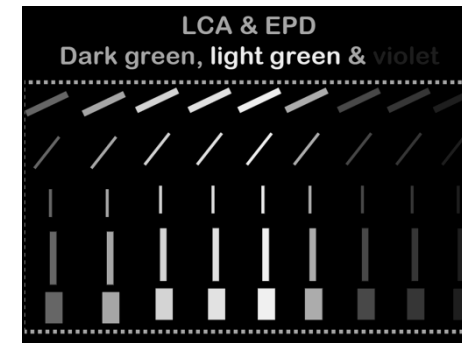
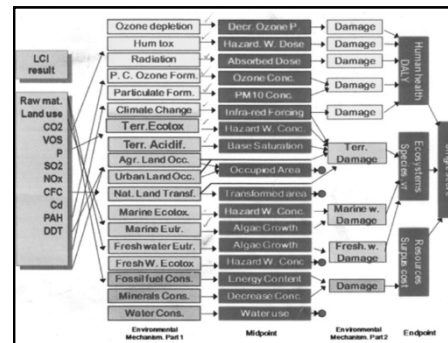
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## LCA & EPD

Jump to Screening   Jump to GBC Calculator

Alternative to LCA & EPD  
GBE CPD for HTA 09/10/20



### LCA Life Cycle Assessment

- Having gone through a screening process you end up with a shortlist
- Then you can compare the results of LCA of your choice(s) to pick the one from a shortlist
- For this reason GBE and 10 organisations in EU (NWE) developed a simplified LCA to support our offering.
- CAP'EM

09/10/20 Each Project Partner offers LCA 68

### LCA Strength/Weaknesses

- LCAs are good in concept
  - Good solid number crunching
  - but done wrong (with bias or inconsistency) OR
  - buried under weighting systems OR
  - missing the best (Greenest) products
- = no improvements
- = business as usual,
- and a barrier to trade
  - for those not in the club
- More on this later.....

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### LCA limitations

- LCA studies and scores negative impacts of manufacture, use and disposal of materials and products
- LCA does not look at positives impacts of manufacture use and reuse of materials since there are very few in normal build

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### LCA & Carbon Sequestration

- LCA does not normally look at carbon sequestration during the growing stage
- LCA of Bio-based products should have the benefit of Carbon Sequestration in the assessments
- PAS 2050 has guidance on its inclusion
- LCA with carbon sequestration will give well rounded results

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### LCA Green or Violet?

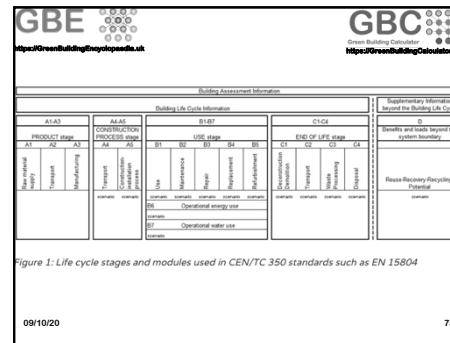
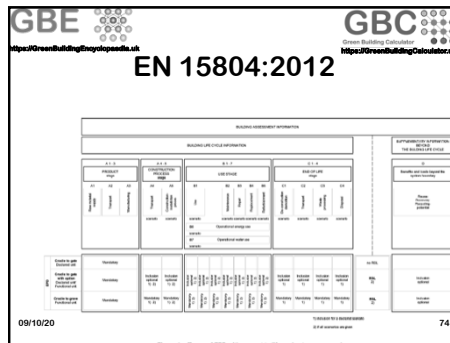
- LCA can find the greenest of the green materials
- LCA can help to find the least violet
- If Green materials are missing
  - LCA finds the least violet of the violets
  - Users might assume they are greenest
  - Especially if the Cover says so
- If the Greens are present?
- LCA will sort the greens from the violet

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### Beyond LCA

- Impacts also include the Building process itself:
  - construction, maintenance, refurbishment, etc.
- This is beginning to be considered by LCA practitioners
- EN 15804 includes many life stages

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### Less bad is not good enough

- Design is a constructive process
- Designers need info on good materials
- Designers are looking for positive outcomes
- They can and do engage in positive environmental design
- They want credits for positive design
- Not just credits for less bad materials
- LCA alone cannot deliver this

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### Using LCA alone

- will result in decisions akin to laying a crazy paving play field because it was the cheapest one in a catalogue
- It's obviously the wrong catalogue
- our children want on play on a lawn.

