

# Lecture: ~~Future~~ Systems: Sustainability

Now      If you want a future

Advanced Technology

Module Leader: Ilona Hay

Module Coordinator: Kenny Fitzmaurice

Technology Champion: Brian Murphy

Lecturer: Brian Murphy

Presented: 11<sup>th</sup> February 2019 A02

Updated: 14<sup>th</sup> February 2019 A03

# Quotes for the Day

- “If we were not committed to **BREEAM** we could have made a **greener building**”
- **BRE EcoHomes and Code For Sustainable Homes**: unintended consequences forced an industry response:
  - **Fabric First** – **Eco Bling Last**
- **BRE Green v GBE Green**

## Semester B Programme

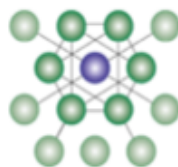
Week 26	21.01.2019	Lecture 09.	Regulatory Framework	Design Task 03
Week 27	28.01.2019	Lecture 10.	Site Analysis	-
Week 28	04.02.2019	Lecture 11.	Building Costs	-
<b>Week 28</b>	<b>05.02.2018</b>	<b>Technology Champion</b>		
Week 29	11.02.2019	Lecture 12.	Future Systems: Sustainability	Design Task 04
Week 30	18.02.2019	Lecture 13.	Guest Lecture: Structural Engineer	-
Week 31	25.02.2019	Lecture 14.	Design to Perform & Detailing	-
Week 32	04.03.2019	-	Class Trip (TBC)	-
Week 33	11.03.2019	-	Independent Study Week	-
Week 34	18.03.2019	Lecture 15	Future Systems: Technologies	-
Week 35	25.03.2019	Lecture 16.	Module Review	-
Week 36	01.04.2019	-	Formative Review	Present your Semester B Work
Week 37	08.04.2019	-	No Lecture	-
Week 38	15.04.2019	-	Spring Break	-
Week 39	22.04.2019	-	Spring Break	-
Week 40	29.04.2019	-	No Lecture	-
Week 41	06.05.2019	-	Portfolio Submission	Semester A & B Work

# >40 years into 1 Hour won't go

- So I am providing links to other information if you want to know more
- Question Everything
- Don't assume that I know everything
- Don't assume I have cherry picked the best bits
- Don't assume what your being told is the whole story
- Some will hide what they don't want you to know
- Do your best with what you know
- When you know better
- Do better

# UofH Part 1 Year 2 Schedule

# GBE



## Green Building Encyclopaedia

<https://greenbuildingencyclopaedia.uk/?P=17699>


Task	Topic	Lecture/CPD	Books	GBE Website pages
0	The Whole Year	Principles of Element Design (Lecture)	Architects Pocket Book	G#17699 (this page)
		Fixings Fastenings	Environmental Design Pocket Book (Book)	Pinterest Z20 Connectivity (folders)
		Adopt a material (Lecture)	Principles of Element Design (Book)	
		Future Systems	Designed to perform (Book)	
1	Site Survey	Site / Existing Building Survey Test Analysis (CPD/Lecture)	Survey Site Analysis (Navigation)	
2	Sustainable Strategy	HERACEY® (Jargon-Buster CPD)	TBH Designer's Handbook	HERACEY® (Jargon-Buster)
		Matrix (Navigation)	Building Regulations AD L- Conservation of fuel and power	Healthy (Jargon-Buster)
			PHPP Passivhaus & EnerPHit	Environmental (Jargon-Buster)
			AECB Carbon Lite & Retrofit	Resourceful (Jargon-Buster)
			CIBSE TM60 2018 Good Practice in the Design of Homes (Book)	Appropriate (Jargon-Buster)
				Competent (Jargon-Buster)
				Effective (Jargon-Buster)
				Yardstick (Jargon-Buster)
3	External walls and openings	Timber External walls External wall Opening Window Door (Lecture)	Principles of Element Design (Lecture)	Calculators (Navigation)
		Masonry External walls External wall Opening Window Door (Lecture)	IBO Passive Houses New Build	Elemental Building U value calculator
		Glass External walls External wall Opening Window Door (Lecture)	Designed to perform (Book)	Elemental Assemblies Spreadsheet
		Other External walls	Building Regulations	Windows (Checklist)

		External wall Opening Window Door (Lecture)	AD L- Conservation of fuel and power	
		Windows External wall Opening Window Door (Lecture)		Rooflights (Checklist)
		Doors External wall Opening Window Door (Lecture)		
		Rooflights		
		Solar Shading (CPD)		
4	Roof & Floor	Pitched Roof	Principles of Element Design (Lecture)	Calculators (Navigation)
		Flat Roof	IBO Passive Houses New Build	Elemental U value calculator
		Ground Floor	Designed to perform (Book)	Elemental Assemblies Spreadsheet
		Upper Floor	Building Regulations AD L- Conservation of fuel and power	
5	Access Stairs	Stairs Ramps Lifts Escalators (Lecture)	Building Regulations AD K	Checklist (Navigation)
	Stairs Ramps Balustrades Walkways	Stairs Ramps Lifts Escalators (Lecture)	Building Regulations AD K	
	Lifts Escalators	Stairs Ramps Lifts Escalators (Lecture)		
6	Internal Linings Elevations and Reflected ceiling Plans	(22) Internal partitions	Principles of Element Design (Lecture)	
		(23) Upper Floors	IBO Passive Houses New Build	
		Interior Linings	Designed to perform (Book)	
		(40) Finishes (CPD/Lectures)		
7	Axo, Build ups, thicknesses	Principles of Element Design (Lecture)	Principles of Element Design (Lecture)	Calculators (Navigation)
			IBO Passive Houses New Build	Elemental Building U value calculator
			Designed to perform (Book)	
8	Drawings + Model			Calculators (Navigation)
				Whole Building U value calculator
9	3D Design	Intro to BIM	BIM A Spec Writers Perspective (Shop)	GBE BIM (Jargon-Buster)
10	Wall Roof Junctions	Principles of Element Design (Lecture)	IBO Passive Houses New Build	Calculators (Navigation)
			Designed to perform (Book)	Psi value calculator
11	Wall Floor Foundation Junctions	(16.4) Foundation (Lecture)	Principles of Element Design (Lecture)	Calculators (Navigation)
		(16.4) Groundworks RC Raft Foundation (Lecture) G#2114	IBO Passive Houses New Build	Psi value calculator
			Designed to perform (Book)	
12	Model			

14/02/19

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5




**Glass External Walls**

(21.4) Curtain Walls

Another GBS CPD/Lecture file to download  
[www.greenbuildingencyclopedia.uk](http://www.greenbuildingencyclopedia.uk)



**(21) Timber External Walls**

CI/SfB (21.1) Load-bearing  
(21.3) Non Load-bearing






**(66) Transport Systems**

Mechanical vertical and diagonal movement



**(21) Masonry External Walls**

CI/SfB: (21.1) Load-bearing  
(21.3) Non Load-bearing



**(21) Masonry External Walls**

CI/SfB: (21.1) Load-bearing  
(21.3) Non Load-bearing

**(21) Timber Frame**

Construction Critique

**(21) Timber Frame**

Construction Critique




**(21) Other External Walls**

CI/SfB (21.1) Load-bearing  
(21.3) Non Load-bearing




**(21) Other External Walls**

CI/SfB (21.1) Load-bearing  
(21.3) Non Load-bearing




**BDA Illustrated Introduction to Brickwork Design**

© Brick Development Association 1975  
TL Knight AADipl RIBA  
A shining example of how to communicate with Architects





**BDA Illustrated Introduction to Brickwork Design**

© Brick Development Association 1975  
TL Knight AADipl RIBA  
A shining example of how to communicate with Architects




**(24) Stairs Ramps +Slides**



14/02/19 Diagonal circulation




**(22) Internal Partitions**

© GBE NGS ASWS 2019 Future Systems: Sustainability

G14 Light steel frame • G20 Light Timber framed •  
K10 Plasterboard  
• K30 Panel Partitions • K32 Cubicle Partitions

**(22) Internal Partitions**

© GBE NGS ASWS 2019 Future Systems: Sustainability

G14 Light steel frame • G20 Light Timber framed •  
K10 Plasterboard  
• K30 Panel Partitions • K32 Cubicle Partitions




**GBE GBS H21 Timber Cladding**

Issues: Designers, Stewardship, Market  
Solutions: Expert system, Design Guide, Certification scheme, Definitive Specification



# Today's Lecture

- **Future Systems:  
Sustainability**
- **Environmental  
Assessment  
Methods (EAM)**
- **Energy Standards**
- **Health & Wellbeing**



