Fforwm BREEAM

The Association of Assessors in Wales
Cymdeithas Aseswyr Cymru

www.fforwmbreeam.co.uk

BREEAM New Construction 2011 Explained

Before 2011

BREEAM 2008 - the good old days!

Huw Jenkins

Centre for Research in the Built Environment

Welsh School of Architecture

ACRONYMS

BRE = **B**uilding **R**esearch **E**stablishment

BREEAM = **B**uilding **R**esearch **E**stablishment
Environmental **A**ssessment **M**ethod

SBEM = **S**implified **B**uilding **E**nergy **M**ethod

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What is BREEAM?

- Environmental Assessment Method
- Certification scheme
- Independent & credible
- Holistic
- Customer focused
- Credits based

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The Main Aims :

- To reduce the environmental impacts of developments.
- To provide a credible, environmental label for buildings.
- To stimulate demand & illustrate economic benefits of environmentally sustainable buildings to stakeholders & clients.
- Recognise best practice.
- Provide comprehensive method of measuring and monitoring environmental performance.

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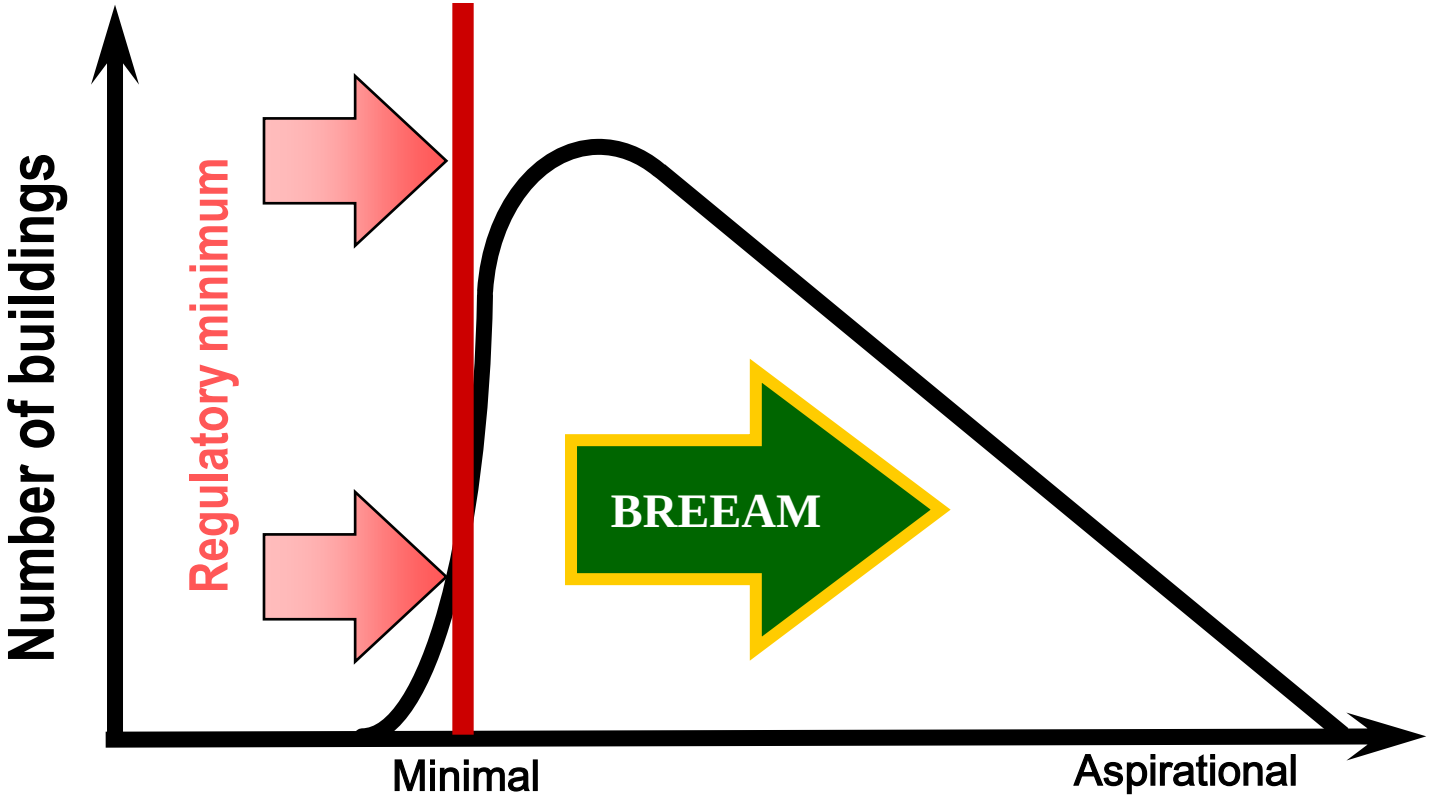

The Demand "Early Aspirations"

•Feb 2007 "All new buildings in Wales to be zero carbon by 2011…..BREEAM excellent as a core condition for all Assembly Government funding, grants, investments, joint ventures and land disposals." Carwyn Jones, Statement to National Assembly

•2009 Planning Policy Wales require any non domestic building over 1000m_2 to achieve BREEAM very good plus mandatory energy credits for excellent.

Which building types can be assessed?

- Offices ✓
- Homes ✓
- Shopping Malls ✓
- Light Industrial Buildings ✓
- Schools ✓
- Prison House Blocks ✓
- Crown Courts ✓
- Job Centres ✓
- Health Buildings ✓
- Heavy Industrial Buildings ✓
- Sports Facilities ✓
- Higher Education ✓
- Garden Sheds ✓

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The Different Schemes:

- Offices
- Schools
- Industrial
- Retail
- Code for Sustainable Homes
- Multi-Residential
- EcoHomes XB
- Courts
- Prisons
- Bespoke

What is the methodology?

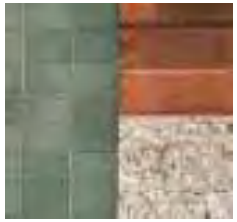
- A method for scoring a building or development's environmental performance. The development scores credits by achieving different criteria.
- This leads to a percentage score, e.g. 62%
- The development will then achieve a BREEAM rating of 'PASS', 'GOOD', 'VERY GOOD', 'EXCELLENT' or even 'OUTSTANDING'.
- The major advantage of the scheme is that it allows developments to use very different methods to achieve the same score, instead of specifiers using strict, restrictive criteria.

  However there are now a few mandatory credits that have to be achieved!

