

Module 4: Climate Change Planning for Construction

Andy Sheppard



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Aims and agenda

- Aim of the course is to provide an understanding of...

“...the broad context of sustainability as it relates to buildings, along with specific relevant issues in sustainable construction to enable successful policy development and deliver”

1. Varying scope of construction sustainability
2. Embedding sustainability into construction projects
3. BREEAM and the Code for Sustainable Homes
4. Sustainability metrics and implementation in policy



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Housekeeping

- Fire alarms
- Assembly points
- Toilets



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Activity 1: exploring scope and prioritisation



- Highest and lowest priority for the region
- If you've time: How does this change for global considerations?



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Each of the cards represents an issue of growing importance over the next decades that can be affected by planning policy for construction in some way.

Groups to choose their highest and lowest priority based on their region. How do the choices vary if the considerations are global.

If there are a small number of groups, record the results at the front and discuss difference. If there are a large number of groups, get them to hold up their top priority and discuss differences. Repeat for lowest priority if time.

Internal note – materials required:

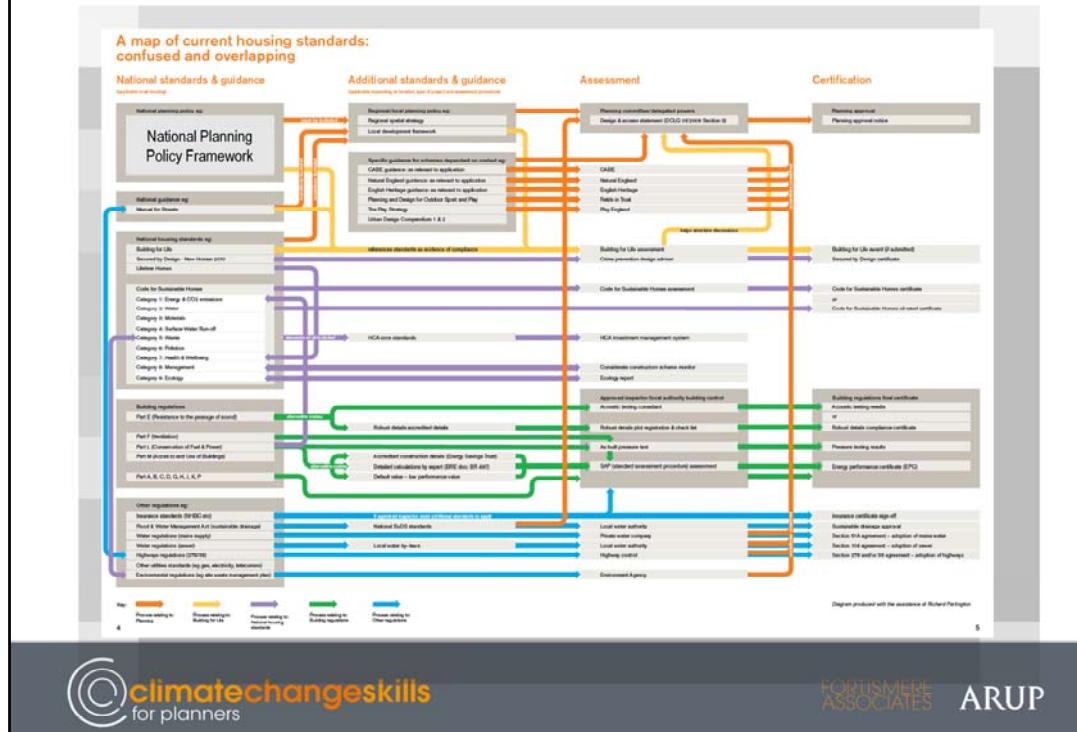
- A4 double sided printouts of each of the cards for each group (10 sets max?)

Session 1: Scope of construction related sustainability



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It can be a bit confusing...



This is what CABE thought in 2010 (from Improving the design of new housing: What role for standards?).

Clarification can help develop effective policies

We will provide this as a handout as well, for ease of reference.

Overview – inc. South Yorks. policies

	BREEAM Buildings	BREEAM Commun.	CSH	Building Regs	EPCs	National Planning (NPPF)	SY Doncaster	SY Sheffield
Regulated energy efficiency	Green	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Unregulated energy efficiency	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Regulated emissions	Green	Green	Green	Green	Green	Green	Green	Green
Unregulated emissions	Red	Red	Red	Red	Red	Red	Red	Red
Renewable energy	Green	Green	Green	Yellow	Yellow	Green	Green	Green
Passive design	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Construction impacts	Green	Green	Green	Red	Red	Red	Yellow	Yellow
Internal environment	Green	Green	Green	Red	Red	Red	Yellow	Yellow
Transport impacts	Green	Green	Red	Red	Red	Green	Green	Green
Water consumption	Green	Green	Red	Red	Red	Red	Yellow	Yellow
Materials inc. embodied	Green	Green	Red	Red	Red	Red	Yellow	Yellow
Waste levels	Green	Green	Red	Red	Red	Red	Yellow	Yellow
Ecology and biodiversity	Green	Green	Red	Red	Red	Red	Yellow	Yellow
Air quality	Red	Red	Red	Red	Red	Red	Yellow	Yellow
Climate change adaptation	Red	Green	Red	Red	Red	Green	Red	Red
Community enhancement	Red	Green	Red	Red	Red	Green	Red	Red
Consultation	Green	Red	Red	Red	Red	Green	Yellow	Yellow
User behaviour	Yellow	Red	Red	Red	Red	Red	Red	Red
Local economic development	Red	Green	Red	Red	Red	Red	Red	Red



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This overview shows a high level of what's covered in some common ways of defining sustainability.

Each of these cells contains a whole discussion on the exact scope of inclusion – it's full of grey areas

It's worth remembering that if a tool, metric or guidance considers a lot of aspects, that can often mean that each one is watered down slightly

We'll now go into a bit more detail on energy and carbon, the common wider topics and the often neglected.

The audience will not be able to read the text – it's the spread and randomness of the colours that's important

Doncaster is: Doncaster Emerging Core Strategy and Sustainable Construction SPD

Sheffield is: Sheffield Core Strategies and Climate Change and Design SPD

Overview – inc. North Yorks. policies

	BREEAM Buildings	BREEAM Commun.	CSH	Building Regs	EPCs	National Planning (NPPF)	NY		
							North York Moors	Scarbr'h	Harrogate
Regulated energy efficiency	Green	Yellow	Green	Yellow	Red	Grey	Red	Yellow	Yellow
Unregulated energy efficiency	Green	Yellow	Green	Red	Red	Grey	Red	Yellow	Yellow
Regulated emissions	Green	Green	Green	Green	Green	Grey	Red	Yellow	Yellow
Unregulated emissions	Red	Red	Yellow	Red	Red	Grey	Red	Red	Red
Renewable energy	Green	Green	Green	Yellow	Green	Green	Green	Green	Green
Passive design	Red	Green	Green	Yellow	Green	Grey	Red	Red	Red
Construction impacts	Green	Green	Green	Red	Red	Grey	Red	Yellow	Yellow
Internal environment	Yellow	Green	Green	Red	Red	Grey	Red	Yellow	Yellow
Transport impacts	Green	Green	Red	Red	Red	Green	Yellow	Green	Green
Water consumption	Green	Green	Red	Red	Red	Green	Red	Yellow	Yellow
Materials inc. embodied	Green	Green	Red	Red	Red	Yellow	Red	Yellow	Yellow
Waste levels	Green	Green	Red	Red	Red	Red	Yellow	Green	Yellow
Ecology and biodiversity	Green	Green	Red	Red	Red	Green	Red	Yellow	Yellow
Air quality	Red	Yellow	Red	Yellow	Red	Grey	Red	Yellow	Yellow
Climate change adaptation	Red	Green	Red	Yellow	Red	Grey	Red	Red	Red
Community enhancement	Red	Green	Red	Red	Red	Green	Red	Red	Red
Consultation	Green	Green	Red	Red	Red	Green	Red	Yellow	Yellow
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North York Moors Core Strategy and Sustainable SPD