# This Presentation on GBE:

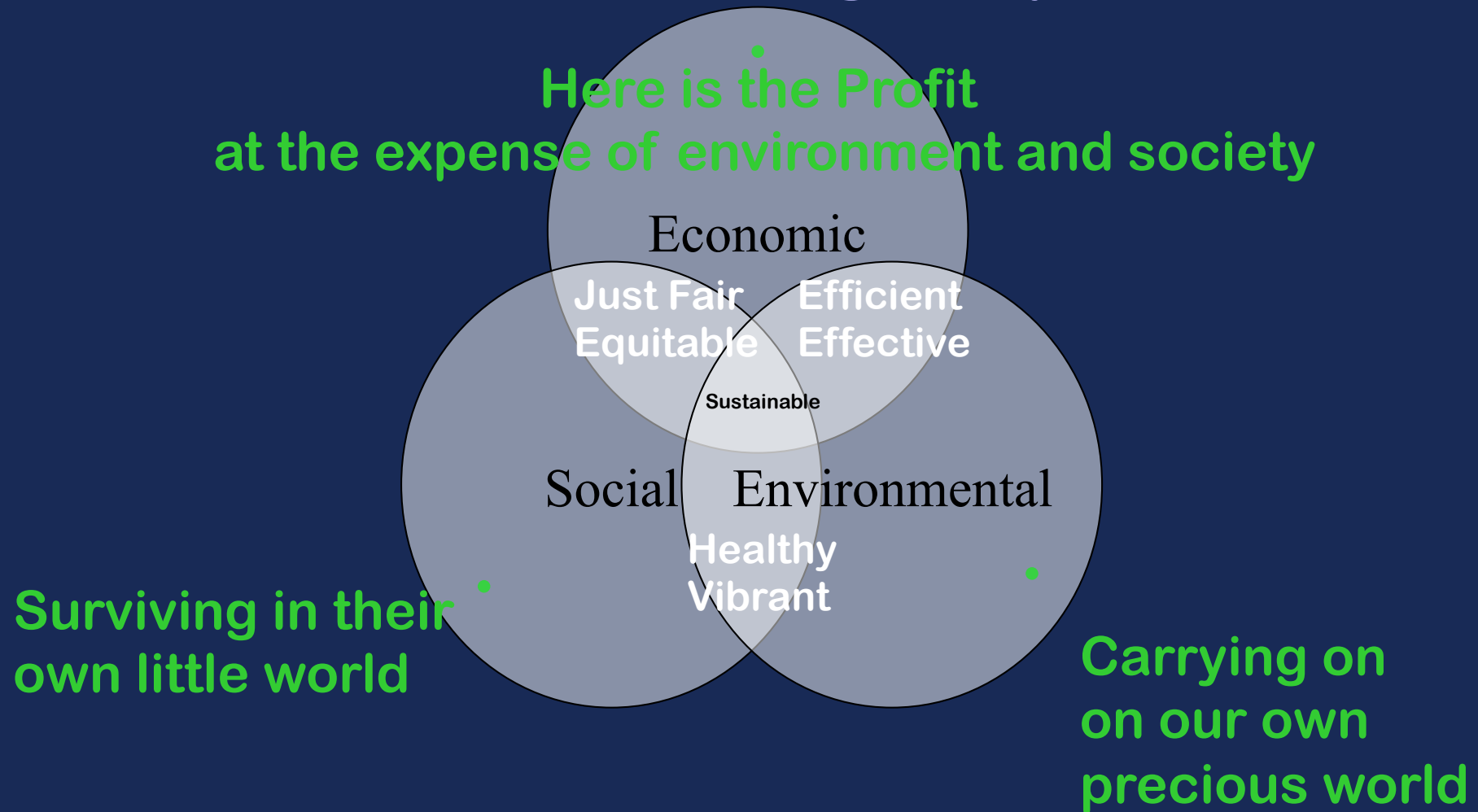
- Find this file on GBE website at:
- <https://GreenBuildingEcyclopaedia.uk/?P=20396>
- Find related image folders on Pinterest
- <https://www.pinterest.co.uk/bmurphy1390/Bioregional>



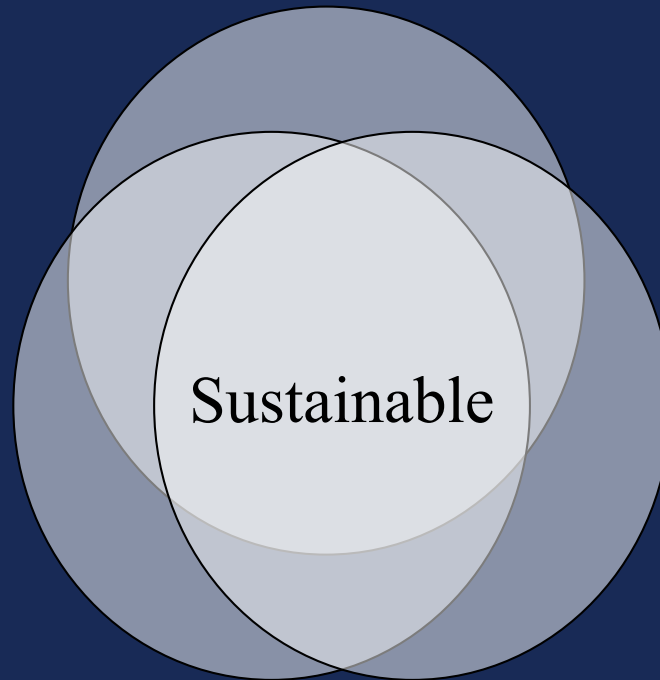
# Definitions/Jargon Busters

- Sustainability
- Carbon Targets v Building Regulations
- Goals: Global v National v Sector
- Future Systems v Now Systems
- Environmental Assessment Methods
- Energy Standards
- Water Standards
- Health & Wellbeing Standards
- Retrofit Standards