BREEAM Categories

Energy

Water



Materials

Transport

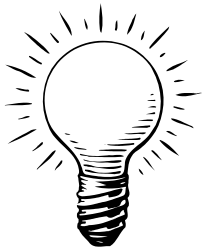
Waste

Pollution

Health & Well-being

Management

Land Use & Ecology



Innovation

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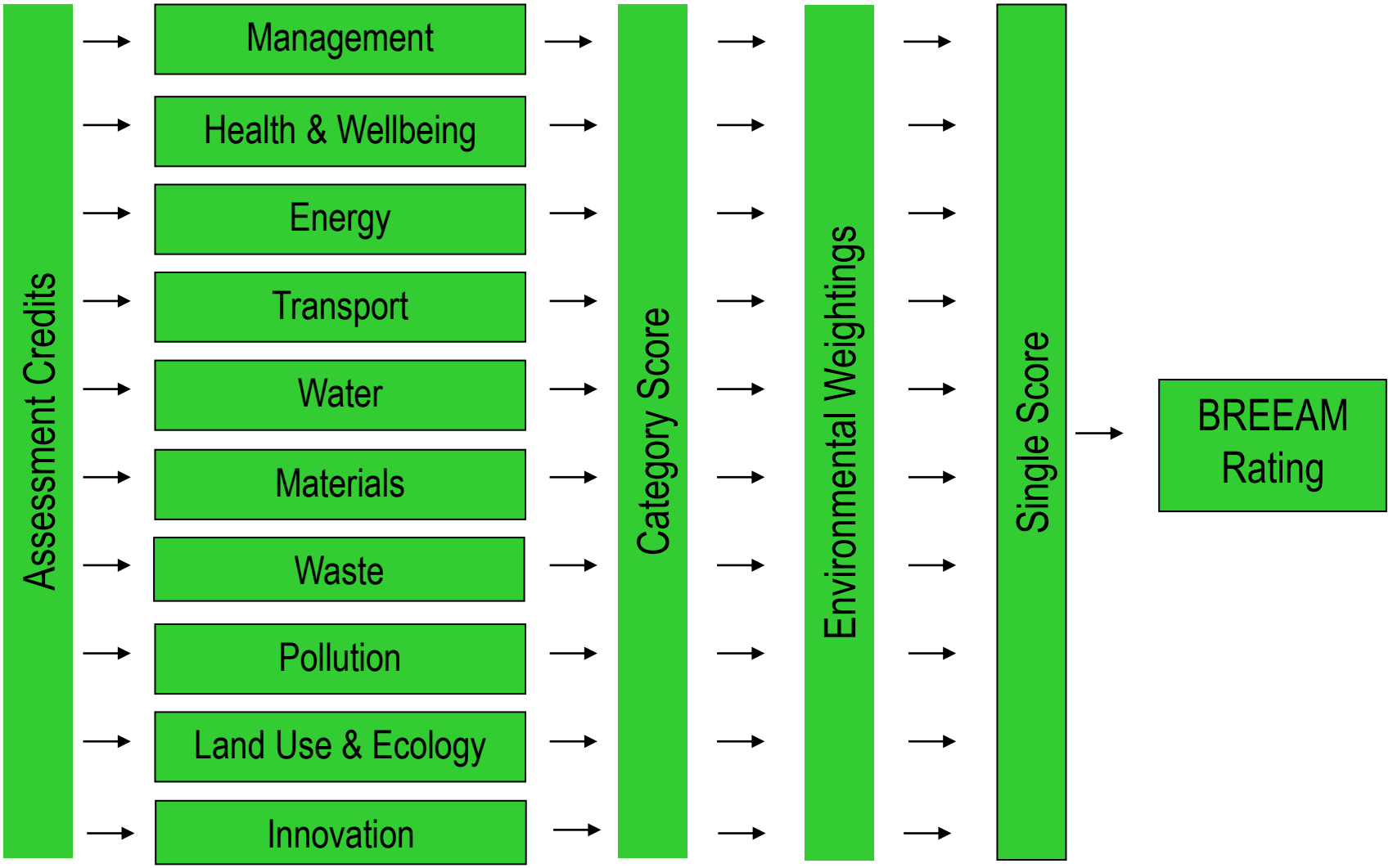

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Building Performance by Section					
	Environmental weighting	Credits available	Credits achieved	% Achieved	Weighted Score
Management	12.00%	10.00	9.00	90.00%	10.80%
Health & Wellbeing	15.00%	13.00	12.00	92.31%	13.85%
Energy	19.00%	21.00	10.00	47.62%	9.05%
Transport	8.00%	10.00	8.00	80.00%	6.40%
Water	6.00%	6.00	5.00	83.33%	5.00%
Materials	12.50%	13.00	7.00	53.85%	6.73%
Waste	7.50%	7.00	6.00	85.71%	6.43%
Land Use & Ecology	10.00%	10.00	10.00	100.00%	10.00%
Pollution	10.00%	12.00	7.00	58.33%	5.83%
Innovation	10.00%	10.00	2.00	20.00%	2.00%
				Total BREEAM Score	**76.09%**

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BREEAM Ratings

Assessment is awarded on overall weighted score:

Non-Domestic Assessments (not Retail)

30%+ = Pass

45%+ = Good

55%+ = Very Good

70%+ = Excellent

85%+ = Outstanding

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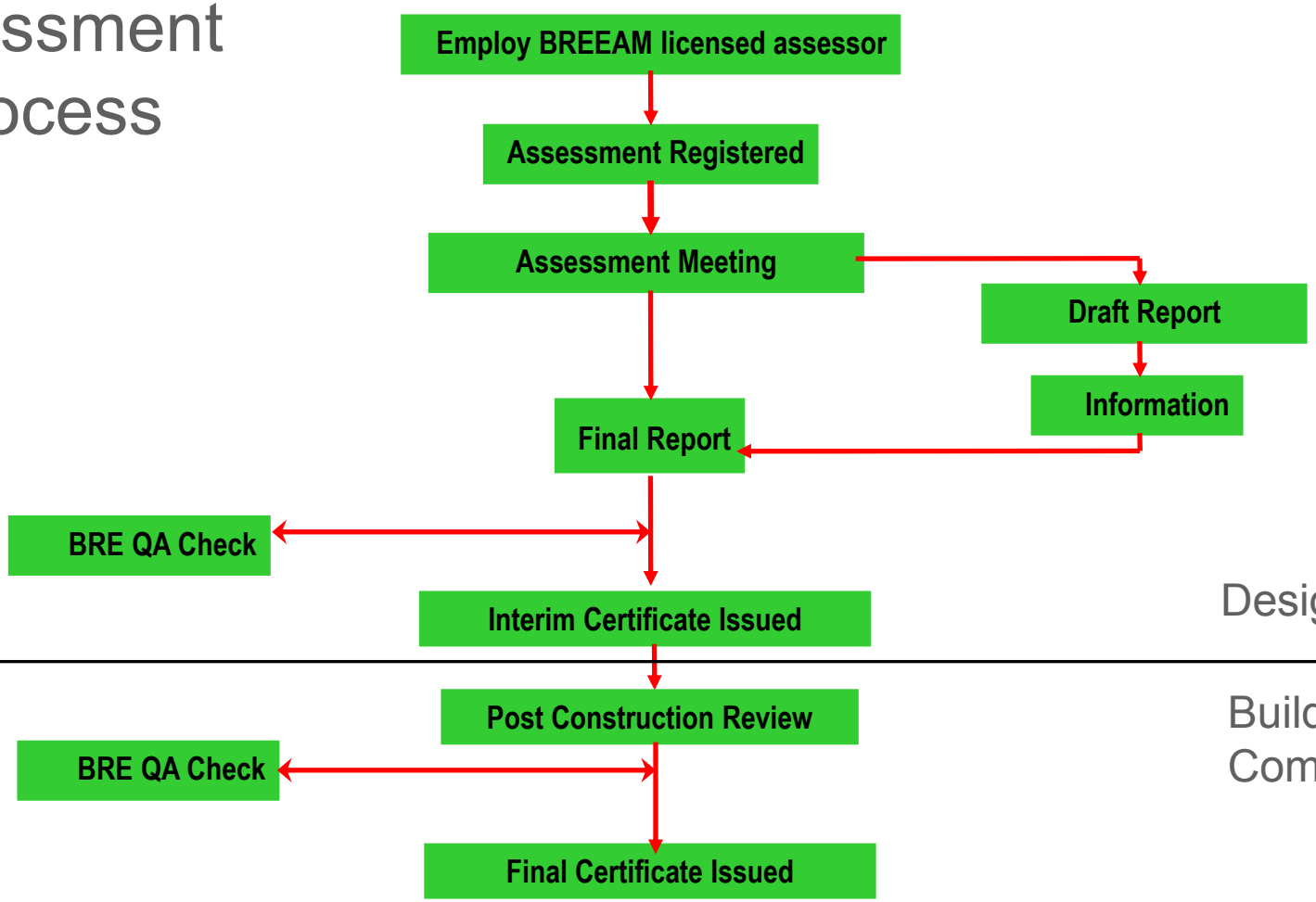
Assessment Process