Scarborough emerging Core Strategy and Building, Guidance for Developers

Harrogate Core Strategy and renewable and Low Carbon Energy SPD

Overview – inc. Hull & Humberside policies

	BREEAM Buildings	BREEAM Commun.	CSH	Building Regs	EPCs	National Planning (NPPF)	HH	
							Kingston upon Hull	East Riding
Regulated energy efficiency	Green	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Unregulated energy efficiency	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Regulated emissions	Green	Yellow	Green	Green	Green	Yellow	Yellow	Yellow
Unregulated emissions	Red	Red	Yellow	Red	Red	Yellow	Red	Red
Renewable energy	Green	Green	Green	Yellow	Yellow	Green	Green	Green
Passive design	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red
Construction impacts	Green	Green	Green	Red	Red	Red	Yellow	Yellow
Internal environment	Yellow	Yellow	Green	Red	Red	Red	Yellow	Yellow
Transport impacts	Yellow	Yellow	Yellow	Red	Red	Green	Green	Green
Water consumption	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow
Materials inc. embodied	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow
Waste levels	Green	Green	Green	Red	Red	Green	Green	Green
Ecology and biodiversity	Yellow	Green	Green	Red	Red	Yellow	Yellow	Yellow
Air quality	Red	Red	Yellow	Red	Red	Yellow	Yellow	Yellow
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Kingston upon Hull emerging Core Strategy

East Riding Emerging Core Strategy

Overview – inc. West Yorks. policies

	BREEAM Buildings	BREEAM Commun.	CSH	Building Regs	EPCs	National Planning (NPPF)	WY		
							Wakefield	Leeds	Bradford
Regulated energy efficiency	Green	Yellow	Green	Yellow	Red	Yellow	Yellow	Yellow	Yellow
Unregulated energy efficiency	Green	Yellow	Green	Yellow	Red	Yellow	Yellow	Yellow	Yellow
Regulated emissions	Green	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow
Unregulated emissions	Red	Red	Yellow	Red	Red	Yellow	Red	Red	Red
Renewable energy	Green	Green	Green	Yellow	Yellow	Green	Green	Green	Green
Passive design	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red
Construction impacts	Green	Green	Green	Red	Red	Red	Red	Yellow	Yellow
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Wakefield D27 and D28

Leeds is: Leeds Emerging Core Strategy and Leeds Sustainable Design and Construction SPD

Bradford is: Bradford emerging Core Strategy and Sustainable Design Guide SPD

Energy and carbon (1)

- Building Regulations cover 'regulated' energy

Regulated	Unregulated
Space heating	Plug loads (esp. IT)
Space cooling	Refrigeration
'Domestic' hot water	Cooking / kitchens
Most lighting	Some lighting (display, communal)
Pumps and fans	



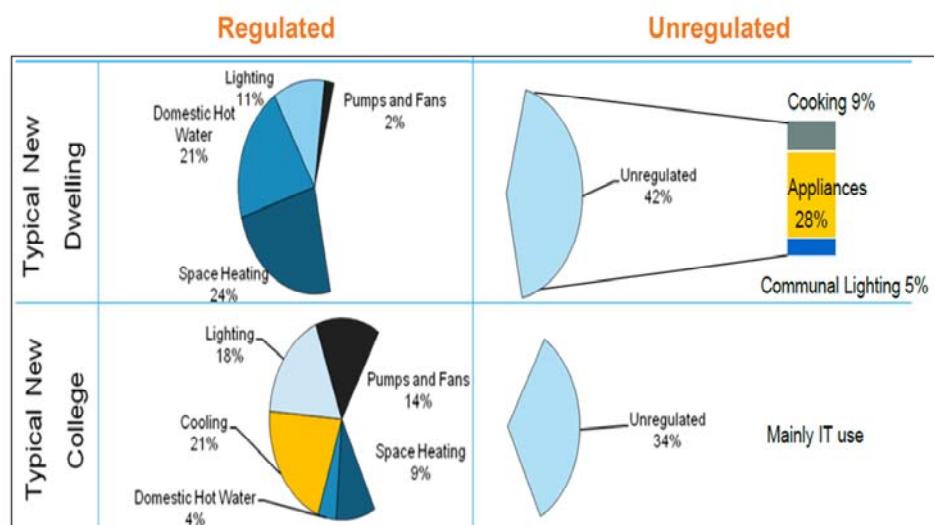
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Regulated energy is concerned with the building itself, not the processes that happen inside the building

Unregulated becoming an increasingly important proportion of emissions as regulated approaches 'zero carbon'

There have been some attempts to get around this in the Code for Sustainable Homes

Energy and carbon (2)



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Case Study: Energy and carbon

- M&S 'eco-store' – Sheffield
- Innovation test-bed
- BREEAM Excellent
- Living wall – 62 species in total
- Transport solutions
- Heated by waste heat from fridges
 - Regulated
- Refrigeration savings of 45%
 - Unregulated



Source: North East Lincolnshire Council



Source: premier electrics



Source: Telegraph.com



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To highlight the savings that are possible from unregulated energy and the subtleties between the two categorisations

The concept of the ‘Notional Building’

- An important comparator

As ‘Actual Building’	Standardised
Size, shape and orientation	Building fabric performance
Internal spaces and activities	Glazing ratios
Shading	System efficiencies
Heating type	Lighting efficiencies
Heating fuel	

- Regulated energy only
- Any inefficiencies need to be recouped elsewhere



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Notional building is the concept on which the building regulations are based. It's emissions form the ‘Target Emissions Rate’ that is often the basis for planning policies.

A compliant building is often a set of priorities and compromises. If developers are saying that improving on Building Regs is not possible then an interrogation of the actual design compared with the notional building could prove insightful.

Building Regs exempt buildings

- How are these buildings captured in policy?

- Places of Worship
- Unconditioned Spaces
- Temporary Buildings
- Agricultural Buildings
- Listed Buildings



Source: Harry West



Bradford City Hall, Source: Guardian



York, Source: English Heritage



Much of policy relies on relating to a percentage of energy and emissions but there is no requirement to model these buildings. Therefore accurate predictions of energy consumption will be difficult.

Should they be exempt from local policy?

Wider approach to carbon and energy

- Each one is subtly different
- Tackle this issue in more detail later on

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Regulated energy efficiency								
Unregulated energy efficiency								
Regulated emissions								
Unregulated emissions								
Renewable energy								



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BREEAM and CSH refer to current building regulations but go further with a more detailed consideration of efficiencies as opposed to emissions

EPCs are only really concerned with emissions. Two buildings that just pass building regs can have a wide range of EPC scores.

Building Regs and EPCs take renewables into account but don't encourage them specifically

Partial consideration of unregulated by CSH is the calculation of standard values for Code 6

Wider than building energy and emissions

	BREEAM Buildings	BREEAM Commun.	CSH	Building Regs	EPCs	National Planning (NPPF)	SY Doncaster	Sheffield
Passive design	Light orange	Green	Light orange	Light orange	Light orange	Light orange	Light orange	Light orange
Construction impacts	Green	Green	Green	Light orange	Light orange	Light orange	Light orange	Light orange
Internal environment	Green	Light orange	Green	Light orange	Light orange	Light orange	Light orange	Light orange
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Sub-region specific area

Go through some of the aspects that are not particularly well covered in the example local policies that are included in the table.

Each of these aspects affects the sustainability of a development in different ways. Many of them are related to indirect carbon emissions (such as construction, transport and materials), others on wider resource impacts such as waste and materials.