# How Sustainability is presented



# Towards sustainability

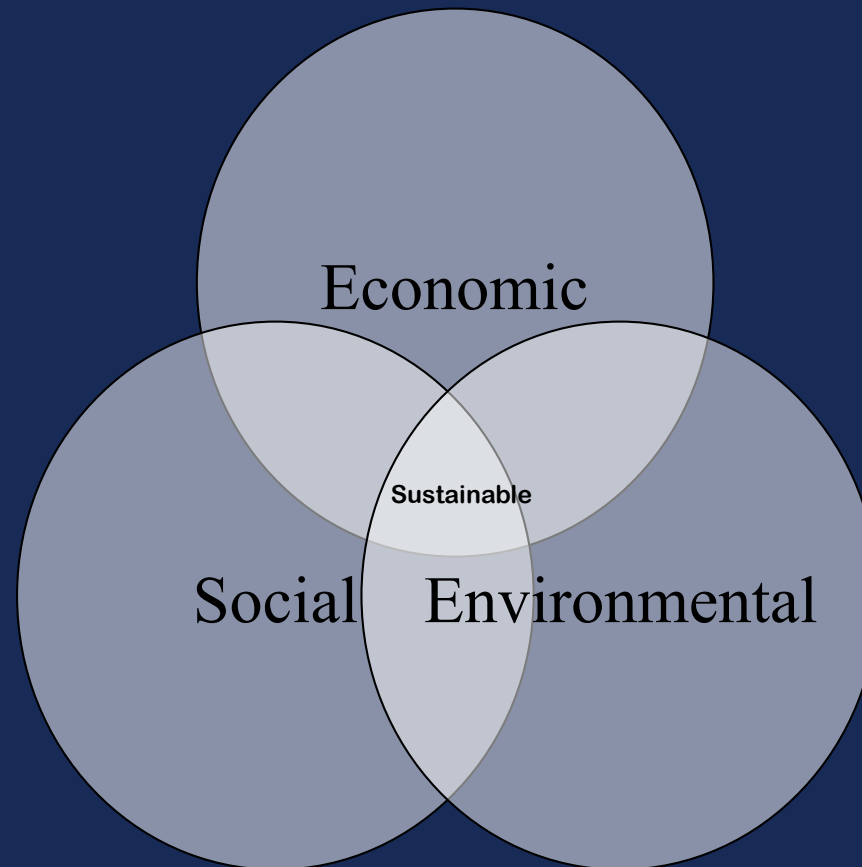


Sustainable: where all three are  
present in all activities

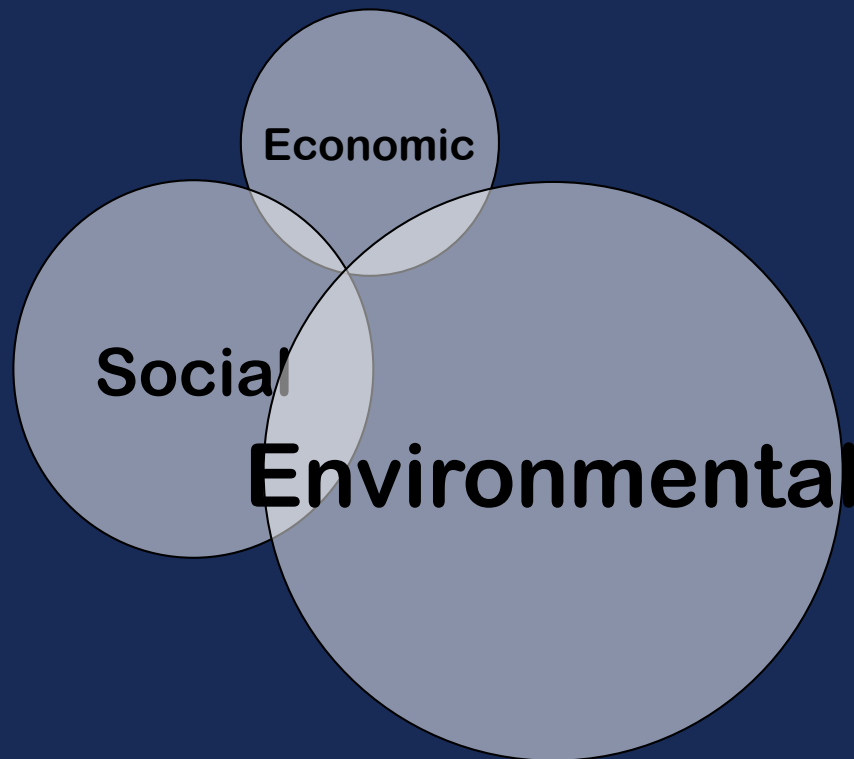


What we need to strive for

# Where we are today



# What is needed right now and for a few decades



## for Human survival



Once we have got past the crisis



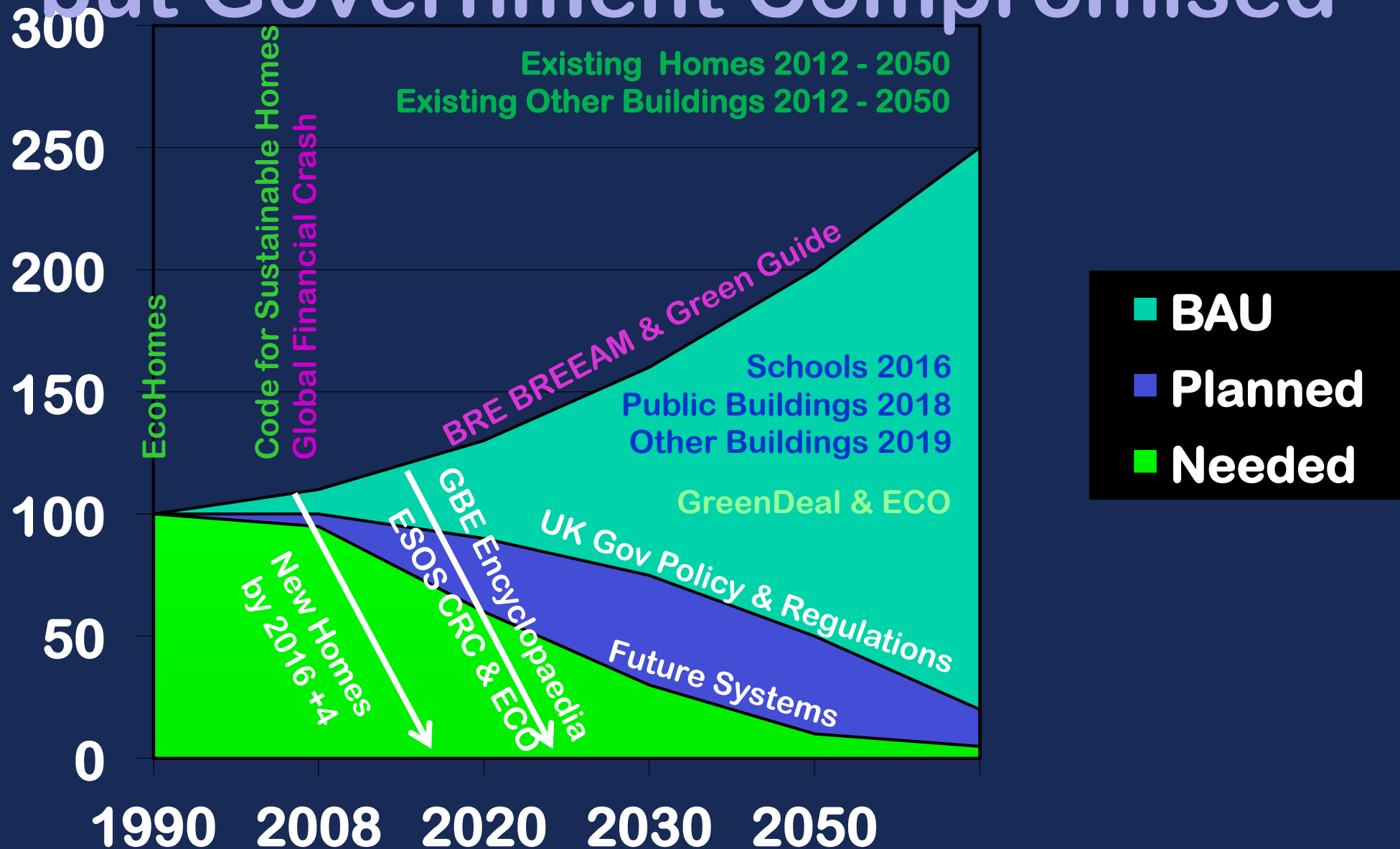
then lets get it & keep it in balance



# UN Global Carbon Targets

- Signed up to by Governments
- Policy does not always show the same commitment
- Regulations updates are lobbied by industry to lower ongoing commitments
- Regulations apply at time of Application
- Building can happen many years later
  - To out of date Regulations
- Performance Gap (not meeting the Regulations) caused by lack of: Skill, Care, Know-how, Management Commitment