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BREEAM

Environmental Assessment Award

This is to certify that

National Assembly for Wales,
Cardiff Bay,
Wales

has achieved the rating of

EXCELLENT

Under

Bespoke BREEAM

This assessment was carried out at the
DESIGN STAGE

Signed on behalf of Building Research Establishment Ltd

24 January 2006

	Steve Webster		TPS Consult
	National Assembly for Wales		Taylor Woodrow Construction Ltd
	Richard Rogers Partnership		BDSP Partnership

BRE

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Key Performance Indicator

- Attempting to quantify the indefinable
- Must be, and perceived to be rigorous
- All credits awarded must be based on auditable trail of evidence (Note these are generally assessments on a design stage and can only be assessed on evidence of commitment).

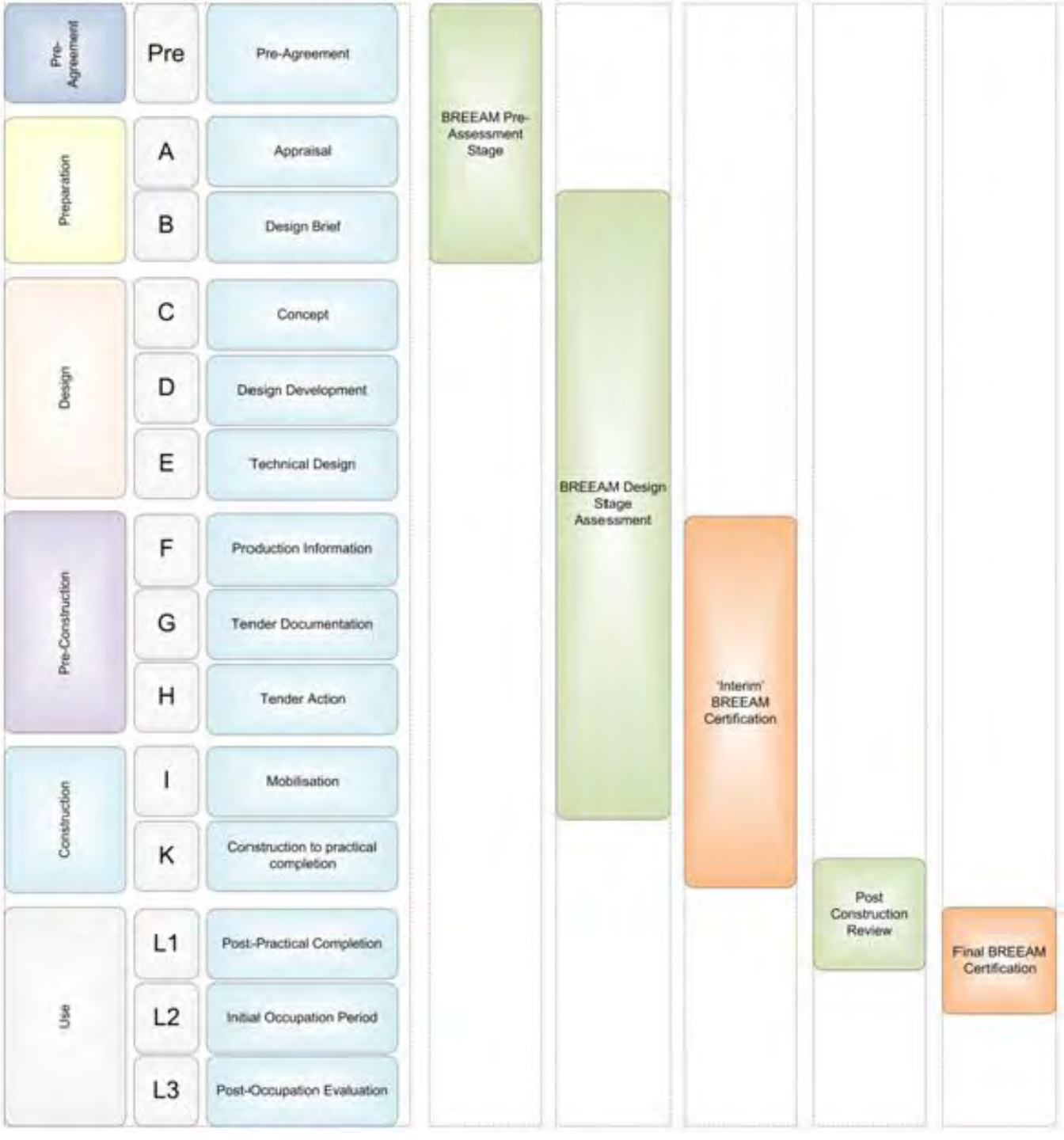
Key Performance Indicator

- Assessors manual and guidance extremely prescriptive and assessment report heavily QA'd, by BRE.
- **There is no scope for discretionary license.** (Its not our fault if we appear to be awkward)
- This rigor is to ensure that quality of certification is uniform and continues to be credible.