A BREEAM or CSH requirement is a good way of having an overall requirement but the market will instinctively do the least difficult / expensive one. Potentially could lead to some important aspects being ignored

Often not considered

	BREEAM Buildings	BREEAM Commun.	CSH	Building Regs	EPCs	National Planning (NPPF)	SY Doncaster	SY Sheffield
Climate change adaptation								
Community enhancement								
Consultation								
User behaviour								
Local economic development								



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Adaptation

The 2003 heatwave is due to be commonplace in just 30 years – well within the life and even the first refurbishment cycle of non-domestic buildings. Needs to be incorporated more carefully into policy and regulations. Has been the poor relation to mitigation for too long

Community enhancement and consultation

Often completely neglected as part of BREEAM and only seem to be carried out for larger developments. Often done through obligation without any intention of actually listening to consultees

User behaviour

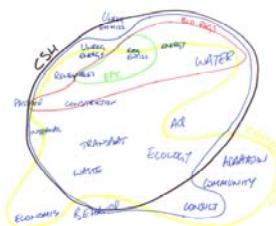
A building often uses two or three times the predicted amount of energy in reality than was predicted. Focussing on managing and changing the behaviour of the building users can provide a very cheap way of reducing emissions

Local economic development

Keeping the workforce local has many benefits, from job creation and security, upskilling of the labour force and greater community investment into a building to reduced transport emissions. Up to 75% of value can be retained local (e.g. BAM in 2010, Yorkshire & Humberside)

Activity 2: Scope of sustainability in construction

- Write each of aspects on the paper
 - Draw a line to represent the boundaries of each tool
 - ‘partial’, ‘indirect’ or ‘guidance’ go through the label
 - Add a line around what you think should be included in policy
 - Might need two or three attempts!
 - You have 20 minutes...



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This will allow the delegates time to pay more attention to exactly what is within the scope of different schemes

A handout of the full table showing which aspects are covered by which documents will be provided.

Internal note – materials required:

- Felt pens with 8 colours per group
 - Copy of the table showing the documents, aspects and red/orange/green
 - 3-4 sheets of blank A3 per group

Overview

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Community enhancement	Red	Green	Red	Red	Red	Green	Red	Red
Consultation	Green	Red	Red	Red	Red	Yellow	Yellow	Yellow
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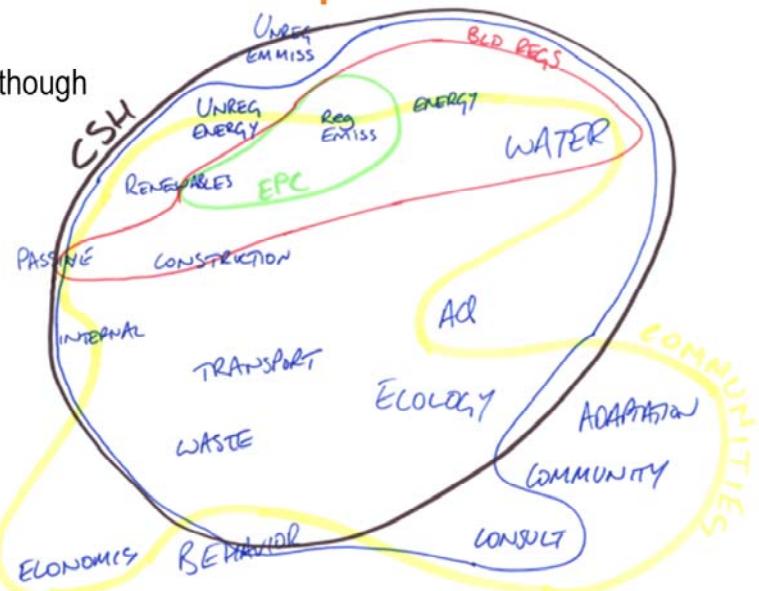
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Activity 2: The answer I came up with...

- No local policies, though



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Here's one I prepared earlier – I'm not saying it's necessarily 'right', though!

Session 2a: Embedding sustainability into a design



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RIBA Green Overlay

- A good summary and reminder

Green Overlay
to the RIBA Outline
Plan of Work

Edited by Bill Gething
November 2011

RIBA Work Stage	Description of key tasks	Sustainability Checkpoints
Preparation A Appraisal	Identification of client's needs and objectives, business case, sustainability aspirations and possible constraints on development. Preparation of feasibility studies and assessment of options to enable the client to decide whether to proceed.	Strategic sustainability review of client needs and potential sites, including re-use of existing facilities, building components or materials.
Preparation B Design Brief	Development of initial statement of requirements into the Design Brief by or on behalf of the client confirming key requirements and constraints. Identification of procurement method, project and sustainability procedures, building design lifetime, organisational structure and range of consultants and others to be engaged for the project.	Internal environmental conditions and formal sustainability targets stated. Building lifespan and future climate parameters stated. Early stage consultation, surveys or monitoring undertaken as necessary to meet sustainability criteria or assessment procedures. Involvement of design team after Practical Completion defined. Site Waste Management Plan (SWMP) started.

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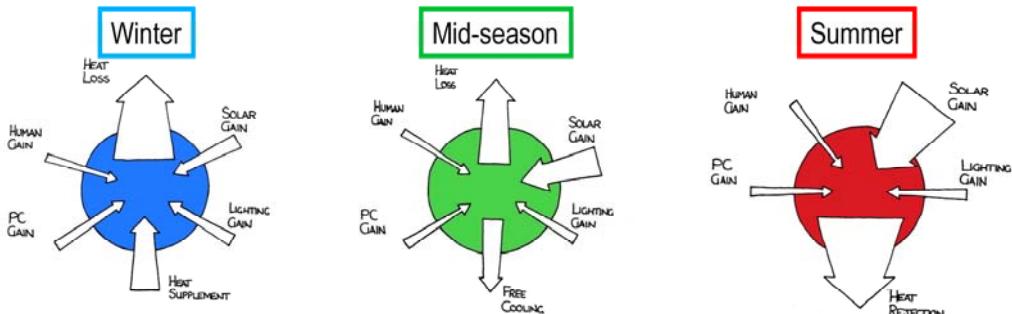
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The RIBA Plan of work outlines the actions that should be taken by the design team at each of the design phases. The Green Overlay pulls out the sustainability actions and gives more detail to them. Outline planning happens at late Stage B with detailed around late C.

Shows that there are many actions that need to be carried out right from the start and sustainability should be embedded at each stage to be done correctly.

Passive energy reduction – Solar gain

- It's both good *and* bad



- Need to consider levels of natural light
- Depends on building usage & freedom of design

Depending on the season and the building usage, solar gain can be a help or a hindrance. The important aspect is to try and expand the mid-season condition of balance so minimise the winter heating season and minimise any cooling requirements or overheating that come into play in summer. This can be done through well designed orientation and shading.

Passive energy reduction – Solar gain

- Innovate Office Building, Leeds
 - North-South Orientation
 - High density office space
 - Extensive vertical shading
 - Minimal solar heat gain



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Good control of solar gain. Atrium has blinds to control summer gains

Passive energy reduction – Solar gain (1)

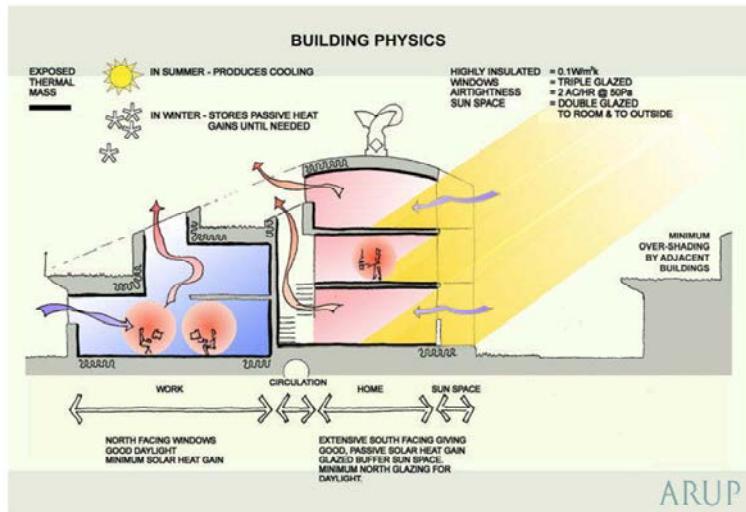
- BedZED, London
- E-W axis
 - South facing residential areas
 - North facing work areas



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Completely different approach for this is needed as it's a totally different type of building. Is still a great example of how to do passive design. Some other aspects of the project were not quite as successful.