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### There are positive materials

- But under LCA as they are today
- these positive materials often look bad
  - or less bad than other materials
- E.g. Taking Carbon sequestration into account
- Materials can be:
  - Low Carbon
  - Carbon neutral
  - Carbon negative

But LCA will not normally show this

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### EPD Environmental Product Declaration

- An EPD is a statement of facts
  - About the product or material,
  - about its manufacturing processes
  - other issues during the period of the assessment,
- the company pays for the assessment to be carried out by an LCA/EPD specialist.
- All EPD methodology should ideally be consistent and comparable but often are not,
- There are many variables including:
  - Product Category Rules, Declared Unit, System Boundaries, etc.

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### EPD Environmental Product Declaration

- EPD is the outcome of an LCA
- EPD is a declaration of negative environmental impacts in the creation of a product or a material;
- EPD is the summing up of the negative impacts of all the processes from extraction to packaging and is often but not always based on Cradle to Gate.
- Factory Gate: Excluding Transport emissions, construction, use and disposal emissions

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### Limitations of an EPD

- EPD is not:
  - a badge of honour,
  - a green label,
  - certificate of compliance
  - an endorsement
- Having an EPD should not be a criteria for acceptance,
  - as in Ska
  - only a means for comparison,
  - however the content may not be comparable
- And violet manufactures associations do not want EPD to be used for comparison

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### LCA & EPD Stakeholders

- Include Manufacturer's Associations/Federations
- many are happy to continue with BAU
- They are considered or are powerful in steering committees
- They do not want EPD to be Declared or Published
- They do not want LCA EPD to be used for comparison
- They have ensured any materials is considered at building level
- not at component so useless for specifiers
- nor element level (as BRE's GGTs)

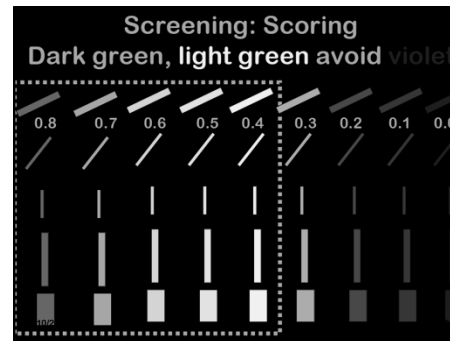
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## PEF Product Environmental Footprinting v LCA EPD

- EC European Commission started the PEF process
- LCA had been railroaded by stakeholders
- Wanted product by product comparison to be possible
- PEF stakeholders railroaded PEF towards LCA methods
- To avoid 2 parallel systems costing them more

09/10/20 Making PEF as unhelpful as LCA EPD 83



## EPD & Marginal Analysis

- An EPC might raise awareness
  - manufacturer may use its results to help them identify problem ingredients
  - find substitution materials to improve the product
- Marginal Analysis shows which ingredient have the greatest share of the impacts
- Might include packaging too
- Replacing that ingredient can significantly the Impacts

09/10/20 The improved product will need a new EPD. 85

## Moving Targets

- LCAs by different organisation, or with differing Product Category Rules, System Boundaries, Cradle to \*, result in incomparable LCA results.
- Compliance with ISO 14025 does not reduce the variability.
- CEN TC 350 aimed to standardise LCA
  - Relate to CE marking & Essential Requirements
- EU Consumer Council challenged TC 350 not to favour manufacturers and to engage with human and societal issues or they would tell consumers to ignore LCA
  - CEN TC 350 was being revised
  - CEN TC 351 is engaging with issues of health
  - CEN TC 350 should embrace CEN TC 351 by now
- All LCA will have to monitor CEN TCs and update at each revision
- Manufactures LCAs need updating at great expense
- Consumers than have to check the date of the LCA and if they include all the latest revisions