BREEAM 2011 Changes

- Drivers
- Structural
- Technical
- Operational

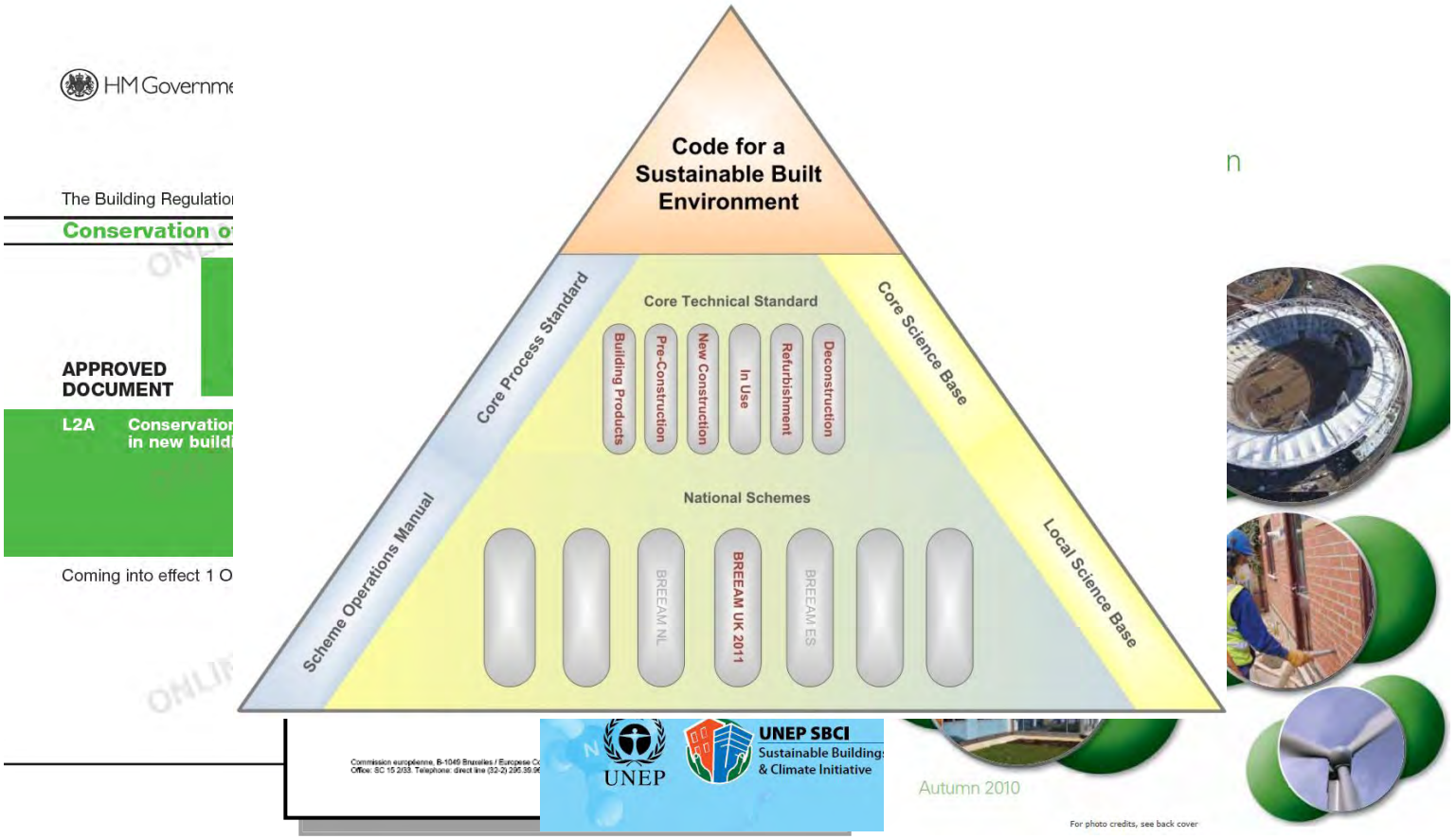
Timings:


Pre-Agreement
Pre
Pre-Agreement
Preparation
A
Appraisal
B
Design Brief
Design
C
Concept
D
Design Development
E
Technical Design
Pre-Construction
F
Production Information
G
Tender Documentation
H
Tender Action
Construction
I
Mobilisation
K
Construction to practical completion
Use
L1
Post-Practical Completion
L2
Initial Occupation Period
L3
Post-Occupation Evaluation
BREEAM Pre-Assessment Stage
BREEAM Design Stage Assessment
'Interim' BREEAM Certification
Post Construction Review
Final BREEAM Certification

Drivers & Influences

- New regulation & standards
- Industry/user feedback
- Continual improvement

New and up-coming regulation and standards



Scope of BREEAM 2011

- Consolidation: One ‘assessment manual’
- 49 assessment issues, across 9 environmental sections
- Scheme defines and measures ‘core’ issues and impacts (links to the CSBE)
- Criteria still accounts for;
  - building type, occupancy and usage differences
  - standards, opportunities and niches

ENERGY	WATER
Reduction of CO_2 emissions	Water consumption
Energy monitoring	Water monitoring
Energy efficient external lighting	Water leak detection and prevention
Low or zero carbon technologies	Water efficient equipment (process)
Energy efficient cold storage	**WASTE**
Energy efficient transportation systems	Construction waste management
Energy efficient laboratory systems	Recycled aggregates
Energy efficient equipment (process)	Operational waste
Drying space	Speculative floor and ceiling finishes
TRANSPORT	**MATERIALS**
Public Transport Accessibility	Life Cycle Impacts
Proximity to amenities	Hard landscaping and boundary protection
Cyclist facilities	Responsible sourcing of materials
Maximum car parking capacity	Insulation
Travel Plan	Designing for Robustness
LAND USE & ECOLOGY	**POLLUTION**
Site selection	Impact of Refrigerants
Ecological value of site/Protection of ecological features	NO_x emissions from heating/cooling source
Mitigating ecological impact	Surface Water Run-Off
Enhancing site ecology	Reduction of night time light pollution
Long term impact on biodiversity	Noise attenuation
HEALTH & WELLBEING	**MANAGEMENT**
Visual comfort	Sustainable Procurement
Indoor air quality	Responsible Construction Practices
Thermal Comfort	Construction site impacts
Water Quality	Stakeholder Participation
Acoustic performance	Service Life Planning and Costing
Safety and Security	

Scope of BREEAM 2011: building types

Sector	Building type
Commercial	Offices Industrial Retail
Public (non housing)	Education Healthcare Prisons Law courts
Multi-residential accommodation	Sheltered accommodation Halls of residence Residential care homes Military barrack Local Authority secure accommodation
Assembly and Leisure	Cinema Theatre/music/concert hall Exhibition/conference hall Indoor or outdoor sports/fitness and recreation
Other non residential	Art gallery, Museum Library Day centre, hall/civic/community centre Place of worship
Other residential	Hotel, Hostel, Boarding and guest house Secure training centre Residential training centre

Minimum standards

BREEAM issue	PASS	GOOD	VERGY GOOD	EXCELLENT	OUTSTANDING
Man01: Sustainable procurement	One credit	One credit	One credit	One credit	Two credits
Man02: Responsible construction practices	-	-	-	One credit	Two credits
Man04: Stakeholder participation	-	-	-	One credit (Bulding User Guide)	One credit (Bulding User Guide)
Hea01: Visual comfort	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Hea04: Water quality	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Ene01: Reduction of CO_2 emissions	-	-	-	Six credits	Ten credits
Ene02: Energy monitoring	-	-	One credit (sub-metering)	One credit (sub-metering)	One credit (sub-metering)
Ene04: Low or zero carbon technologies	-	-	-	One credit	One credit
Wat01: Water consumption	-	One credit	One credit	One credit	Two credits
Wat02: Water monitoring	-	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Mat03: Responsible Sourcing	Criterion 3 only	Criterion 3 only	Criterion 3 only	Criterion 3 only	Criterion 3 only
Wst01: Construction waste management	-	-	-	-	One credit
Wst03: Operational waste	-	-	-	One credit	One credit
LE03: Mitigating ecological impact	-	-	One credit	One credit	One credit

Technical changes and additions

- Energy & reduction of CO_2 emissions
- Water consumption
- Low or zero carbon technologies
- Life cycle impacts (building elements/materials)
- Sustainable procurement
- Other changes to look out for

Man 01: Sustainable procurement

- New approach; embodying and consolidating existing BREEAM 2008 elements

- Aligns with the principles of the ‘soft landings’ framework

- Project brief and design (4 credits)
  - Defining main stakeholders roles and responsibilities
    - End user reqs > design strategy > handover and occupation
  - Use of BREEAM Accredited Professional (at key stages)
    - Facilitation, monitoring and reporting progress
    - BREEAM performance targets contractually set and agreed

- Construction and handover (2 credits)
  - Targeting construction defects (thermographic survey)
  - Building services commissioning (as existing criteria)