Passive energy reduction – Solar gain (2)



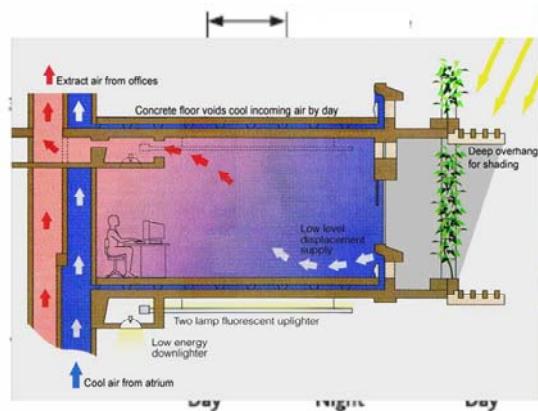
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Passive energy reduction – Thermal mass

Peak temperature delayed by up to 6 hours



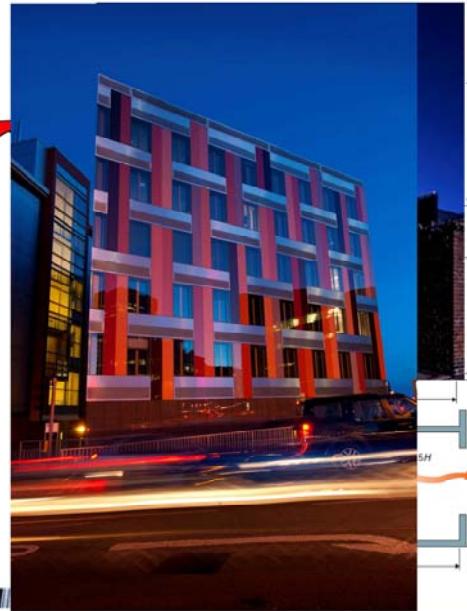
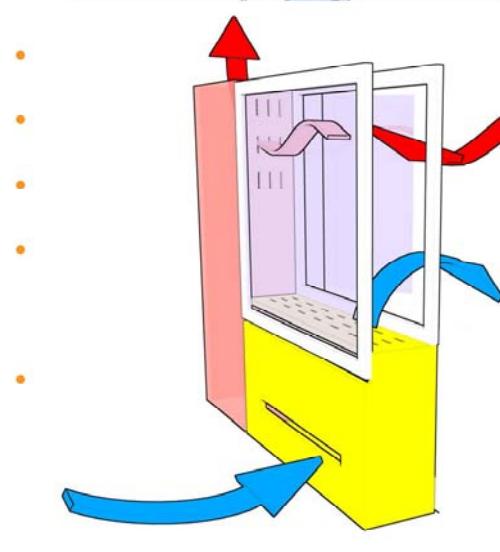
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Thermal mass can be incredibly effective at reducing peak temperatures during occupied hours. Can work on a 24hour cycle or help with much longer heatwaves of up to 3-4 days. Only the top 100mm is effective. Can be a cost saving on builds but there's a need to increase the effort put into detailed finishes.

Can be very effective. This is an example of a building in Harare that uses it to avoid the use of air conditioning. Zimbabwe's a bit warmer than Yorkshire.

Passive energy reduction – Natural ventilation



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Natural ventilation can be designed to pretty simple rules of thumb if the building is simple but the proportions still need baking in from the very start. If things are going to get more complicated like ICoSS and Jessops West then it becomes the driving force for the building design. Just goes to show what can be done with innovative engineering and architecture (not to mention a visionary client!)

Passive energy reduction – Non-physical actions

- Bake into project early on:
 - Extent of commissioning
 - Soft-Landings
 - Post-occupancy survey cycles
 - Behaviour change program
- All help turn a sustainable *design* into a sustainable *building*



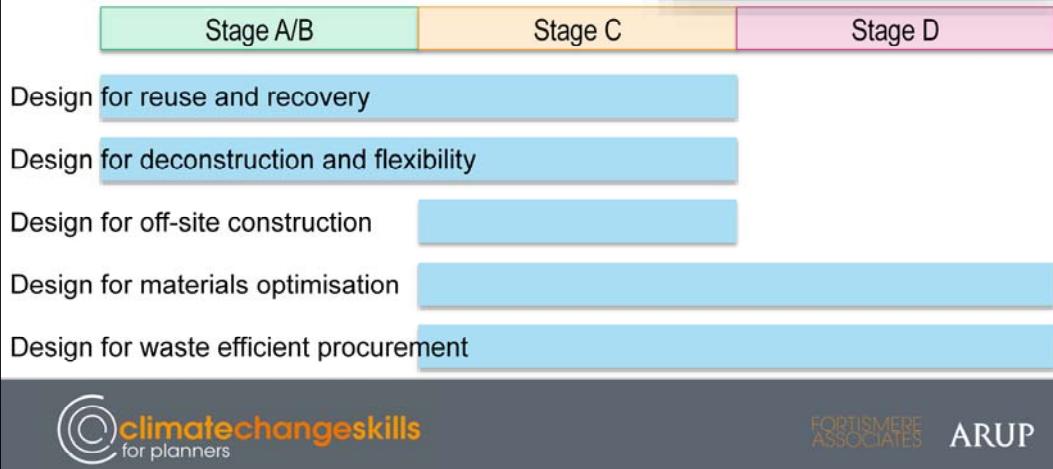
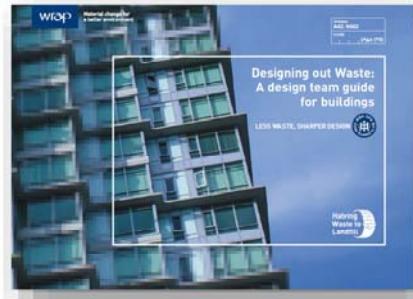
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Some aspects of passive energy reduction are those that don't have physical design response but they are no less important.

These aspects affect energy in uses, not energy predicted on a piece of paper. Would be good to get these into policy as they're often seen as optional. Behaviour change in particular can save a significant amount of emission for minimal investment if done properly.

Materials and Waste

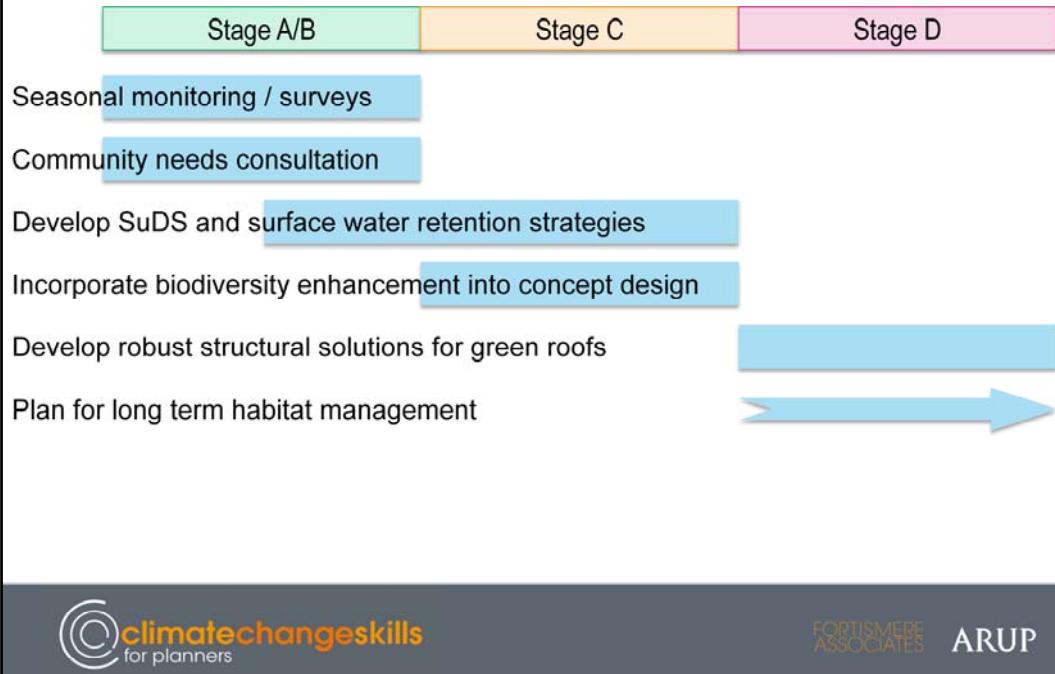
- Reduction of embodied carbon – cementitious replacements?
- Use BRE Green Guide to Specification?