# We needed step changes but Government Compromised



# Bioregional One Planet Living Logo

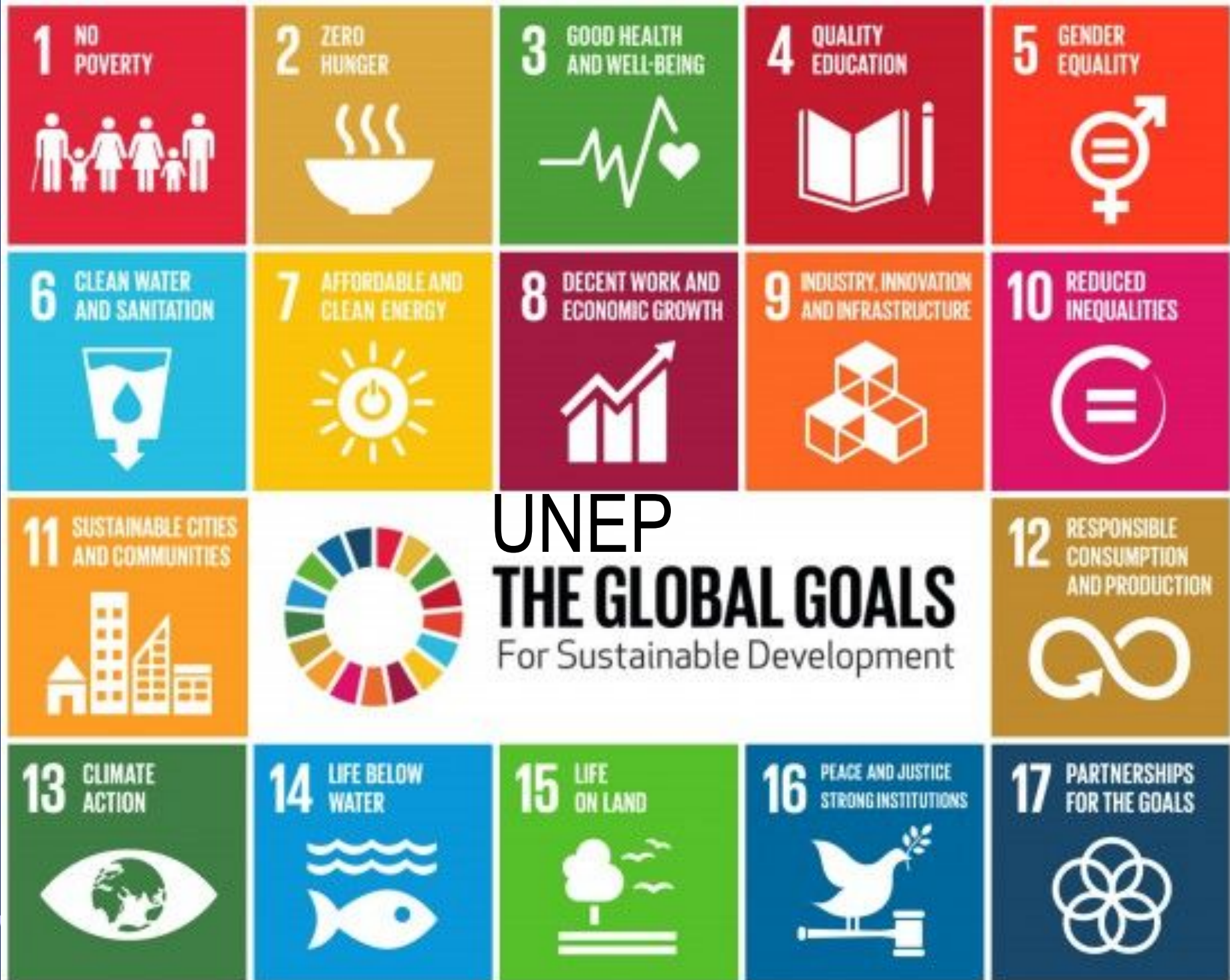


# Bioregional One Planet Living Principles





	<b>Health and happiness</b>	Encouraging active, sociable, meaningful lives to promote good health and well being
	<b>Equity and local economy</b>	Creating bioregional economies that support equity and diverse local employment and international fair trade
	<b>Culture and community</b>	Respecting and reviving local identity, wisdom and culture; encouraging the involvement of people in shaping their community and creating a new culture of sustainability
	<b>Land use and wildlife</b>	Protecting and restoring biodiversity and creating new natural habitats through good land use and integration into the built environment
	<b>Sustainable water</b>	Using water efficiently in buildings, farming and manufacturing. Designing to avoid local issues such as flooding , drought and water course pollution
	<b>Local and sustainable food</b>	Supporting sustainable and humane farming, promoting access to healthy, low impact, local, seasonal and organic diets and reducing food waste
	<b>Sustainable materials</b>	Using sustainable and healthy products, such as those with low embodied energy, sourced locally, made from renewable or waste resources
	<b>Sustainable transport</b>	Reducing the need to travel, and encouraging low and zero carbon modes of transport to reduce emissions
	<b>Zero waste</b>	Reducing waste, reusing where possible, and ultimately sending zero waste to landfill
	<b>Zero carbon</b>	Making buildings energy efficient and delivering all energy with renewable technologies



# Environmental Assessment Methods (EAM)

- When **Business as Usual (BAU)** is bad,
  - EAM are invented
  - Sadly quite often **BAU with a green tick**
  - Just a sticking Plaster
- “If we were not committed to **BREEAM** we could have made **a greener building**”
- Don't assume following EAM means you are being Environmental
  - **You may be being less bad**
  - **Less bad is not good enough**



# Environmental Assessment Methods

- BRE EcoHomes (was UK wide then Scotland only)
- SPEAR (Arup's own, makes nice diagrams but no robust scoring)
- NEET (Healthcare sector invented by Architects practice (Gone now) (Swallowed by BREEAM Healthcare)
- DREAM (Defense Related Environmental Assessment Method) (BRE prevented its development)
- BREEAM (UK+Global) Many Building Types; New, Refurb, In-use
- LEED (USA+Global Invented by ExBREEAM staff)
- DCLG's Code for Sustainable Homes (CfSH) developed by BRE
  - (no longer in statute, parts added to other legislation)
- BRE Homes for Good (to fill the gap left by CfSH)
- Ska (Fit-out, Refit; Retail, Office, Higher Education; Broader and better than BREEAM)
- CEEQUAL (Civils; now BREEAM Infrastructure)
- GreenStar (Australia) (Business focus)

# BREEAM

- Applies to non-domestic buildings
- Pass levels: Fail, Pass, Good, Very Good, Excellent, Outstanding.
- Works with Green Guide to Specification
  - Pushing the boat out?
  - Boat never left the dock
- My project brainstorm sessions address real issues but frequently fail to score a BREEAM credit
  - except 1 for having the brainstorm session

# BREEAM Ticks boxes

- BDP invited NGS to brainstorming session with 5 Architect teams on city centre regeneration project
- Teams described proposed actions
- NGS proposed one team's problems were another team's solutions
  - Real solutions for real problems
  - BDP said 'what great ideas, wish we had recorded them'
- BREEAM assessor said 'but you won't get a BREEAM credit for that'
- And so it went on all day
- What would you do?
  - Drop BREEAM and do the greener thing?
- It was a BREEAM assessed project so what did they do?
  - BAU



Green & Blue  
Infrastructure

BREEAM Commu

BREEAM Civils

EAM  
& EP

Existing

BREEAM In Use

EcoHomes XB

BREEAM Refurb

BRE Green  
Guide to  
Specification  
Generic  
materials

Non-domestic

BREEAM

BREEAM Materials

In assemblies  
for buildings &  
Ext. works

Homes

EcoHomes Scotland

Environmental  
Profiling

CiSH > BREEAM Resi

SusTrains

Or Equivalent

GBE Green Building  
Encyclopaedia

CEEQUAL

BREEAM Civils

GBE HERACEY

EnerPHit

BREEAM In Use

GBE PASS Product Accessory  
System Screening

EcoHomes XB

GBE Compare

GBE Services

GBE Civils & Infrastructure

Ska

BREEAM Refurb.

GBE Echo

Office  
Retail

BREEAM

GBE BEST

High Education

BREEAM Materials

GBE BEACON

GBE SWMP

GBE End Of Life

SPEAR

DREAM

NEET RIP

GBE Product Passport

GBE LCA

GBE EPD

PHPP

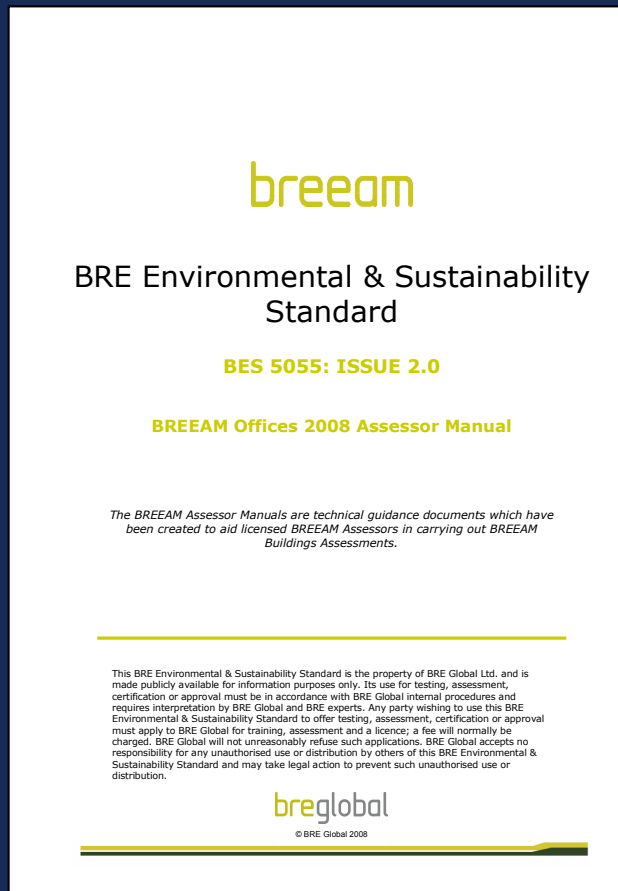
CarbonLite

EcoHomes Scotland

AECB Water

CfSH > BREEAM Resi

# BREEAM Offices



# BRE Green Guide To Specification (GGtS)

- Green Guide expressly excludes Indoor Air Quality from its assessment.
- If you assume Green Includes Healthy
- How can GGtS be promoted as a guide to Greenness?
- Its has so few 'Green' materials that it can only be regarded as a guide to the 'least Violet of the Violets'

# BRE: Environmental Profiles:

## Negative manufacturing impacts

- Abiotic depletion
- Global warming
- Ozone layer depletion
- Human Toxicity
- Fresh water aquatic ecotoxicity
- Terrestrial ecotoxicity
- Petrochemical oxidation
- Acidification
- Eutrofication
- Solid waste
- Radioactivity
- Mineral extraction
- Water extraction

# Ska Fit-out/Refit

- Introduction:

- [https://www.sustainabilityexchange.ac.uk/files/rics\\_ska\\_the\\_introduction\\_-\\_04\\_10\\_2016\\_-\\_eauc-s\\_sustainable\\_construction\\_tsn.pdf](https://www.sustainabilityexchange.ac.uk/files/rics_ska_the_introduction_-_04_10_2016_-_eauc-s_sustainable_construction_tsn.pdf)

- Tool:

- <http://ska-tool.rics.org/>

- Good Practice Measures:

- <http://ska-tool.rics.org/assets/pdf/datasheets/higher%20education/1.0/D02.pdf>