Man 01: Sustainable procurement

- ‘Aftercare’ (2 credits) - Aim: deliver a functional, sustainable asset in accordance with expectations
- Assessment criteria
  - First 12 months after handover
  - Seasonal commissioning (as existing)
  - Mechanism for building data collection, comparability and analysis
  - Provision of ‘aftercare’ support to building occupants
    - Aftercare team/individual
    - Building user guides
    - FM support
- Exemplary level of performance
  - First three years of occupation
  - FM collection of occupant satisfaction, energy and water data
  - Check performance, set targets
  - Provision of data to BRE Global
  - BREEAM In Use scheme

Technical Advice Note 22 & Planning Policy Wales

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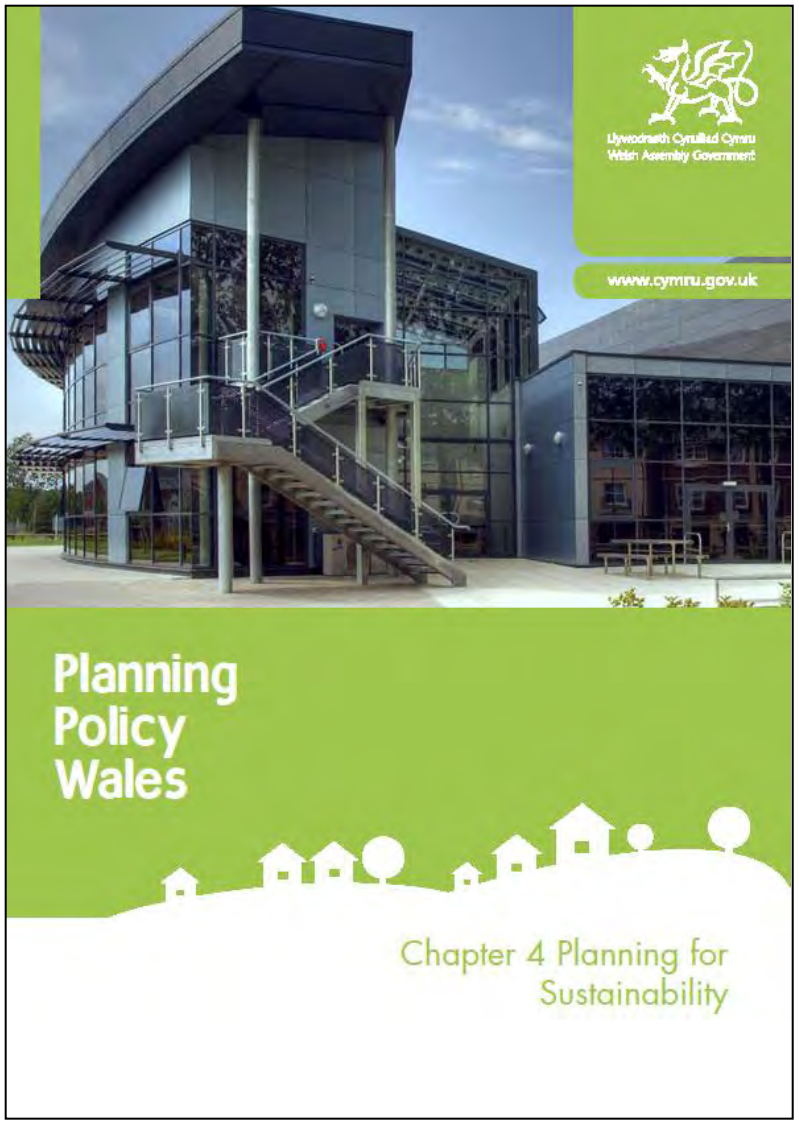


Technical Advice Note 22 & Planning Policy Wales

Date	Type	Threshold	Standard Expected	Energy
1st September 2009	Residential	5 units or more	CSH Level 3	**6 credits for Ene1 31% reduction in CO_2**
	Non-residential	1,000 sqm or more	**BREEAM 'Very Good'**	**6 credits for Ene1 CO_2 index (EPC rating) <40**
1st September 2010	Residential	1 or more units	**CSH Level 3**	**6 credits for Ene1 31% reduction in CO_2**

Part L2A 2010 requirements

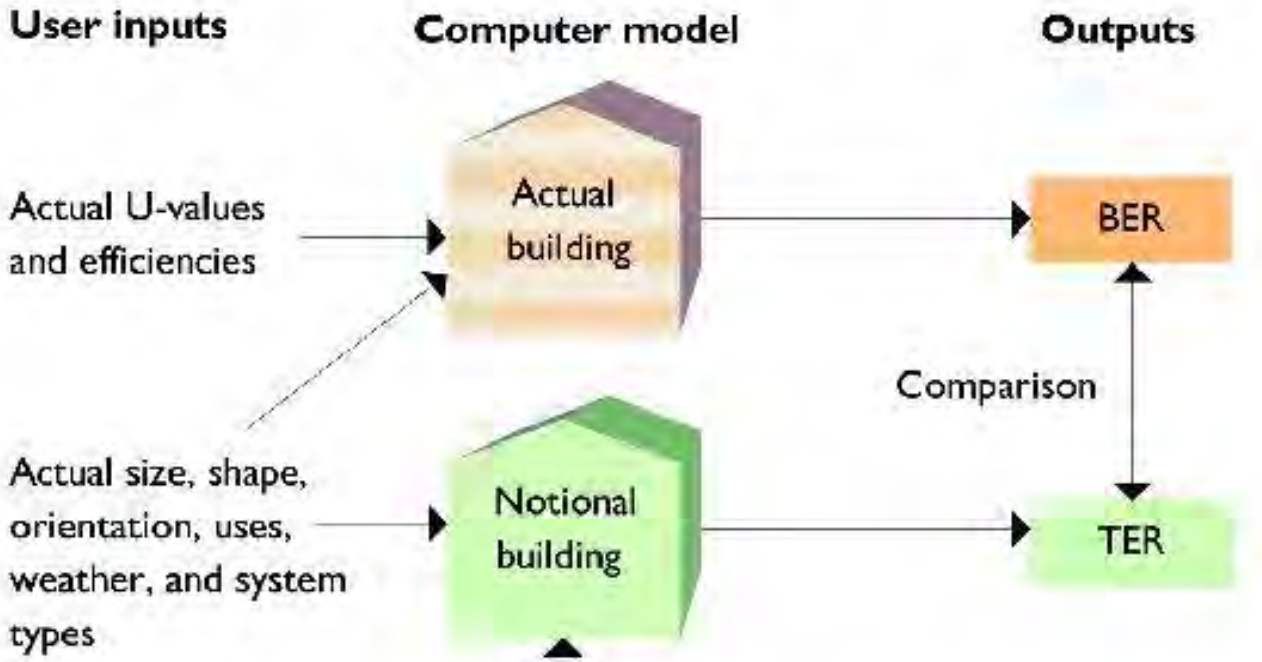
Recap on 5 criteria for Building Regulations Part L2A compliance

Criteria:

1. Building Emission Rate ≤ Target Emission Rate
2. Limits on design flexibility
3. Limiting the effects of solar gains in summer
4. Quality of construction & commissioning
5. Providing information / O&M instructions

Criterion 1

Building Emission Rate ≤ Target Emission Rate



Criterion 1

Building Emission Rate ≤ Target Emission Rate

Element	Notional building	
	2006	**2010**
Roof (W/m2.K)	0.22	0.18
Wall (W/m2.K)	0.30	0.26
Floor (W/m2.K)	0.25	0.22
Window (W/m2.K)	2.20	1.80
Lumens/Circuit Watt		55
Space heating	0.73 – 0.83	>0.86
Cooling	Cooling: 1.67	Cooling: 4.50
Air permeability	$10m^3/hr.m^2$	$5m^3/hr.m^2$

SBEM is not a design tool!!!!!