The environmental impact of materials is very difficult to quantify as it goes well beyond the traditional 'embodied carbon'. To implement a policy around it, an existing framework could be used such as the Green Guide to Specification.

For Waste, there's more guidance available from WRAP. They note several actions that can be carried out during the design phase to minimise waste levels. Once these stages have passed there are still reductions to be made from implementing best practice waste management procedures during construction.

Biodiversity and ecology



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Much of the monitoring aspects covered by current guidelines, policies and regulations. These are the aspects that the RIBA Green Overlay highlights for the early stages of design.

Consultation and construction impacts

- Consult before decisions have been taken
 - Role of client, architect, independent consultant?
 - Consult with public and other interested parties:
 - Future building users
 - Community representatives
 - Existing partnerships and networks with relevant experience
 - Users of any shared facilities
- Construction impacts – social
 - Considerate constructors
- Construction impacts – environmental
 - BREEAM guidelines
 - Could be taken further – benchmarking?



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Consultation needs to occur before even the most initial sketches have been developed. This is often client consultation (which may include the public as an end-user of the building). Public consultations are often carried out after time and money has been spent on the design and can be defensive. Difficulties are with engagement at early stages

Construction impacts can be either social or environmental and there are relatively well established frameworks for measuring each but the BREEAM requirements can lack teeth as it's just 'monitoring and reporting', not improving

Session 2b: Linking issues to policy



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What does NPPF say?

- Paragraph 95 states '*when setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards*'.
- Paragraph 96 'In determining planning applications, local planning authorities should expect new development to:
 - **comply with adopted Local Plan policies on local requirements for** decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
 - **take account of landform, layout, building orientation, massing and** landscaping to minimise energy consumption.



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NPPF

96.

Tests of Soundness

- **Positively prepared** – the plan should be consistent with achieving sustainable development;
- **Justified** – the plan should be the most appropriate strategy, when considered against the reasonable alternatives, based on proportionate evidence;
- **Effective** – the plan should be deliverable over its period and based on effective joint working on cross-boundary strategic priorities; and
- **Consistent with national policy** – the plan should enable the delivery of sustainable development in accordance with the policies in the Framework.



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What does this mean?

Policies must consider Building Standards;

Be consistent with the policies in NPPF – using National targets

NPPF - Positively prepared – the plan should be prepared based on a strategy which seeks to meet objectively assessed development and infrastructure requirements, including unmet requirements from neighbouring authorities where it is reasonable to do so and consistent with achieving sustainable development;

Justified – the plan should be the most appropriate strategy, when considered against the reasonable alternatives, based on proportionate evidence;

Effective – the plan should be deliverable over its period and based on effective joint working on cross-boundary strategic priorities; and

Consistent with national policy – the plan should enable the delivery of sustainable development in accordance with the policies in the Framework.

What does this mean?

- Building regulations sets standards to deliver BREEAM and Code for Sustainable Homes.
- NPPF and Tests of Soundness requires LPA to set local requirements using these standards.
- There is no point reproducing Building Regulation Requirements (part L) – policy only needed when going higher.
- Be **Technically Feasible** and **Commercially Viable** – use CLG Guidance
- If going **higher than Building Regulations it must be evidenced** – for example if you could show you were struggling to reduce carbon in other sectors, transport / business sector.
- Consider allowable solutions – off-site contributions



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Policies related to construction – Example Text

- Using contemporary Building Regulations standards as the baseline for carbon (CO₂) reduction standards, all applicants for development (subject to exclusions set out in the supporting text) should seek to achieve additional reductions in carbon emissions associated with the development. How improvements are achieved should be set out in an energy statement as part of the planning application..



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The above recommended policy wording is relatively lengthy in order to cover all aspects of promoting low carbon development. In setting out the wording, we have sought to keep the detail as limited and clear as possible, however it will be important that the policy is read in the context of supporting text. The following paragraphs set out what is proposed.

The planning system has a key role to play in delivering targets for low and zero carbon development in the UK as part of working towards energy security and mitigating the causes of climate change through reducing greenhouse gas emissions. Policy has been set out to ensure that, through effective Development Management, the planning authority influences the quality of development proposals to promote energy efficiency and sustainable sources of energy supply. The policy also sets out a supportive framework for delivering low and zero carbon energy infrastructure to demonstrate to investors the authority's commitment to supporting the right types of development in the right locations.

The above policy wording has been developed with direct reference to Planning Policy Statement (PPS) 1 supplement for climate change and also to the Draft PPS, 'Planning for a Low Carbon Future in a Changing Climate'. Note that whilst the draft PPS is no longer being progressed by Government, it has been used as a basis throughout the development of this study and provides a clear guiding framework for promoting low and zero carbon development through the planning system.

responsible for monitoring.

Exclusions:

In certain circumstances the planning authority does not consider it appropriate to require applicants to submit energy plans as part of planning applications. These exclusions include applications for:

- Material change of use of land or buildings, unless it also involves operational development;
- All householder development;
- Advertisement control;
- Shop fronts;
- Tree preservation orders;
- Storage of hazardous substances;
- Minor operations not permitted under the General Permitted Development Order;
- Temporary buildings and uses; and
- Telecommunications equipment.

Policies related to construction – Example Text

The energy statement will quantify improvements to the CO₂ emissions savings over the required baseline standard associated with the following:

- All energy efficient building design solutions that ensure future occupiers will have reduced energy requirements; and
- Energy supply from decentralised low and zero carbon sources.

Development not achieving improvements above the baseline will not be approved unless applicants can demonstrate that it is **not feasible** or **viable** to do so.



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Viability and feasibility 1: Where it is considered by the developer that it is not viable or feasible to exceed baseline carbon reduction targets, this should be raised with the planning authority in advance of submitting

a planning application as part of pre-application discussions and then explained in full as part of the application with reference to the factors set out in the supporting text for this policy. No improvement over the baseline target may be acceptable where evidence clearly demonstrates barriers to a higher target.

Viability and feasibility 2: Where it is concluded that the connection to DH is not viable or feasible, the developer should provide the following information to the planning authority in advance of submitting a planning

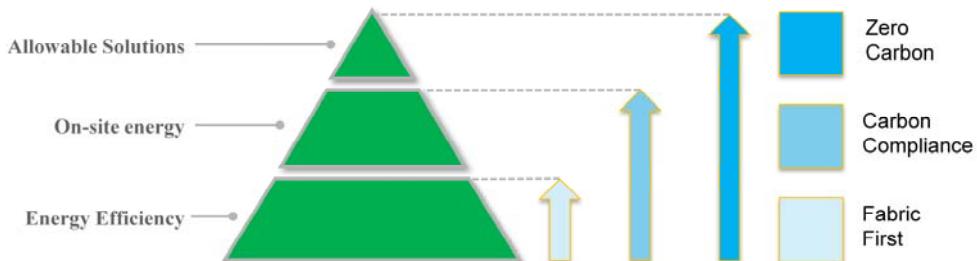
application for further appraisal by that authority:

- Low energy targets for the development;
- Energy options and costs considered;
- Funding sources considered;
- Total site area (m²);
- Combined building footprint area (m²);
- Related total building floor area(s) (m²);
- Number and type of residential properties; and
- Schedule of non-residential floor areas by type (eg commercial or industrial).

Identifying Opportunities and Monitoring: in order to optimise opportunities for joining up development proposals and to measure the relative success of energy policy and the commitment to preparing for a low carbon future, the planning authority will:

- Require all applications to fill out the on-line DH viability tool; and
- Monitor all energy projects developed or consented.

Future Proofing Policies: Allowable Solutions



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Future proofing Policy Allowable Solutions

Allowable Solutions are measures / options available to planners and developers that would reduce / offset carbon (CO₂) emissions should on-site solutions not be feasible and / or viable when bringing forward new development.