# SKA rating for Higher Education

Introduction to scheme by Elina Grigoriou

October 2016



## Investigate HE scheme

Ska Higher Education 1.0

Design stage

Project details	Scope	Assessment	Rating	Report
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All	Ecology	Energy & CO2	Materials	Pollution	Project Delivery	Transport	Waste	Water	Wellbeing
-----	---------	--------------	-----------	-----------	------------------	-----------	-------	-------	-----------

## In scope

125 measures

ID	Name	
<a href="#">D71</a>	Soft landings - aftercare (fine tuning, seasonal commissioning and POE)	
<a href="#">D01</a>	Energy efficient lighting	
<a href="#">E04</a>	Energy efficient light fittings	
<a href="#">D28</a>	Thermal comfort assessment	
<a href="#">D02</a>	Lighting controllability	
<a href="#">E14</a>	Efficient taps	
<a href="#">D30</a>	Lighting design	
<a href="#">D29</a>	Acoustic design	
<a href="#">D33</a>	Ventilation rates	
<a href="#">D72</a>	Pre-refurbishment audit	
<a href="#">M05</a>	Hardwoods	
<a href="#">M12</a>	Soft flooring	
<a href="#">D22</a>	Low-GWP insulation	
<a href="#">D60</a>	Designing out waste	
<a href="#">D12</a>	Reduce gypsum waste	
<a href="#">D23</a>	Low impact refrigerants	
<a href="#">D69</a>	Soft landings: design workshops	
<a href="#">D09</a>	Resource management plan (RMP)	
<a href="#">E02</a>	Energy efficient white LEDs	
<a href="#">E01</a>	Lighting controls	
<a href="#">E23</a>	Existing lower flush WCs	

## Not in scope

6 measures

	ID	Name
	<a href="#">P10</a>	Reduce lighting energy in use
	<a href="#">P08</a>	Reduce water in use
	<a href="#">P11</a>	Reduce small power energy in use
	<a href="#">P05</a>	Reduce total waste in use
	<a href="#">P06</a>	Increase recycling of waste in use
	<a href="#">D73</a>	Reduce packaging waste

## Investigate HE scheme

## Ska Higher Education 1.0

## Design stage

Project details

Scope

Assessment

Rating

Report

☐ Expand / collapse all measures

ID	Measure		Issue	Owner	Targeted	Included
<a href="#">+ D71</a>	Soft landings - aftercare (fine tuning, seasonal commissioning and POE)		Project Delivery	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D01</a>	Energy efficient lighting		Energy & CO2	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ E04</a>	Energy efficient light fittings		Energy & CO2	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D28</a>	Thermal comfort assessment		Wellbeing	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D02</a>	Lighting controllability		Energy & CO2	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ E14</a>	Efficient taps		Water	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D30</a>	Lighting design		Wellbeing	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D29</a>	Acoustic design		Wellbeing	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D33</a>	Ventilation rates		Wellbeing	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D72</a>	Pre-refurbishment audit		Waste	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ M05</a>	Hardwoods		Materials	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ M12</a>	Soft flooring		Materials	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D22</a>	Low-GWP insulation		Pollution	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D60</a>	Designing out waste		Waste	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D12</a>	Reduce gypsum waste		Waste	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D23</a>	Low impact refrigerants		Pollution	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D69</a>	Soft landings: design workshops		Project Delivery	--	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">+ D09</a>	Resource management plan (RMP)		Waste	--	<input type="checkbox"/>	<input type="checkbox"/>

## Options

[Finish and mark as complete](#)

## Your current rating is

Unrated

## Measures

0 included

## Gateways

0 gold - 0 silver - 0 bronze



## Your targeted rating is

Unrated

## Measures

0 targeted

## Gateways

0 gold - 0 silver - 0 bronze



## Gold rating requires

 94 measures  
24 gold gateway

## Silver rating requires

 63 measures  
16 silver gateway

## Bronze rating requires

 31 measures  
8 bronze gateway

## Investigate HE scheme

Ska Higher Education 1.0

Design stage

Project details

Scope

Assessment

Rating

Report

All

Ecology

Energy &amp; CO2

Materials

Pollution

Project Delivery

Transport

Waste

Water

Wellbeing

## In scope

17 measures

## Not in scope

0 measures

All measures in scope

ID	Name	
<a href="#">D28</a>	Thermal comfort assessment	✗
<a href="#">D30</a>	Lighting design	✗
<a href="#">D29</a>	Acoustic design	✗
<a href="#">D33</a>	Ventilation rates	✗
<a href="#">D39</a>	Outside views	✗
<a href="#">D62</a>	Breakout space	✗
<a href="#">D76</a>	Personal storage	✗
<a href="#">D77</a>	Biophilic design	
<a href="#">D31</a>	Daylight glare control	✗
<a href="#">D40</a>	CO2 monitors	✗
<a href="#">D32</a>	Occupant HVAC control	✗
<a href="#">D36</a>	Cleaning of existing air supply ductwork	✗
<a href="#">D35</a>	Specialist and printer-copier equipment area ventilation	✗
<a href="#">D37</a>	Fine air filters	✗
<a href="#">D63</a>	Low-VOC finishes	✗
<a href="#">D64</a>	VOC monitors	✗
<a href="#">P12</a>	Fit-out VOC monitoring	

## Lighting controllability

### Criteria

The following scoping shall be provided as a minimum:

- Keep the 60lm/circuit-watt criteria stipulated by Part L, even with lighting controls in place.
- For teaching spaces, laboratories and workshops (where safe and appropriate to do so) provide a minimum of 2 lighting scenes, controllable by the main entrance door, and teacher's position (or remote control switching) where appropriate, together with manual override of automatic controls.
- Provide local task lighting to laboratories, workshops and work-desks in libraries and ICT spaces where appropriate.
- Reduce lighting levels to a maximum of 50% of its normal output in corridors and reception areas when these are not occupied.
- Automatically alter lighting levels in accordance with natural daylight levels for all window areas including window/exhibition displays, auditoria and laboratories.
- Time controls to turn off lighting out-of-hours, where appropriate.

### Scoping

This measure addresses the following areas within a higher education building, including but not limited to:

- Reception spaces, break-out, eating and front-of-house circulation.
- Teaching spaces, workshops, laboratories and lecture theatres.
- Back-of-house circulation.
- Staff area, including offices and administration spaces.

### Assessment

**At design stage:** check specifications and drawings meet the criteria.

**At handover stage:** check as-built drawings, and/or carry out a site visit for visual confirmation of installation and location.

**At occupancy stage:** if the controls have been changed or added, carry out the handover stage assessment. If this measure was achieved at handover stage and the controls have not been changed or added to, this measure will be achieved by default.

### Rationale

Good practice dictates that lighting should be simply and easily controlled. When new lighting is being installed, the design should incorporate controls that minimise energy usage: lighting should switch off when daylight provides a sufficient level of illuminance and when spaces are unoccupied.

### Fit-out benchmark & assessment tool

Energy & CO<sub>2</sub>

Issue

D02

ID

8

Rank

SKA Higher Education  
Version 1.0 2016

If you would like to comment on this measure please email [ska@rics.org](mailto:ska@rics.org)

© RICS 2016

Page 1 of 2

## Investigate HE scheme

## Ska Higher Education 1.0

## Design stage

Project details

Scope

Assessment

Rating

Report

## Summary

Status: **In progress**Measures in scope: **125**Measures targeted: **0**Measures achieved: **0**

## Targeted rating

SKArating®

Rating: **Unrated**Threshold: **N/A**Gateways required: **N/A**

## Achieved rating

SKArating®

Rating: **Unrated**Threshold: **N/A**Gateways required: **N/A**

Issue	In scope	Targeted	% Targeted	Achieved	% Achieved
Ecology	1	0	0%	0	0%
Energy & CO2	26	0	0%	0	0%
Materials	32	0	0%	0	0%
Pollution	7	0	0%	0	0%
Project Delivery	10	0	0%	0	0%
Transport	6	0	0%	0	0%
Waste	16	0	0%	0	0%
Water	10	0	0%	0	0%
Wellbeing	17	0	0%	0	0%
<b>TOTALS</b>	<b>125</b>	<b>0</b>	<b>0%</b>	<b>0</b>	<b>0%</b>

# Energy and related design standards

- Building Regulations Approved Document L
  - Will eventually meet carbon targets but not now
  - Most new buildings will need to be retrofit by 2030-2050
- Energy (exceeding Building Regulations)
  - AECB Bronze, Silver, Gold and Platinum Standard
  - Super E (Canadian; means to sell their softwood)
  - Passivhaus (German) PHPP Software
    - Indoor Air Quality and Thermal Comfort conditions driven
    - Minimise air leakage, minimise thermal bridges
    - EnerPHit (Passivhaus Retrofit)
  - Minergie (Swiss)
  - Carbon Lite (UK AECB)
    - Passivhaus interpretation for UK climate and energy mix
    - Carbon Lite Retrofit (CLR)