ENE1

AIM: To recognise and encourage buildings designed to minimise operational energy demand, consumption and CO_2 emissions

Available credits: 15

Minimum required for PPW: 6

Minimum required for 'Excellent' rating: 6

ENE1

How is it calculated?

Requires the use of BREEAM ENE1 calculator to give us an EPC ratio

ENE1

What does it mean?

In a nutshell – 25% improvement over 2010 ADL2A regulations for an Excellent rating or to comply with Planning Policy Wales

ENE1 calculator

Stage 1 – The BRUKL report

ENE1 calculator

Stage 2 – The all important figures

ENE1 calculator

BRUKL Output		
	Actual	Notional
Heating & Cooling demand [MJ/m^2]	113.81	138.31
Total consumption [kWh/m^2]	64.43	83.59
Total emissions [Kg/m^2]	19.50	19.80

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BREEAM credits	EPC ratio	Minimum requirements
1	0.05	• Requires a performance improvement progressively better than the Target Emission Rate (TER) required for Building Regulations approval.
2	0.15	
3	0.25	
4	0.35	
5	0.45	
6	0.55	• BREEAM Excellent: 6 credits • **Also requires a CO_2 calculation of 0.22 which is equivalent to a 25% improvement over current Part L regulations**
7	0.59	
8	0.63	
9	0.67	
10	0.72	• BREEAM Outstanding: 10 credits • Also requires a CO_2 calculation of 0.30 which is equivalent to a 40% improvement over current Part L regulations
11	0.75	
12	0.79	
13	0.83	
14	0.87	
15	0.90	

Excellent - Also requires a CO_2 calculation of 0.22 which is equivalent to a 25% improvement over current Part L regulations

Putting it in perspective

Case Study 1

Building details

- A small classroom block for a comprehensive school in Swansea
- Single storey
- Independent heating and DHW provision

SBEM is not a design tool!!!!!

Designed parameters

Element	Designed building	
	Actual	**Notional**
Roof (W/m2.K)	0.16	0.18
Wall (W/m2.K)	0.35	0.26
Floor (W/m2.K)	0.25	0.22
Window (W/m2.K)	2.20	1.80
Lumens/Circuit Watt	T5 lamps	55
Space heating	0.89	>0.86
Cooling	n/a	4.50
Air permeability	$10m^3/hr.m^2$	$5m^3/hr.m^2$
Renewable	n/a	n/a

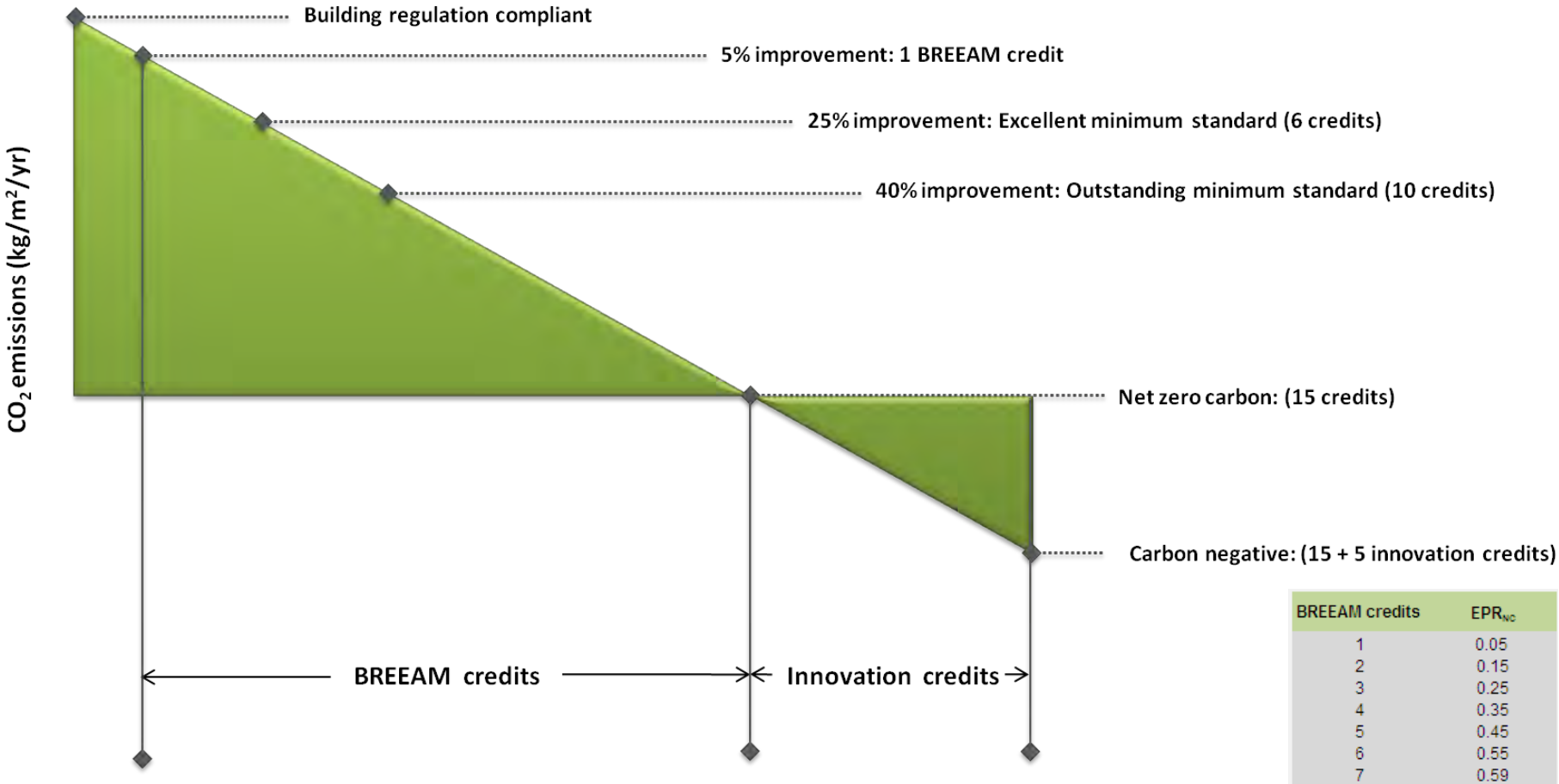
Part L2A ✓

Element	Designed building	
	Actual	**Notional**
Roof (W/m2.K)	0.15	0.18
Wall (W/m2.K)	0.25	0.26
Floor (W/m2.K)	0.16	0.22
Window (W/m2.K)	1.60	1.80
Lumens/Circuit Watt	T5 lamps	55
Space heating	0.90	>0.86
Cooling	n/a	4.50
Air permeability	$5m^3/hr.m^2$	$5m^3/hr.m^2$
Renewable	$20m^2$ solar thermal	n/a

ENE1 calculator

BRUKL Output		
	Actual	Notional
Heating & Cooling demand [MJ/m^2]	113.81	138.31
Total consumption [kWh/m^2]	64.43	83.59
Total emissions [Kg/m^2]	19.50	19.80