In July 2011, the Zero Carbon Hub produced 'Allowable Solutions for Tomorrow's Homes - Towards a Workable Framework', an industry led study into the 'real world' delivery of zero carbon buildings. To comply with the 2016 Building Regulations, new zero carbon homes will have to meet on-site requirements for Carbon Compliance (achieved through the energy efficiency of the fabric, the performance of heating, cooling and lighting systems, and low and zero carbon technologies). In addition, through Allowable Solutions, they will need to account for the carbon emissions that are not expected to be achieved on site through Carbon Compliance. Carbon Compliance and Allowable Solutions measures will both be needed to meet the zero carbon Building Regulations in 2016, and each will need to be submitted, checked and verified as part of Building Control approval.

Allowable Solutions options include scenarios where:

The developer would make a payment to secure emissions reductions through (largely) near-site or off-site, carbon-saving (Allowable Solutions) projects.

Independent of the developer, there would be an opportunity to aggregate a number of Allowable Solutions payments to deliver larger scale carbon-emission reduction projects.

Allowable Solutions would be affordable and (per unit of carbon) would cost, at least initially, less than Carbon Compliance.

That wherever possible, Allowable Solutions would be linked with local projects that would bring local benefits.

This document sets a number of routes / mechanisms for developer's contributions to be used to deliver off-site energy infrastructure in order to meet carbon targets set by LPAs. These include:

Contracts with Third Party Providers over-seen by a Local Authority, possibly choosing projects off a National Project Database.

Payments into a Community Energy Fund to enable the Local Planning Authority to deliver carbon savings.

Payments to a Private Energy Fund (operating in the same way as the Community Energy Fund but privately run and with no geographical constraints).

The payments would not exceed a national market ceiling price for carbon.

Packages of Allowable Solutions have now been developed that provide a flexible framework of options for planners. These are categorised as on-site, near-site and off-site options. Each provides a wide range of energy efficiency, renewable and low carbon intervention measures that can be used to meet and exceed energy policy and target requirements.

Break

- 30 mins
- Back at...



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Session 3: BREEAM and the Code for Sustainable Homes

brēām? brēm?



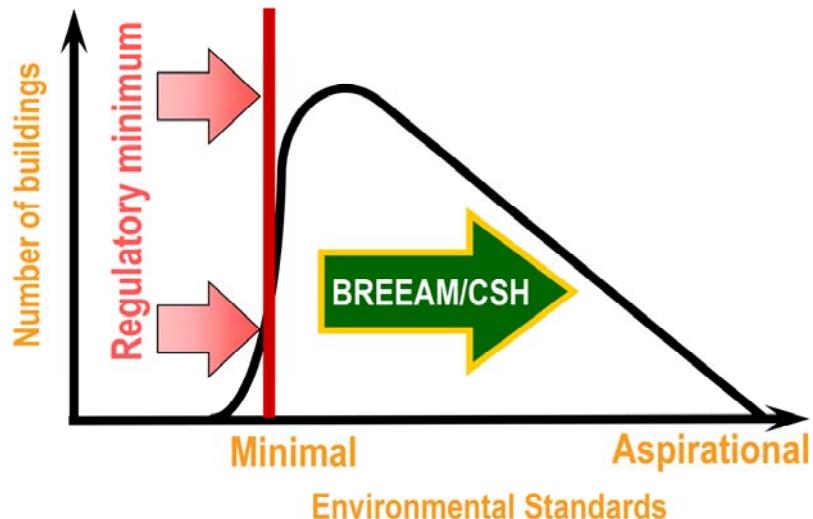
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The aims of the schemes



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Aim of BREEAM is not necessarily to force everyone to produce exemplar buildings, more to move the bulk of the buildings higher in sustainability terms whilst providing a transparent framework

BREEAM – types of buildings

BREEAM 2011 New Construction



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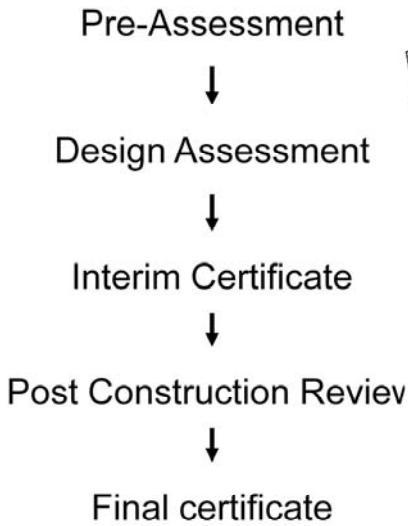
Most building types come under BREEAM 2011 apart from Bespoke (still using 2008 methodology)

Communities is a separate scheme

Refurbs use 2011 or 2008 depending on extent of change. BREEAM refurbishment on its way this year (apparently)

Also BREEAM international

BREEAM - Methodology

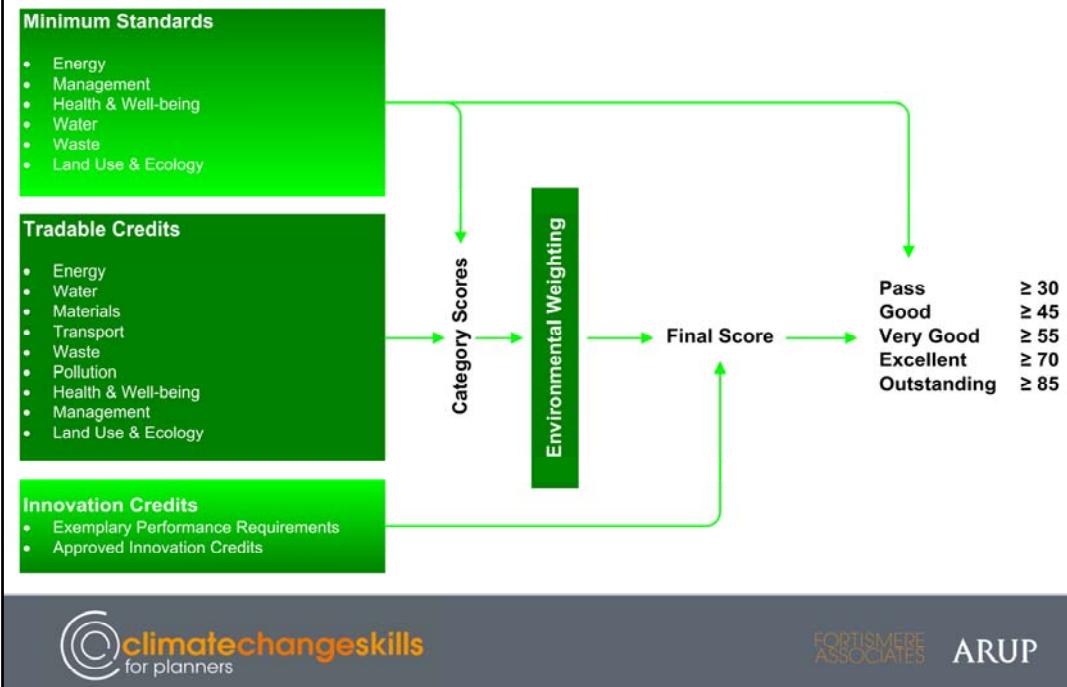


BREEAM methodology and where it fits in with the planning process.



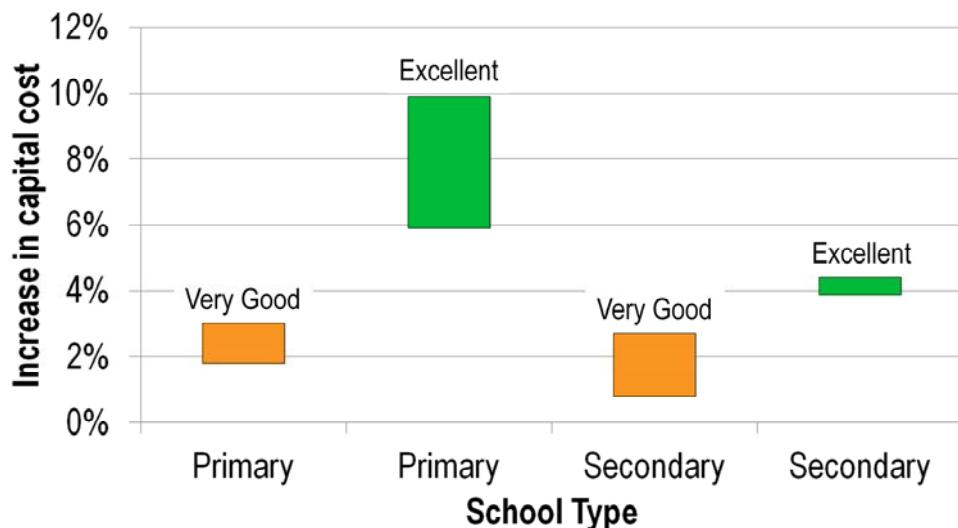
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BREEAM – Scope & Scoring



Environmental weighting is very important as it means that credits in each of the categories are worth different amounts in the final score.