# Many Energy Regulations and Design Standards compared

[illegible]



# Water Design Standards

- Building Regulations Approved Document G
  - Part L update was found too hard to take
  - Part G update was easy to address but postponed
- **BREEAM water credits**
  - Calculation made no sense
    - Fill the bath to overflow then get in
  - Freedom of Information Act
    - BRE Staff: 'Calculator does not work'
    - BRE Management: 'We go live tomorrow'
- **AECB Water standard**
  - **Realistic standards**
    - avoiding retrofit of power showers

# Biodiversity

- BCT Biodiversity for Building tool
- BCT Biodiversity for Planning tool website
- BCT RSPB RIBA Book Biodiversity & Building
  - Brian Murphy: produced 50% of book content
  - 1<sup>st</sup> Edition: Biodiversity for Low and Zero carbon Buildings: A Technical Guide for New Buildings
  - 2<sup>nd</sup> Edition: Added refurbishment and Green Infrastructure ISBN: 9-781859-463536
  - 3<sup>rd</sup> Edition: being discussed now: MMC to add

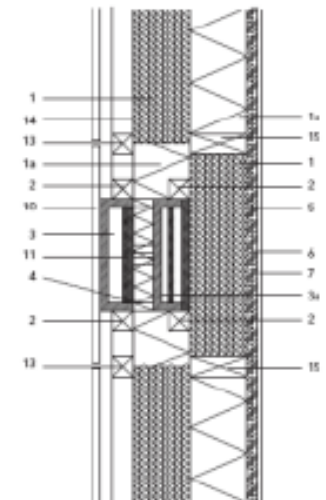
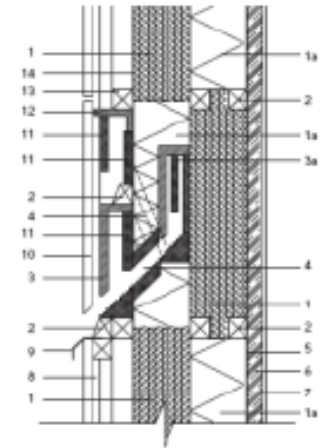
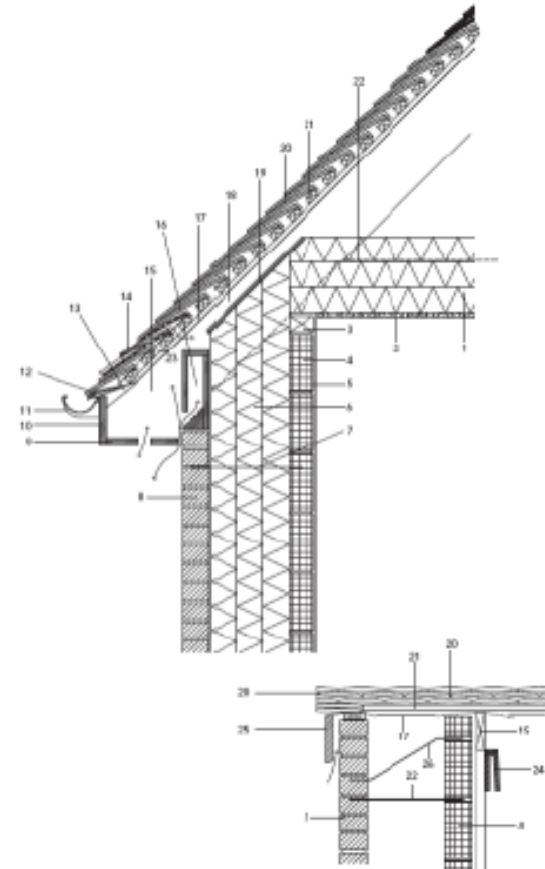
# Designing for Biodiversity: A technical guide for new and existing buildings

Kelly Gunnell, Brian Murphy and Dr Carol Williams

Second Edition

RIBA Publishing

Bat Conservation Trust



Plan

Designing

# Wider issues

- **GBE HERACEY™**
  - Healthy Environmental Resourceful Appropriate  
Competent Effective Yardstick (400 criteria)
- **Minergie P + Eco (Swiss)**
  - Energy, Passivhaus and Eco
- **Passivhaus + Eco (Austria) IBO Book**

# Health and Wellbeing (H&W)

- Ska
  - Fit-out & Refit; Good Practice Measures (GPM)
  - Retail (R), Office (O), Higher Education (HE);
  - Broader scope and better application than BREEAM
  - HE addresses H&W substantially
- BREEAM
  - Addresses H&W superficially
- WELL (USA) Health and Wellbeing
  - in the UK already
  - £££ assessments and tests carried out in USA
- Building Biology Association (BBA)
  - German Institute's standards developing since 1960's
  - Choice of healthy materials and method of construction
  - 2 day TGR training course with design manual

# Retrofit

- EnerPHit (Passivhaus for **Retrofit**)
  - Carbon Lite Retrofit (AECB interpretation of EnerPHit for UK Climate & Energy Mix)
- **GreenDeal funding scheme: failed**
  - 25m homes to retrofit by 2050
- **Energy Company Obligation (millions of properties upgraded, many badly)**
- **'Each Home Counts' Bonfield review**
- **'Whole Building Plan' Parity Projects**
- **Address: Performance Gap**
- **Sustainable Traditional Building Alliance (STBA)**
  - Take care of pre-1919 historic buildings
  - STBA Guidance Wheel
  - No insulation, without ventilation
- **Trustmark, Quality Mark, Guarantee scheme**
- **Risk Assessment: 3 approaches, 3 levels of risk**
  - BS 5250 Condensation risk Assessment (Static: inadequate)
  - BS 7913 Historic Significance Assessment
- **Publically Available Specification**
  - PAS 2030:2019:Installation
  - PAS 2035:2019:Design (publication imminent)

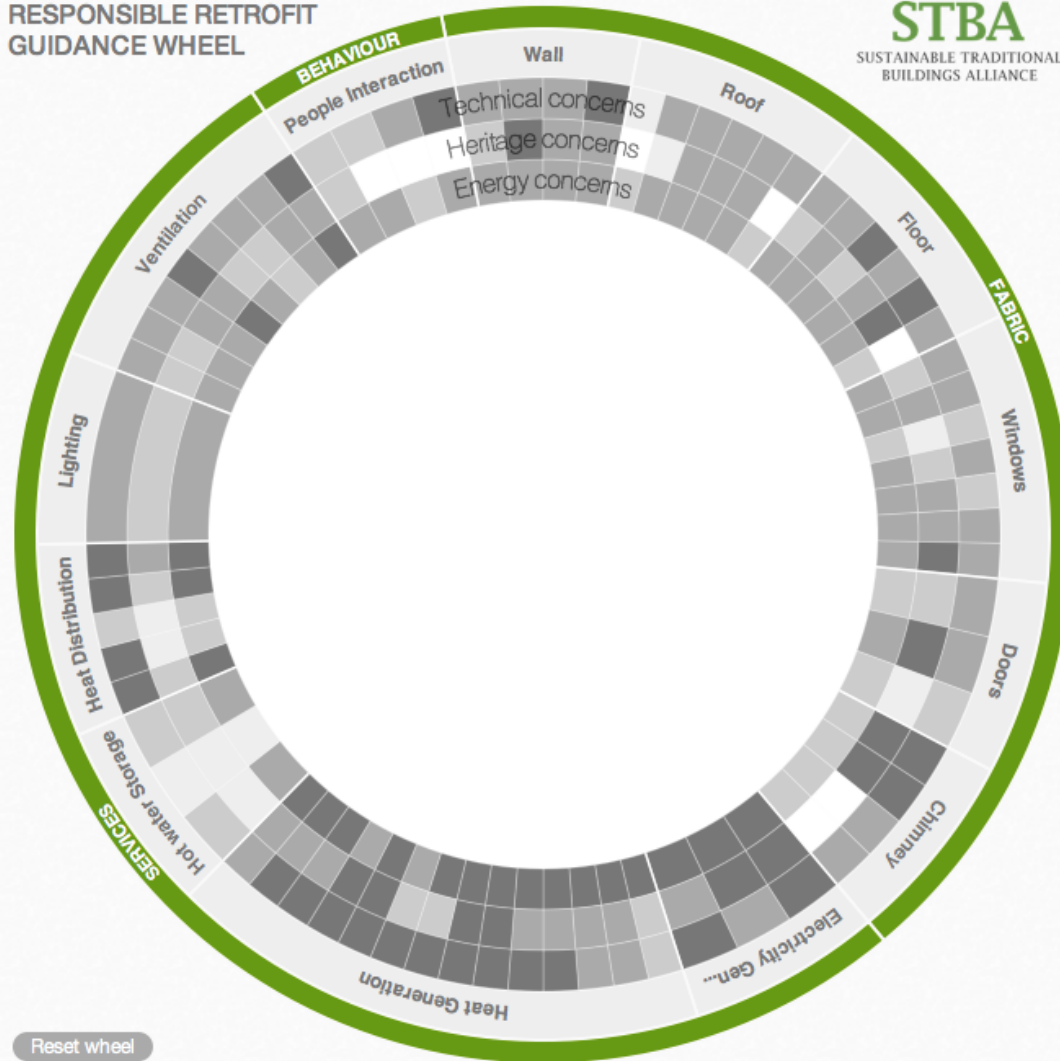
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All Categories