Calibrating performance



BREEAM credits	EPR_{NC}
1	0.05
2	0.15
3	0.25
4	0.35
5	0.45
6	0.55
7	0.59
8	0.63
9	0.67
10	0.72
11	0.75
12	0.79
13	0.83
14	0.87
15	0.90

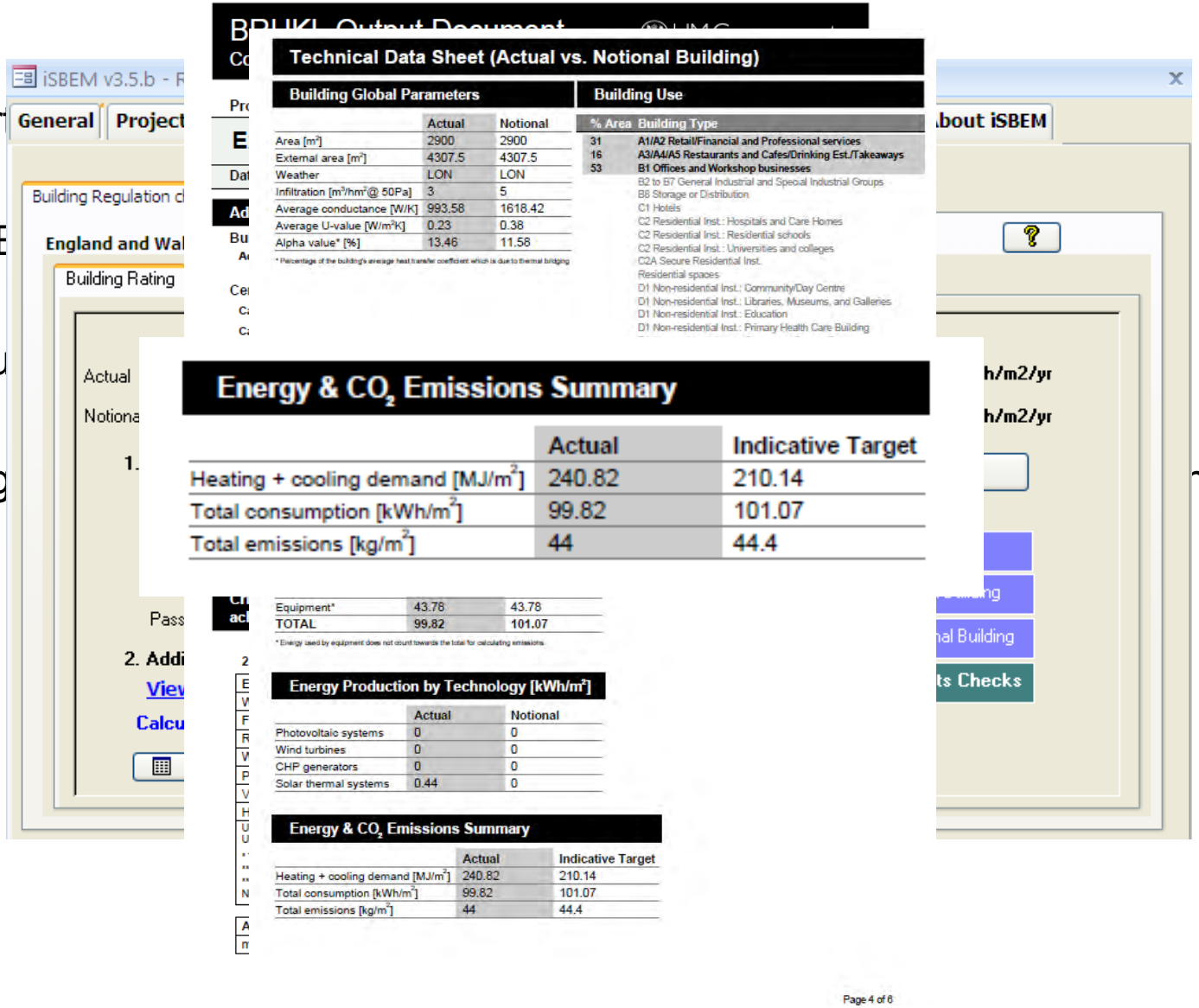
Translating performance

- Performance expressed as a ratio (EPR_{NC}) = BREEAM credits
- BREEAM Performance $EPR_{NC\ Total} = EPR_{NC\ Demand} + EPR_{NC\ Consumption} + EPR_{NC\ CO_2}$
- 3 steps to determining EPR_{NC}

  - Step 1: Calculate actual performance as a proportion of notional/TER
  - Step 2: “Translated” in to EPR_{NC}
  - Step 3: Demand/consumption/CO_2 weighting applied

Sourcing required data for Ene

- Par
- SBE
- Sou
- Pag



Ene 04: Low & zero carbon technology

- Benchmarks increased

(for upper levels)

- Additional BREEAM ‘credit’
- Life cycle carbon impact of technology addressed
  - % reduction in regulated (operational) CO_2 emissions
  - % reduction in embodied and operational CO_2 emissions

No of credits	% reduction in operational CO_2
1	Feasibility study
2	10%
3	20%
4 (Exemplary credit)	30%

No of credits	% reduction in life cycle CO_2 emissions
2	Feasibility study
3	10%
4	20%
5 (Exemplary credit)	30%

Wellbeing

- Visual comfort - 3-5 credits
- Indoor air quality - 4-6 credits
- Thermal comfort - 2 credits
- Water quality - 1 credit
- Acoustic performance -
- Safety and security - 2 credits - New issue:

Wat 01: Water consumption

- Expanded water consumption methodology
  - More building types covered
  - Updated occupancy usage data (activity database)
  - Baseline and five performance levels/standards defined
  - Accounts for greywater (BS8525) and rainwater harvesting systems (BS8515)

- Water consumption calculated and reported
  - litres/person/day
  - m^3/person/yr

- Minimum standards maintained
  - Good, V Good, Excellent = 1 credit
  - Outstanding = 2 credits

% improvement on notional baseline	No. of BREEAM credits
12.5%	1
25%	2
40%	3
50%	4
55%	5
65%	Exemplary performance

Component	Baseline	units
WC	6	litres
Wash hand basin taps	12	litres/min
Showers	14	litres/min
Baths	200	litres
Urinal (2 or more urinals)	7.5	litres/bowl/hr
Urinal (1 urinal only)	10	litres/bowl/hr
Greywater/rainwater system	0%	% flushing demand met by recycled
Kitchen tap: kitchenette	12	litres/min
Kitchen taps: restaurant	10.3	litres/min
Domestic sized dishwashers	17	litres/cycle
Domestic sized washing machines	90	litres/use
Waste disposal unit	17	litres/min
Commercial sized dishwashers	8	litres/rack
Commercial sized washing machines	14	litres/kg

Mat 01: Life cycle impacts

- Use of specific Environmental Product Declaration (EPD) data for an element or part element
- Can be used to calculate a bespoke Green Guide rating
- Accounts for the EPD methodology/type used to verify life cycle impact data
- Reporting of life cycle CO_2 emissions ($kgCO_2$):
  - Data available via Green Guide online
  - Total by element and for building

Waste Section

- Utilising the SWMP:
  - targets for minimisation should be set
  - Procedures for minimising waste defined
  - Procedures for monitoring and reporting
  - Procedures for sorting
  - Role specified and nominated
- Recycled aggregates:
  - Use in high grade areas
  - Obtained on site or within 30km
- Floor finished to fitted out offices:
  - Small area only