BREEAM – Cost of compliance (2008)



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Source is 2008 study from Faithful+Gould

Minimal increased cost for VG. Excellent figure for primary schools seems a little higher than other sectors.

Starting early is the key to getting a good score

Anyone who tells you Very Good is too difficult is either doing it wrong or started too late

Costs undoubtedly increased for 2011 – no data yet

BREEAM – getting it right

- The right way...
 - Stage A/B ← Initial discussions & Plans
 - Stage C (concept) ← Constant reviews
 - Stage D (detailed) ← Careful procurement
 - Stage E (technical) ←
- Policy? – Pre-assessment at outline
 - Evidence of assessor appointment
- Beware the bargain assessment cost



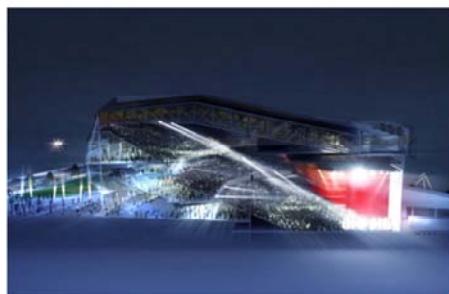
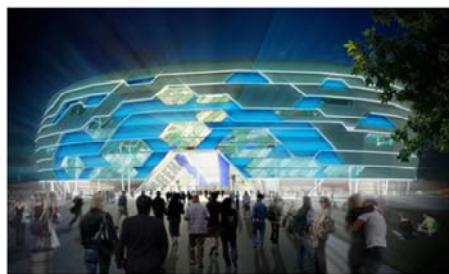
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Too often given a call as a BREEAM assessor when people have finished designing their buildings!

As with everything, it's early consideration, continued focus and robust technical reviews that embed the requirements into the design

Another aspect to consider is how any conditions are worded. Do you want to see the post-construction certificate before people can move in? Sometimes not even the design stage is completed by then. If planning requirements are robust on BREEAM then it adds motivation and momentum to the evidence gathering process – something the design team are always reluctant to do!

BREEAM – Case Studies



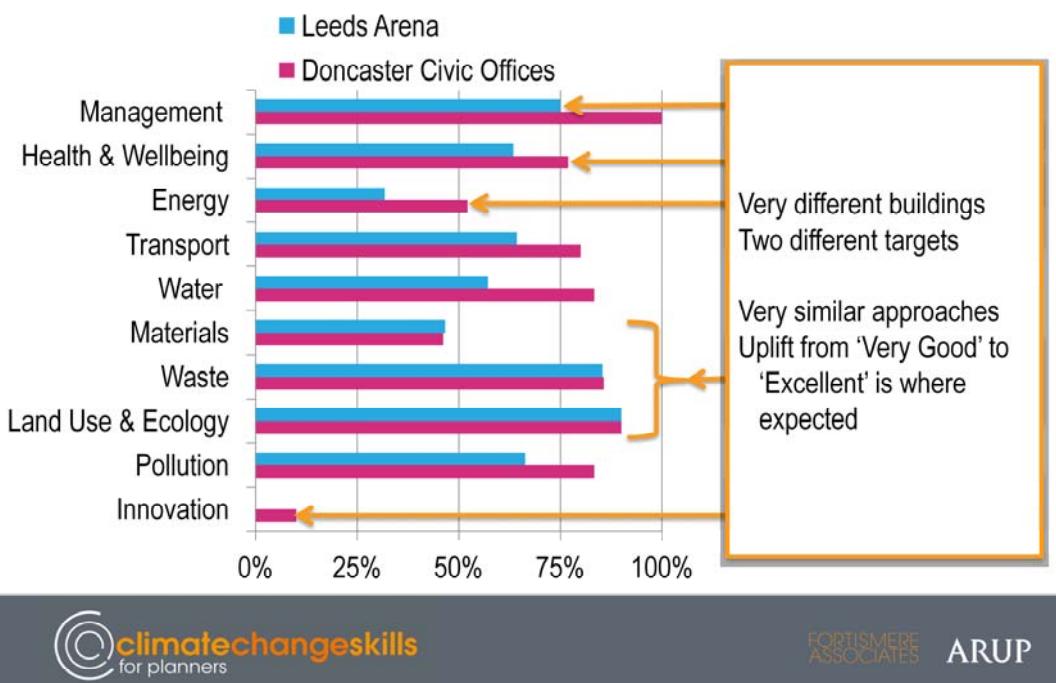
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A couple of case studies

- Leeds Arena under Bespoke 2008 – Very Good at design stage
- Doncaster Civic Offices – Excellent at design stage

BREEAM – Case Studies



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Can see from notes on slides where people often concentrate their efforts and where the uplift from Very Good to Excellent comes.

BREEAM Communities – Overview

- Applicable to all sizes and types of development
- Supports planning applications
 - Outline – optional – interim assessment
 - Detailed – mandatory – final assessment
- Can be used in conjunction with SAs, EIAs, SEAs



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An overview of BREEAM communities which is specifically intended to align with the planning process to step broader than the standard buildings schemes.

BREEAM Communities – Methodology

1. Selection Compliant Assessment *Methodology*
2. Create Compliant Assessment *Framework*
3. Independent assessment



- BREEAM Communities Pre-Ass. Estimator
- Regional Sustainability Checklists
- GreenPrint Assessment Methodology
- Other Compliant Assessment Methodologies

- In conjunction with:
 - Assessor
 - Developer
 - Planning authority
- Core and optional credits

- Scoring and weighting region-specific
- Mandatory credits
- Dependant on development size



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There are choices of methodologies which are then used in a collaborative process to determine a specific framework for the development to be assessed under. Allows tailorability by the planning authority

Image (C) BREEAM

BREEAM Communities - Scope

- Climate and energy – mitigation and adaptation
- Place shaping – local area design and layout
- Community – consultation and involvement
- Ecology
- Transport
- Resources – Materials, water & waste
- Business – local and regional economic issues
- Buildings – BREEAM, CSH etc



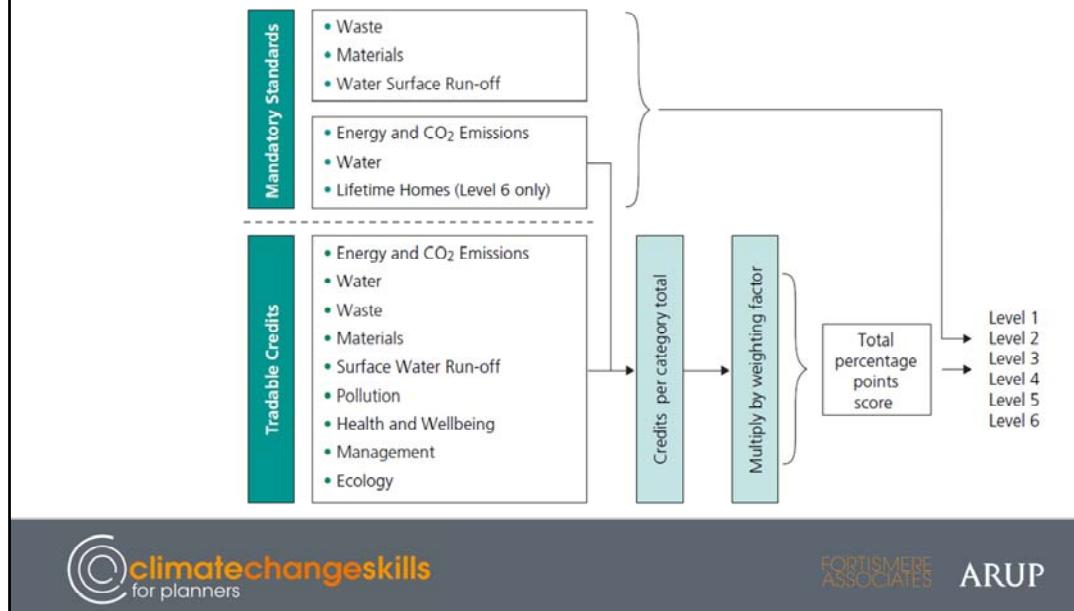
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These are the aspects included within the scheme.