<http://www.responsible-retrofit.org>

## RESPONSIBLE RETROFIT GUIDANCE WHEEL



► Colour key

► Building context



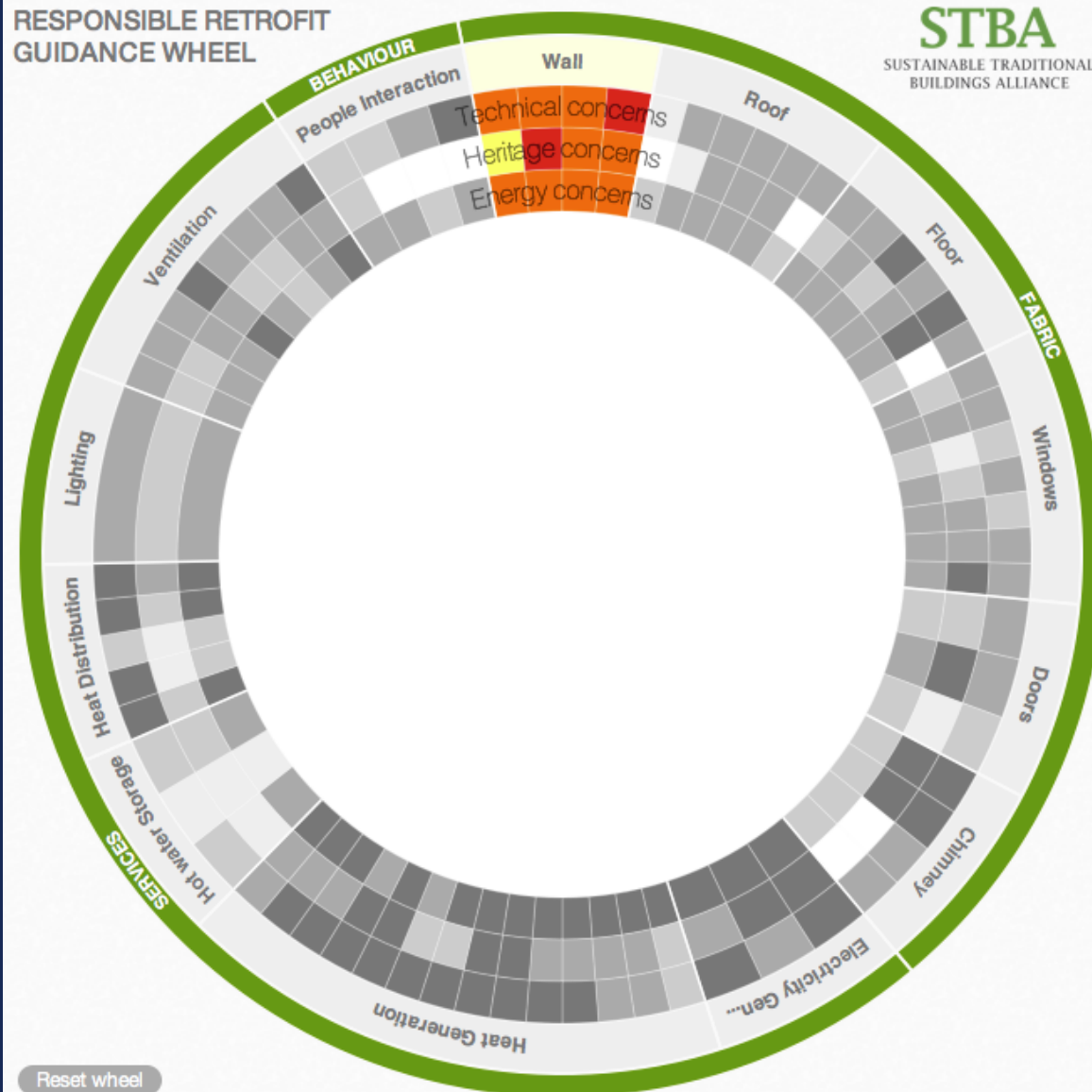


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All Categories



## RESPONSIBLE RETROFIT GUIDANCE WHEEL



**STBA**  
SUSTAINABLE TRADITIONAL  
BUILDINGS ALLIANCE

GETTING STARTED

ABOUT

GLOSSARY

REPORT

### ► Colour key

### ► Building context

#### Wall

Wall measures look at the introduction of insulation in traditional wall construction. The options look at alternative positions of the insulation layer within the wall: within a existing cavity, external or internal to a solid wall construction or within a framed wall construction. Depending on context different solutions may be considered for different building elevations.

#### Cavity Wall Insulation

#### External Wall insulation

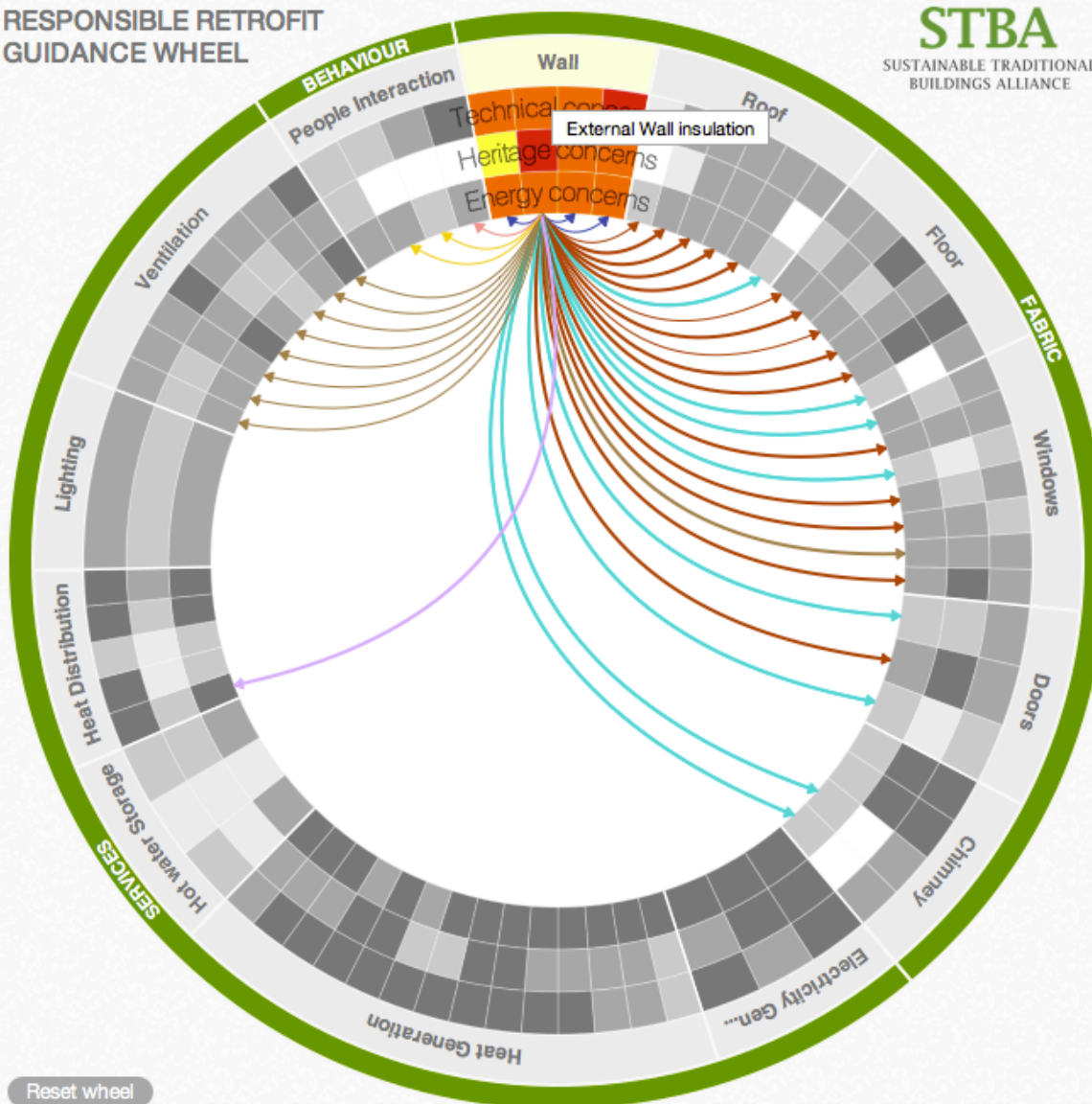
#### Internal Wall insulation

#### Frame infill insulation

CLOSE CATEGORY



## RESPONSIBLE RETROFIT GUIDANCE WHEEL



## STBA

SUSTAINABLE TRADITIONAL  
BUILDINGS ALLIANCE

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Wall

### External Wall insulation

Application of an insulation material and a weather-protective finish to the outside of the wall

