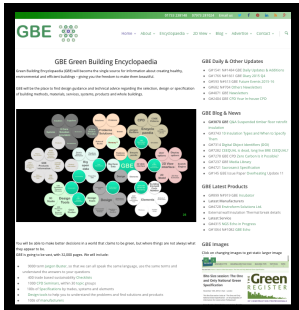

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Product Passports
Material Passports

ZWS & SEDA Circular Economy Event

24th October 2019

BrianSpecMan Murphy

This Presentation on GBE:

- Find this file on GBE website
- Event at:
- https://GreenBuildingEcyclopaedia.uk/?P=27448
- CPD file at:
- https://GreenBuildingEcyclopaedia.uk/?P=30129

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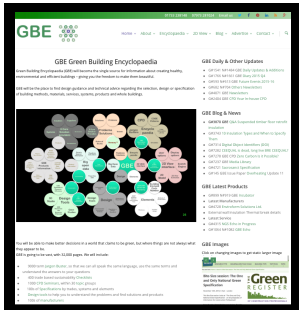
Current Doctrine

- ‘Profits Before People Before Planet’
- Fiduciary Rules Okay
  - *Obligation to make a Profit for Shareholders*
  - *At the expense of everything else?*
- ISO 26000 invented to curb excesses
  - *CSR Corporate Social Responsibility*
    - *Often Greenwash Plaster*
  - *Ethical Trading*
- Created as a guide
  - *Became a Benchmark*



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Sustainable

- Sustainable = inconsistent inadequate definitions
- Sustainable = Environmental eroded by profits

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GBE Alternative Definition: for Sustainability

- Healthy Environmental Resourceful Appropriate Competent Effective or Ethical Yardstick
- = HERACEY™

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Constructions Demolition Excavation CDE Waste Stats:

- Pre 2004 110 m tonnes/annum in UK
  - (400m tonnes/annum consumed)
  - 25% = ¼ wasted
- SWMP and SWMP Regs. 2004
  - at best 78m tonnes/annum
- After red tape deregulation of SWMP Regs.
  - Today: 120m tonnes/annum
- £150m/annum over-ordered, never needed

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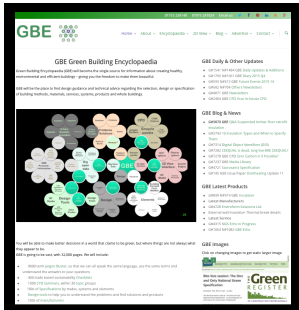

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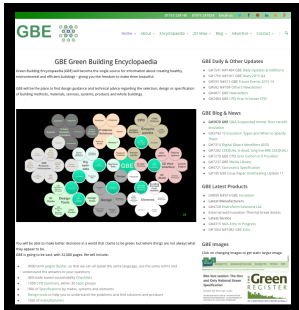
EU Initiative

- 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



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EU Funded projects

- Horizon 2020
  - BAMB Buildings as Materials Banks (recent) includes database of O products
- Interreg
  - MF&H Makers, O Fixers and Hackers (past)
  - FCRBE Facilitating O Circulation of Reclaimed Building Elements (current)
  - SB&WRC Sustainable Bio and O Waste Resource for Construction (just finished)

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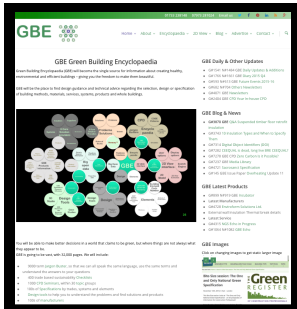
Global awareness has risen

- 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
  - SchoolStrike4Climate
    - Asked the Adults to join them
      - Declare Architects
      - Declare Construction
      - Declare Education
    - Architects CAN Carbon Action Network
      - Can’t, don't have the know-how
      - TGR facilitating CPD by PHT TRA BBA AECB ASBP CL CLR etc.



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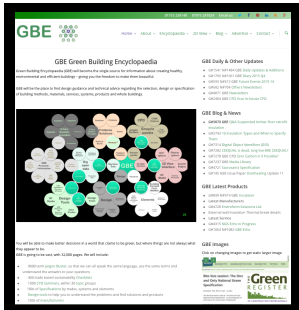
RIBA Plan of Work

- Circular diagram
  - O Circular information-only flow
- 0-7 = --- linear economy model
- 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
  - Nobody unites behind the science
- 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

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Product Passports? Materials Passports?