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## EPDs could be brilliant

- they could put all the info you want to compare in one place
- without any weightings, etc.
- but due to their infancy there was a lack of prescribed method of assessment and presentation

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## EN 15804

- EN 15804:2012 provided a level playing field
  - And a table of outputs that many are now familiar with
- It has voluntary and mandatory requirements
- Provided a level of consistency and inconsistency
  - Some National Schemes also ask for additional information
  - Inconsistency creeps back in.
- Latest thinking is aligning with PEF
  - Including impacts for any product (outside of Construction)
  - Many impact categories so the table becomes unwieldy
  - Many impact categories that are not regarded as robust enough
    - Some are saying they will add disclaimers in their EPDs
- Others say concentrate on the GWP, carbon and transport impacts
- Move towards a single summary evaluation
  - Like BRE Green Guide to Specification A to G ratings
  - Dumbing down in my view
  - Convenient for Architects and Brand BREEAM Assessments

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## How does Development Control use LCA & EPD?

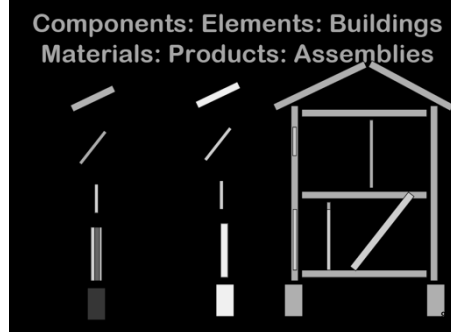
- In Belgium 2012 future plans
- Developments will be 'fined' a fee for development according to the LCA of the Buildings
- If the Building has high impact the fine matches with a high price
- If Greener the fine is smaller
- If substitution happened the fine will rise or fall according to the LCA of the replacements compared to the proposed

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## How does Development Control use LCA & EPD?

- In UK SPAB STBA Conference 2020
- Discussed a 'Tax' for development to reflect the impact of what is built
- However we do not like 'taxes' so come up with a better name?
- Developments will be 'fined' a fee for development according to the LCA of the Buildings
- If the Building has high impact the fine matches with a high price
- If Greener the fine is smaller
- If substitution happened the fine will rise or fall according to the LCA of the replacements compared to the proposed

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**Elemental Assemblies**

- We need to consider how materials are promoted and used in any permutation:
  - Green materials in green assemblies
  - Green materials in violet assemblies
  - Violet materials in green assemblies
  - Violet materials in violet assemblies
- GBC is moving towards screening out the worst combinations to assist with the step changes needed to solve our current problems

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**In Use Carbon Reduction**

- GBC Green Building Calculator will have:
  - New Build & Refurbishment
  - Robust Detail assemblies
  - Building Regulations Acoustic construction
  - Passivhaus standard construction
  - Passivhaus greener construction
  - All to PH performance

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**Low & Negative Carbon Materials**

- GBC Green Building Calculator will have many:
  - Carbon negative & Low Carbon construction methods
  - Eco versions of Passivhaus
  - IMC Innovative Methods or Construction
  - MMC Modern methods of Construction
- GBC will continue to add to them

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**GBC Green Building Calculator**

- 892 Readymade Elemental Assemblies
  - will be added to choose from
- Each has a unique 5 cluster code made up of:
  - elemental code,
  - outer finish code,
  - core code,
  - inner finish code,
  - unique number if similar assemblies arise
- Performance code
  - 6<sup>th</sup> cluster code was planned as a performance code
  - But external envelope elements should all be Passivhaus or better

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**Green Building Calculator**

**Executive Summary**

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**V1.0.0. launched June 2020**

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**V1.0.0. launched June 2020**

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**V1.0.0. launched June 2020**