Land Use & Ecology

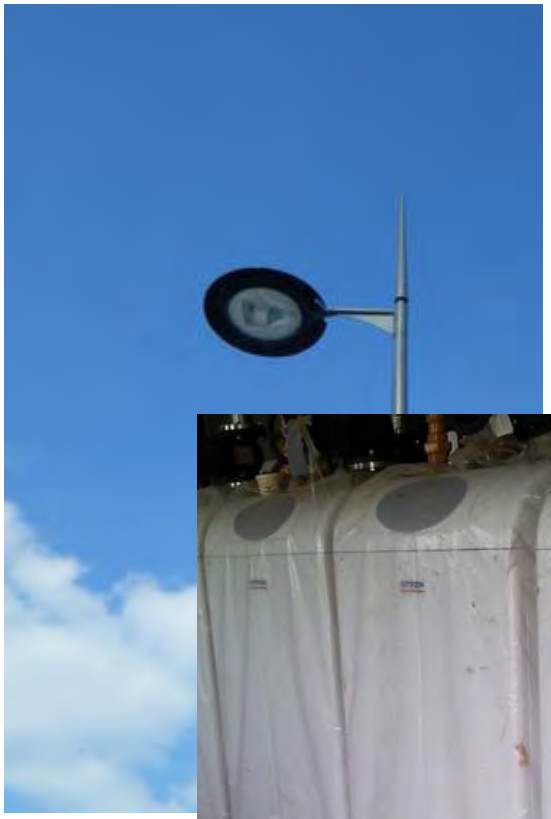
Ecological value conservation and enhancement

- Re-use of land
- Reclaimed contaminated land
- Ecological value of land
- Protection of ecological features
- Management plan and site practice
- Using an ecologist

Pollution

Air, water and social pollution issues

- Refrigerant / Insulant Global Warming Potential (GWP)
- NO_X emissions
- Minimising flood risk
- Water course pollution
- Renewable energy
- Light pollution
- Noise pollution



Technical changes: ones to look for….

- Stakeholder Participation: consolidation of consultation issues
- Construction waste management: updated benchmarks
- Impact of refrigerants: updated criteria
- Surface water run-off: aligns with CSH
- Responsible sourcing: review of schemes/tiers, hard landscaping element added, minimum req. for timber spec projects
- Ecological value of site: New checklist and data
- Thermal comfort: New criteria and reporting requirements
- Water quality: new issue, includes existing criteria
- Transport: ‘rural location sensitive buildings’
- Indoor air quality: additional credit, criteria and reporting requirements
- Service life planning and costing: re-defined criteria
- Construction site impacts: re-defined criteria
- Recycled aggregates: application specific benchmarks
- New exemplary levels of performance

Operational changes

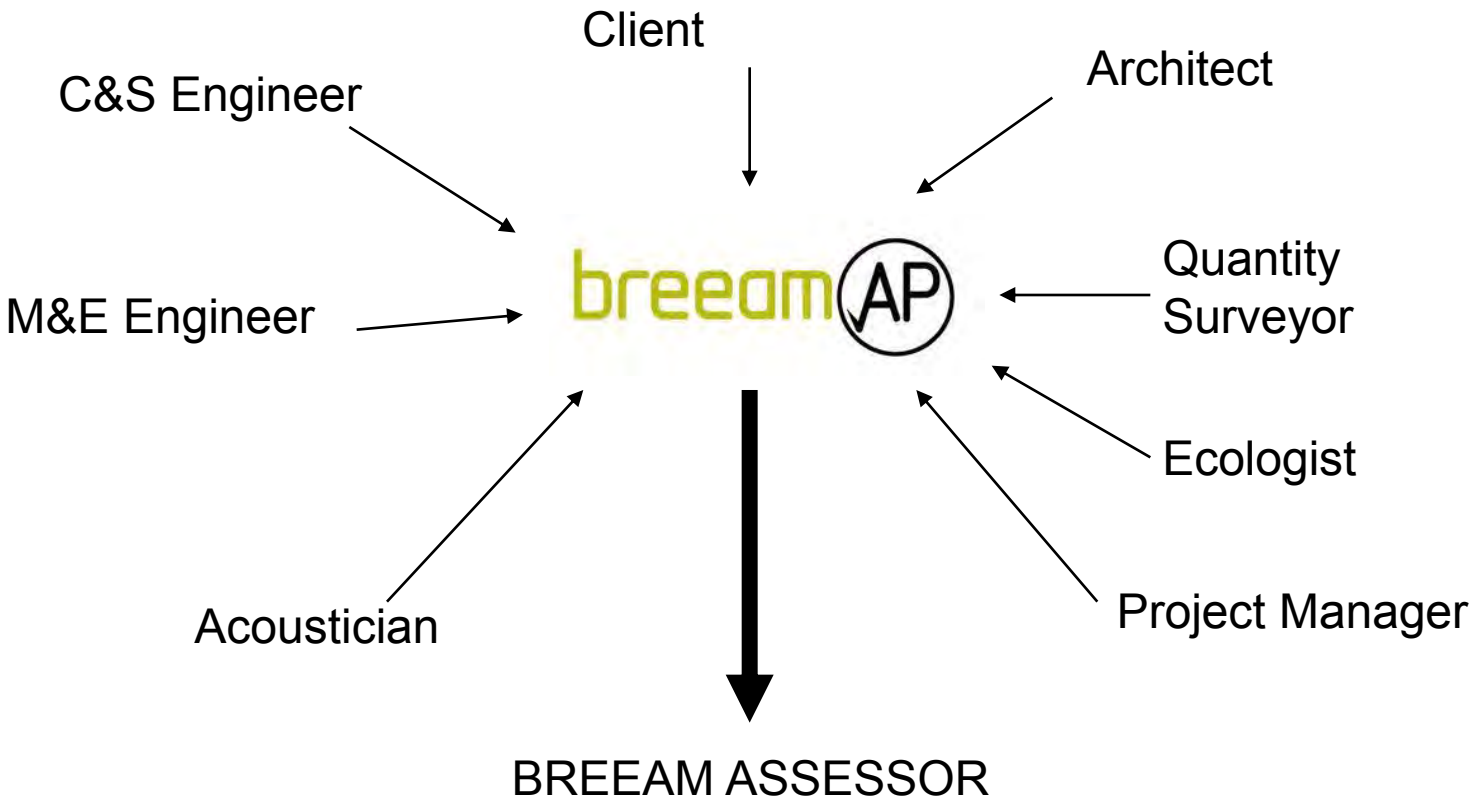
- Move away from paper-based reports and validation statements
- New assessment reporting and certification tool
- Server for electronic submission of reports/tools and evidence
- Updated licensing structure
- Updated training structure (for new and existing assessors, including no more test assessments)
- Updated registration and certification charging structure
- Listing of certified buildings on Green Book Live

Further information

- BREEAM 2011 live: July 1st 2011
- www.breeam.org/2011 (includes FAQs and technical guides)
- BREEAM certified buildings: www.greenbooklive.com

The way forward...

Important to have central point of contact to act as a hub.



Closing Suggestions

- Integrate BREEAM into page 1 of tenders & clauses
- Clauses raised for ‘Specification Bank’
- Early involvement of ALL
- “Development must achieve BREEAM excellent”
- Lead the team and ensure full proof is provided.
- Pre-assessment estimator checklists - be wary!

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Questions?

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Cymdeithas Aseswyr Cymru

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