- Wrong name?
  - ‘Products’ in first life
- Materials Passport?
  - ‘Materials’ or ‘Resources’ in second life
- Unless EPR applies

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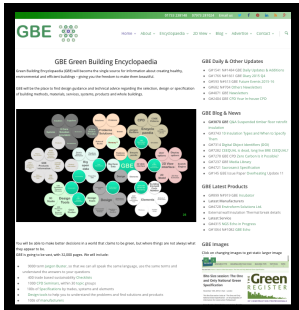
Extended Producer Responsibilities (EPR)

- 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
- Remanufactured by original manufacturer or a dedicated specialist
- Returned 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



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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
  - (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 upgraged, 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:

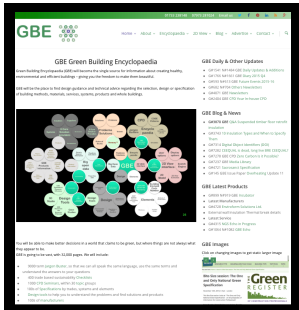
- Physical Properties
- Chemical Properties
- Biological properties
- Material Health
- Unique Products & System Permutation Identification
- Design and production
- Transportation and Logistics
- Construction: Identify materials and Product locations in buildings and in elements
- Use and Operate Phase maintenance information
- Disassembly and Reversibility
- Reuse and Recycling

GBE Product Data Collection

- 1250 data points
- say 600 collected for any manufacturer and product
- 35 Document outputs
- E.g. Specification, Method statement,
- Including PP or MP

PDT Templates v Flexibility

- Templates developed by BSRIA CIRIA CPA and Sector Stakeholders
- Stakeholders include Manufacturer Associations that want ‘dumb PDT’
- LCD Lowest Common Denominator
  - For level playing field
  - Least information necessary
- BIM PDT Product Data Templates
  - Do not make a Robust Specification
  - Not fit for purpose
  - Cells need to link to external data: e.g. Specification or LCA
- Manufacturers want to promote
  - Unique Selling Point (USP)
  - Or multi-functional properties
  - Multi-application materials
  - These help to make Robust Specifications and defend against substitution



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Provenance

- Comes from antiques world
  - Where from, who made it, when, whom owned it,
  - Applies to Architectural Salvage
- Audit trails back to source
  - Theft Alerts Helps avoid Theft or retrieve stolen goods
- Materials Stewardship for reclaim
  - FSC CoC, for sustainable new timber
  - EUTR, for legal new timber
- Chain of custody
  - Linear: from source to supplier/processor/site
  - Circular: from first life to next use
- Can mean a clean bill of health or warn of limitations
  - Avoiding Carbonated concrete or Alkali Aggregate Reaction "Concrete cancer" joining Recycled Concrete Aggregate

Blockchain technology

- (minus the BitCoins)
- Any individual or multiple transaction up/down the demand/supply chain
- Robust data that is not possible to alter
- Visible to all parties at any time
- All data in place permanently
- Can be added to as supply chain extends
- Audit trails without long searches first

Digital Object Identifiers (DOI)

- Ex Pharmaceuticals Sector
- Big Data, Open Data,
- Better Information Management (BIM)
- Product Data Templates (PDTs)
  - Product Data Sheets (PDS)
  - Individual cells cannot hold many data sets so each cell can become search engines to other sources
  - Or DOI link to correct information sources
- Act a bit like SEO 301 Redirects
- DOI Tracking and linking to on-line data:
  - That might move in a website to a new URL
  - But should remain current
- Audit trails to numerous end addresses
  - as stuff subdivides into variations of the original
  - as stuff divides and disperses to different end uses

Industry Sector Response to Material Passports

- Manufacturer Association (UK) Federations (EU)
- Looking after Business as Usual
  - Rejected PPs and MPs
  - 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

Design Profession Response to Material Passports

- Silence?
- Didn’t event know it was being discussed?

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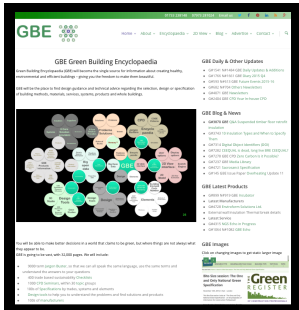

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Circular O Building

Appropriate Design Response to MP and Circular Economy

- Rationalisation
- Simplification
- Modularisation

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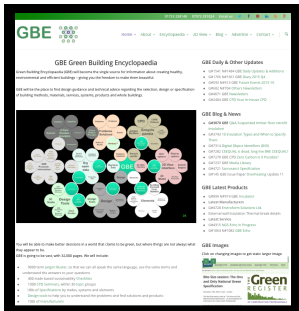