ADD TO LIST

CLOSE MEASURE

### ► Advantages

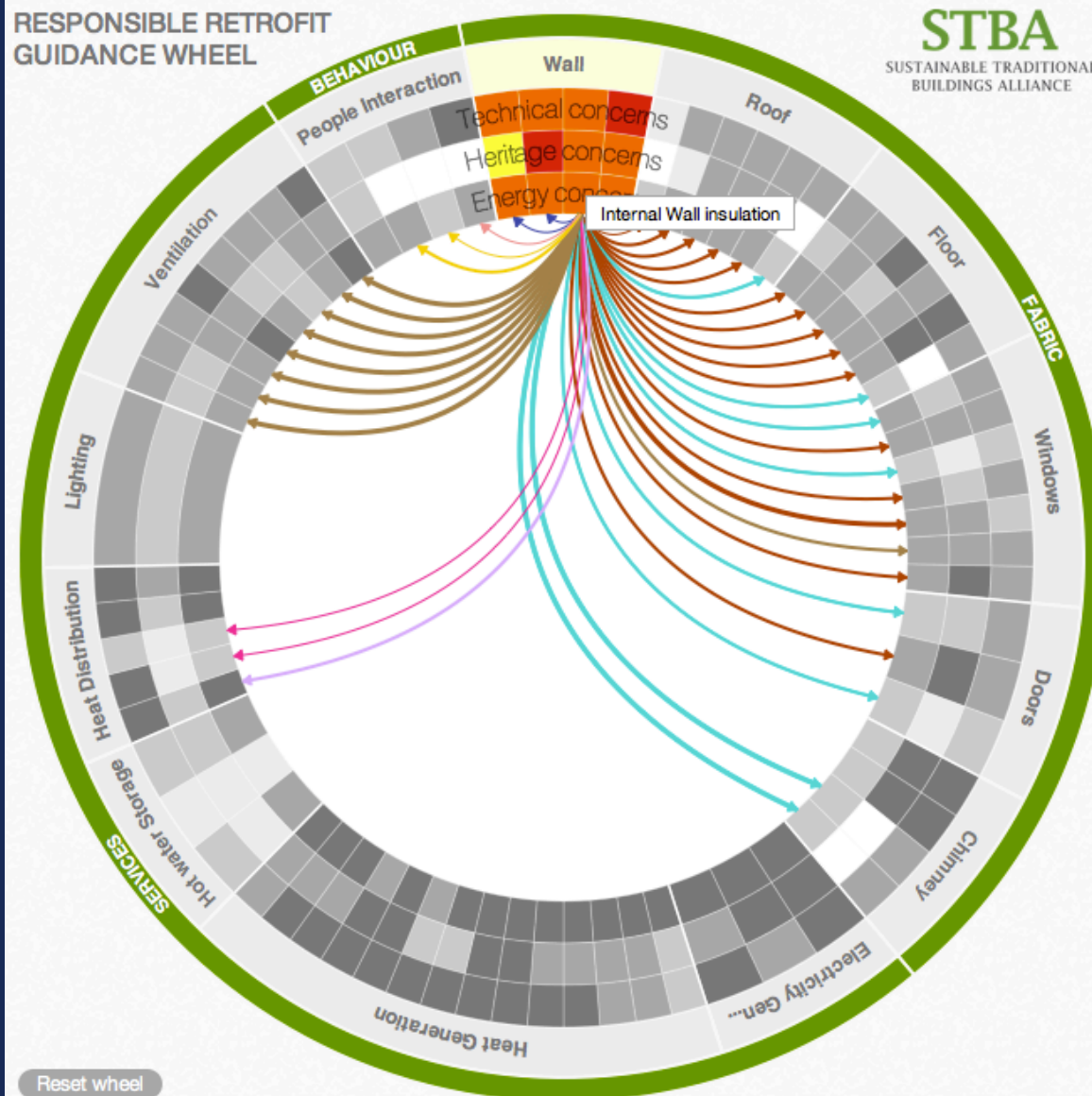
### ► 7 Technical Concerns

### ► 3 Heritage Concerns

### ► 3 Energy Concerns

### ► Related measures

## RESPONSIBLE RETROFIT GUIDANCE WHEEL



### ► Colour key

### ► Building context

#### Wall

### Internal Wall insulation

Insulation material is fixed to the inside surface of external walls and new internal finishes applied or insulation is blown behind existing linings

ADD TO LIST

CLOSE MEASURE

### ► Advantages

### ► 8 Technical Concerns

### ► 3 Heritage Concerns

### ► 3 Energy Concerns

### ► Related measures

# Whole House Plan

# Plan the Journey

- Know your destination
- Then your meanderings all lead to the same destination
- Without detours
- Without going round in circles
- Without treading the same path twice

# House plan

- Showing the final insulation regime
- Modify the services installations with the final insulation regime in mind
- Avoid servicing > undoing services > insulating > re-servicing
- Or avoid services and insulation in the same place or insulate first
- Radiators not on the external wall
- Insulate in patches then service
- Insulate wall then boiler
- Insulated underfloor heating and no radiators

## Plan

External wall

External wall  
Thermal insulation  
Thermal bridges  
Through ducts &  
Party wall  
Internal party wall  
thermal insulation  
Duct Space  
insulation

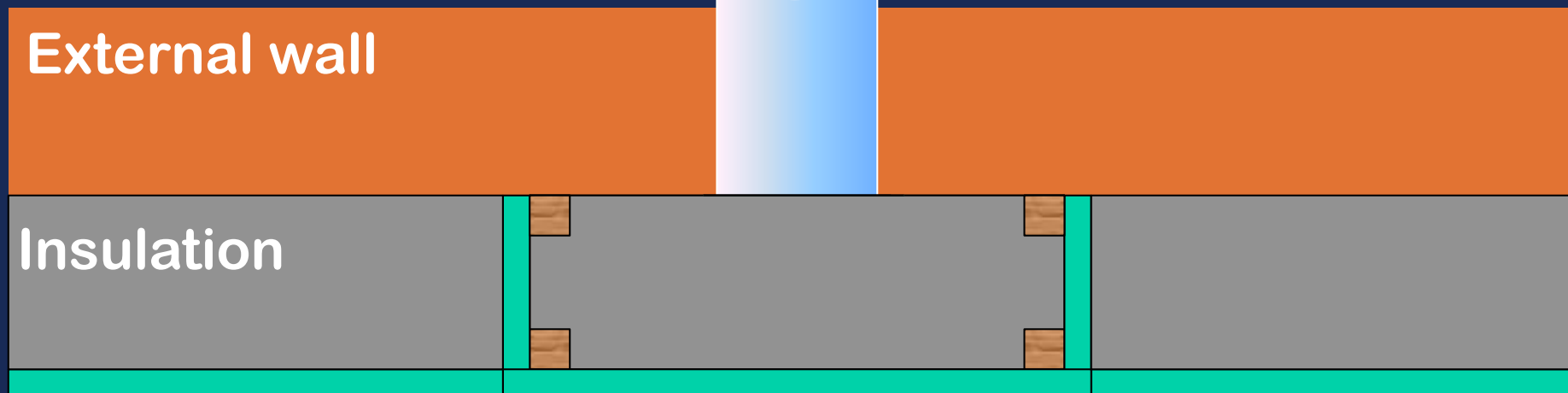
Party Wall  
chimney breast

Limited access  
to services  
To connect  
To insulate  
To make air tight  
To maintain  
To fix leaks  
To replace

14/02/19

not pipe lagging

## Plan







# 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 download the whole file
- You will find a large number of other files there too

# 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
- From time to time they will get updated

# © GBE 2019

- Brian Murphy BSc Dip Arch (Hons+Dist)
  - Technician and Architect by Training
  - Specification Writer by Choice
  - Environmentalist by Actions
- Greening up my act since 1999
- Founded National Green Specification 2001
- Launched [www.greenspec.co.uk](http://www.greenspec.co.uk) 2003
- Created: GBE at <https://greenbuildingencyclopaedia.uk> 2015
- E [BrianSpecMan@icloud.com](mailto:BrianSpecMan@icloud.com)
- Twitter: <http://twitter.com/brianspecman>
- Twitter: [@GBEGreenBuild](https://twitter.com/GBEGreenBuild)
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- CAP'EM Compass <http://www.capemcompass.eu> No longer
- LSBU London South Bank University Faculty and Course website page [Brian Murphy](#)