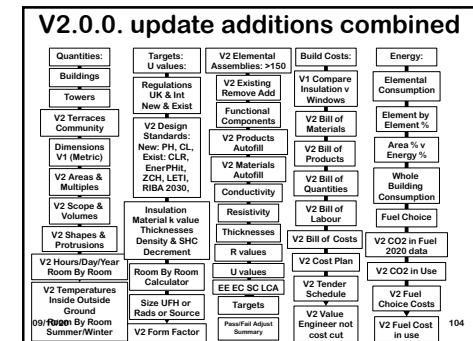
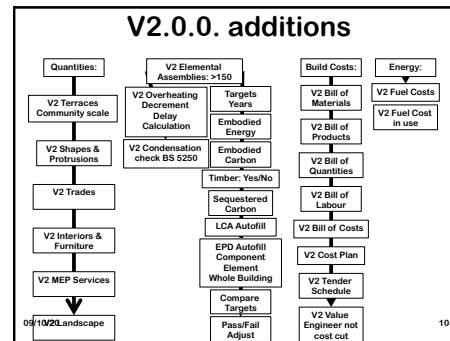
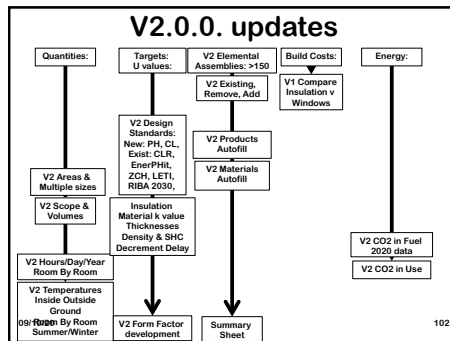
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**GBC Green Building Calculator**

- Scope: V1.0.0. Completion:
  - New Build, Domestic, Multi-storey, Multi-occupancy, Non-domestic (partial)
- Building Size:
  - Minimum: 100m<sup>2</sup> 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, EnerCEN, AECB, CL, or CLR or others
- Winter Thermal Insulation Material Choices
  - 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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**V1>V2 24 of 39 Elements  
U or R value  
12 secondary element U/R values  
Refurb Actions**

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**V1 Insulation and Windows Costs: Superseded by V2 BoM?**

- Costs of insulation and windows are added here
- to help persuade architects and clients to spend money
- on insulation and higher performance windows and glazing

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**V1 Elements: Bill of Materials Quantities Costs**

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

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**V2 Bill of Materials**

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**V2 Bill of Materials (BoM)**

- Being added:
  - Non-envelope items,
  - Services
- V? National Building Price book datasets?
  - But they are part of BAU
  - 'race to the bottom'

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**V20.0.0. Future Development**

- Green Building Price Book
  - Proposed 18 years ago
  - But proposal rejected by publishers
  - Discussions started
- Embedded in GBC V 20.0.0.
- Products and Materials sheets
  - Add costs
  - Add rates

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V2 EE EC SC

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V2 LCA EPD (Dev)

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V1 Products:

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

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V1 Properties of Products

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V2 > V3 Products

- Becomes a Look Up Table to populate 'Elements: Components'
- GBC to only permit them to be chosen as intended by manufacturer
- V1 Users can still overwrite – but consciously
- V3 GBC shall prevent it (Protect GBC)
- V20 Green Building Price Book

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V2 Element Summary Ext Env For U Value Calculations

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V2 Element Summary: Non-Ext Env for EE EC SC LCA

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V1 Awards/Shortlists

- 3 months after V1.0.0. launch
  - Green Apple 2020 Award Winner
    - Category and metal to be announced
  - Central England Prestige 2020-21 Winner
    - November announcement
  - Construction Computing 2020 Awards Shortlisted: (Announcement Nov/Dec 2020)
    - Innovation of the year 2020
    - One to watch Company 2020
- Submitted Applications:
  - CIBSE Building Performance Award 2021
  - PEA Awards 2020



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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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## Revisions

- First written 2006
- Updated to 2020
- GorV added ex 2003
- Added GBC 2020

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## © GBE & GBC 2006 - 2020

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