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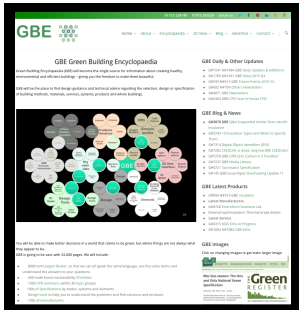
Rationalisation

- Layering
  - Material, Component, Product, System, Building
  - Site, Structure, Skin, Services, Space plan, Stuff
- Rationalising component life expectancy
  - for consistency in whole building
  - to layers of the building
- CLM Component Life Manuals
  - HAPM, SPON, (no longer)
  - BSI KM, BBA C, ETA, longer life
  - BBA Certificates states Life expectancy



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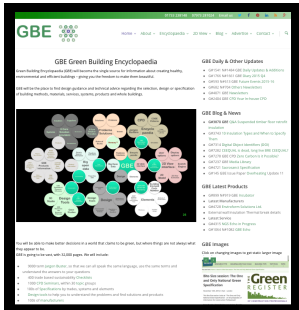
Simplification:

- Of details and fixings
  - to permit ease of assembly and disassembly
- Fix ability and un-fix ability
  - Nuts and bolts, clamps, screws v nails
- No permanent or no undoable joining
  - No glues, adhesives, welding, rivets
  - Weak mortar (lime based)
  - low tack adhesive patch (carpet tiles)
- Exploit:
  - Gravity, Ballast, friction, mechanical key compression and expansion
- Minimise cutting and drilling of parts
  - Minimise weakening of parts



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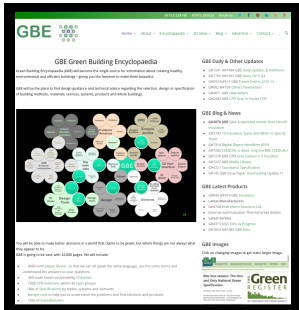
Modularisation:

- Understanding the size of stuff
  - Working with it, not against it
- Modular with minimal offcuts
  - In first life and subsequent lives
- No offcut waste in first life
  - No redundant non-modular pieces in subsequent life
  - No more offcut waste in subsequent lives
- Exponent:
  - Walter Segal, Self build Architect: Framed & infill, practice no waste
  - Water Segal Method
    - Walter Segal Approach
  - WSSBT Walter Segal Self Build Trust
    - Geoff Stow of BIY Build it Yourself
  - Architype
    - Robin Hiller Forever green projects Ltd.
  - LEGO
    - Load-bearing walls or framed and infill

MP's HERACEY™ expanded

- MPs can contain enough information to address any of all of the following:
  - Healthy
  - Environmental
  - Resourceful
  - Appropriate
  - Competent
  - Effective or Ethical
  - Yardstick



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Healthy:

- Natural Materials and ingredients
- Begs question: why not screening in place of LCA (more later)
- Low to No Chemistry
- Low to No Off-gassing
- Healthy for all along whole supply chain

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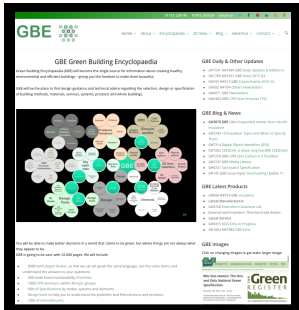

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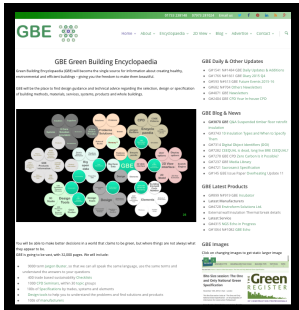
Environmental:

- Screening of Chemicals
  - COSHH, RoHS, REACH, SVHC, VOC
- LCA Life Cycle Assessment
  - Low to No Petrochemical
  - Low to No Embodied Carbon
  - More Sequestered carbon
  - Low to No Embodied Energy
  - Low to No Embodied Water
  - Low to No emissions/pollution
  - Low to No Land, Water and Atmosphere pollution
  - Less erosion by excavation or from extraction



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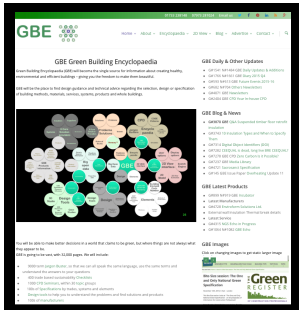
Resourceful:

- More resource efficient design
  - Awareness and approach
  - Changing bad habits, taught or acquired
  - Less centering and cutting perimeters
  - Less Geometry for its own sake
  - Less clashing geometries for fun
- More layering less interfaces
  - Structures and Services Clashes
  - Services and Building Clashes
  - Building and Structure Clashes
- More understanding of size
  - More Design to suit
  - Less off-cutting waste
  - Bigger components generates more waste
  - Smallest components can make no waste
- More reuse avoids more new
- Less waste to landfill



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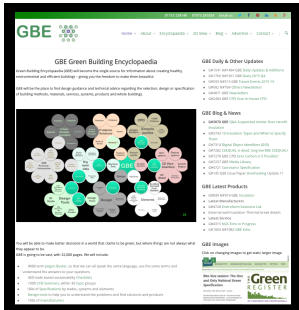
Appropriate:

- Material properties for:
  - Manufacturing process
  - Application
  - Durability
- Desire to own and care about stuff
  - Happy making (e.g. natural materials)
- Component + Accessories = Assembly or System
- Performance
  - Fit for Purpose
- Not Appropriate:
  - WRAP Waste Resource Action Programme
  - Increase recycled content %
  - Catalogued Substitutions
  - Ignored important properties
  - Unintended consequences



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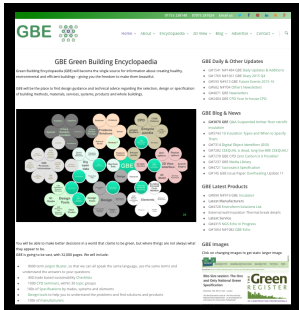
Competent:

- As manufacturer intended
- Correct application
  - in building
  - in elements
  - for exposure conditions
  - for durability
- Tried, tested and certified
  - Used within tested limits
  - BBA may break rules but sets new ones



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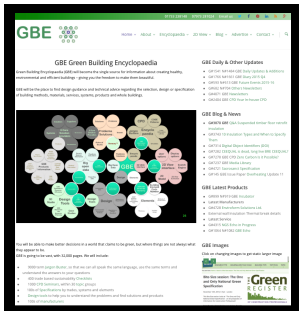
Effective:

- Much more than efficient
  - Usually diminishing returns on big improvements
- Step changes in performance
- Modular sizing
  - Modular fixing
  - No off cut waste
- Improve the performance of another adjacent component
  - E.g. Membranes or boards around insulation
- Value Engineering stuff into projects not out
  - Holistic view, multi-functional material replaces many
  - Not cost-cutting individual components
  - Not substitution (unless REACH SubsPort)
  - Not joining the race to the bottom
  - Not Kamikaze tendering



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Ethical

- UN SDG for all
  - –not just profits at any expense
- HERACEY for all along the demand and supply chain

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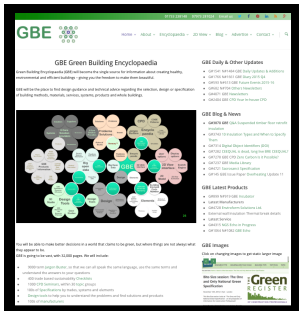

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Cycle Assessment Procedure for Eco-impacts of Materials

Investing in Opportunities

This project has received European Regional Development Funding through INTERREG IV B.

INTERREG IVB

Yardstick

- Benchmarking
  - Setting agenda: brief targets
  - Setting new standards for way forward
  - Setting new trading Models
- Not pay-back periods
  - But carbon-back periods

Complimentary O activities

- Salvo
- SWMP
- Material Exchange
- Others

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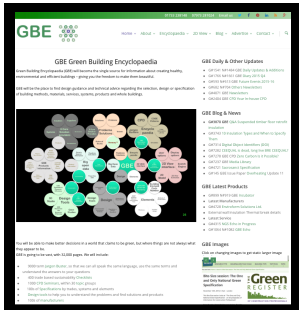

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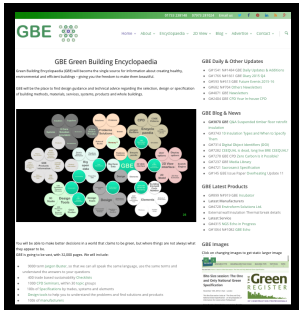
Salvo

- Architectural Salvage
- Reuse not recycling
- Sector Gateway
- Buying and Selling
- Salvage Protocol
- Pre-Alteration Pre-demolition Audits
- Theft Alerts

Site Waste Management Plan

- Checklists
- Workshops
- Tools
  - Envirowise (Packaging calculator)
  - BRE (SmartWaste tools)
  - WRAP(Waste and ResEff tools
- Calculators
  - GBE Waste Cost® Lite
  - Envirowise Packaging Calculator



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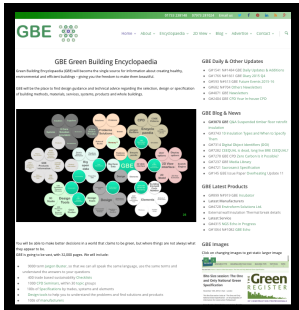
Material Exchanges

- Virtual and real
  - Earth Exchange (gone)
  - Aggregain (gone)
  - CIRIA (recycled)
  - BREMAP (gone)
  - Salvo (Architectural Salvage)
  - BioRegional Reclaim



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O Others

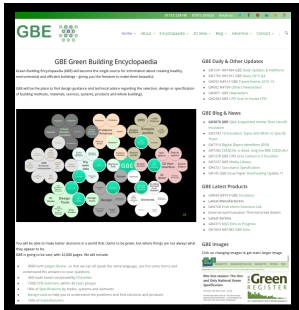
- ICE Demolition Protocol (invented in Scotland) In 2 parts
- Waste Aware Scotland
  - Segregation colour codes
- Zero Waste Scotland
  - Wordy design Guides
  - Architects can't read
  - RIBA Library Policy: Picture books not reading books
- WRAP
  - Publications and tools
  - No longer interested in Construction
  - Legacy persists but not so visible
- National Industry Symbiosis Programme (NISP)
  - Haves and Wants
  - Joined up Businesses
- BRE Smart Waste Data logging
- HAZRed Hazardous Waste Reduction (information)
  - (Now Scottish Website)

How + where used in O Building

- Structural Frame
  - Bolted/clamped connections
- Loadbearing Walling
  - brick/block and lime mortar
- Panel construction
  - Framed and Insulated
  - Solid
- External Claddings
  - Wall, roof, soffits
- Internal linings
  - Floor, wall, ceiling

O Products + O Accessories = O Systems

- Elements or Sub-elements
  - Products or Materials
    - Plus Accessories
    - Equals Systems
      - System Permutations
  - Combination greater than the sum of the parts
- Essential
  - XRef between parts to obtain whole



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Accessories include:

- Fixings
- Spacers/leveling shims
- Fastenings
- Isolation (electrolytic/bimetallic)
- Tapes (Air tightness, etc.)
- Sealants (avoid gunned, use strips)
- Adhesives (avoid where possible)
- Ballast
- Etc.

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Products + Finishes

- Potentially complicates reuse
- Scratched finished need repair
- Sacrificial coatings help use or reuse
- Corrosion protection helps disassembly by bolts or other fasteners
  - (not shearing heads off screws)
- Corrosion protection helps prevent discolouration of fastener or material

Ingredients + Recipe = Materials

- Resources
  - Materials
- Mixes
  - Recipes
  - Conglomerates
- Materials
  - Components
    - Elements

Materials + Bonding = Composites

- Materials
  - Ingredients
- Layers
  - Matrix
- Binder
  - Bonding
- Composites
- Systems
- Build-ups

Bonding materials in layers = Build ups

- Leveling
- Smoothing
- Decorating
- Protection

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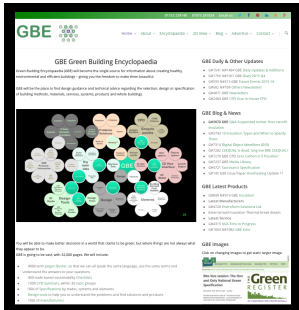

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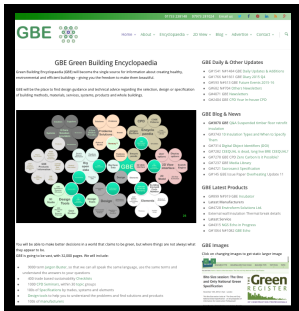
How used in building

- Bolted or clamped steel frames
- Lime Mortar jointed (not cement)
- Layered components in elements
  - Overlap tiling
  - Overlap boarding
- Framed and open jointed Rain-screen cladding
- Visible fixings not hidden (weatherboarding)
- Avoiding interlocking e.g. T&G joints
- Interlocking Mortise and tenon Joints, removable dowels
- Buried or surface mounted metal connectors
  - Special angles for fasteners into end grain
- Nailed or cleated/screwed light timber frame panels
- Riveted or crimped light steel frame
- Zed Factory spacing brackets for consistent spacing for modular



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