Ecology and Transport are relatively standard approaches

Code for Sustainable Homes

- New-build only



The build-up of the score is similar to BREEAM. The credit categories are slightly different and there's obviously a different focus with different weightings.

No innovation credits



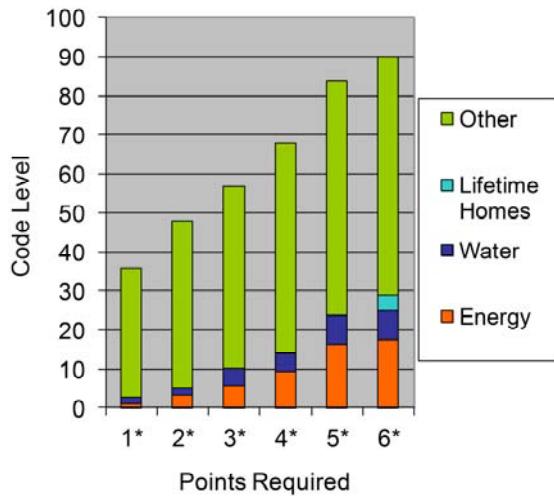
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Code for Sustainable Homes

- CSH3 – relatively easy
- CSH4 – achievable
- CSH5 – challenging
 - Water standards
- CSH6 – necessary?
 - Long term relevance?

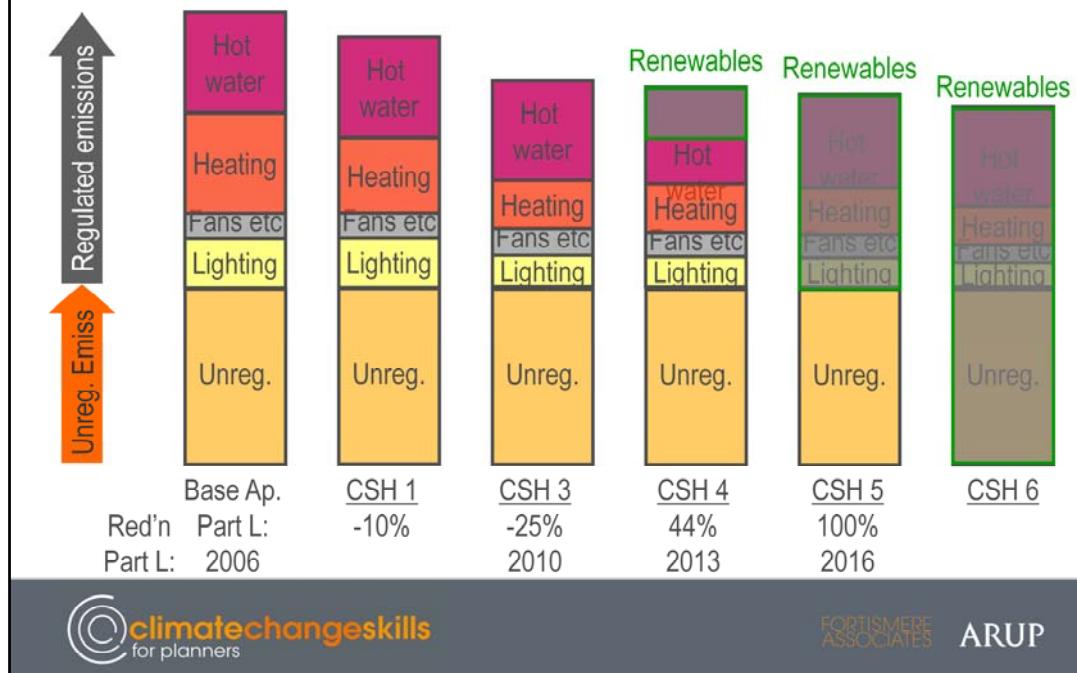


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How hard is each scheme, especially when considering 2010 building regs.

Also shows the level of 'tradable credits' that are needed at each scheme compared with the maximum available.

Code for Sustainable Homes – Energy



Common energy policies for meeting each level of the Code

Everything below CSH3 is redundant.

Code 4 is achievable with minimal renewables.

Code 5 is when things start to get serious. Step from Code 4 is significant

Code 6 brings in unregulated energy using a standard calculation based on the interior area of the building.



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Case Study – CSH4 (from Energy Savings Trust)

Element	Gas boiler	Low Carbon heating
Walls	U=0.2 (~150mm insulation, 375mm total)	
Glazing	U=0.8 (triple)	U=1.5 (double)
Air tightness	3	3
Ventilation	Whole house Mech. Vent with Heat Recovery	
Renewables	4m ² solar thermal OR 5m ² photovoltaics	None on dwelling if biomass or heat-pump heating OR 4m ² solar thermal if communal gas GHP

- Achievable with standard construction techniques and architecture



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How can CSH4 be achieved. There are many options that the Energy Saving Trust came up with. Need to spend a bit on windows if you keep a traditional gas boiler. Got to think about the liveability of these buildings, though. Can the average Joe-public use a biomass or heat pump system?

Figures from CE291, semi-detached house

Case Study – EST Route to Zero Carbon

Element	Code 4	Code 5	Code 6
Walls (total mm)	U=0.2 ~375mm	U=0.15 ~425mm	U=0.15 ~425mm
Glazing	U=0.8 (triple)	U=0.8 (triple)	U=0.7 (limit)
Air tightness	3	3	3
Ventilation	Whole house Mech. Vent with Heat Recovery		
Renewables	4m ² solar thermal OR 5m ² photovoltaics	4m ² solar thermal AND 22m ² photovoltaics	4m ² solar thermal AND 42m ² photovoltaics

- Using gas boilers



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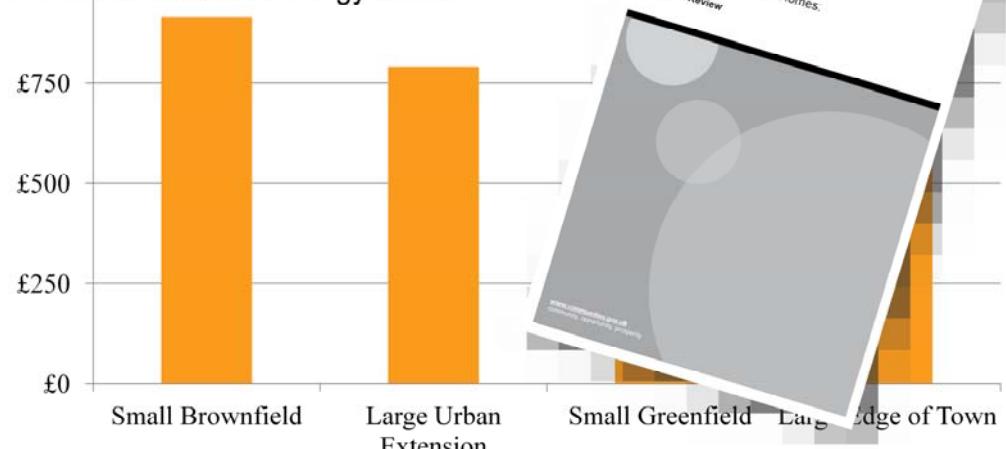
Heat loss is so low at the high levels that moving to low carbon heat hardly changes renewables needs

If Code 5 is ever going to be liveable then people are going to need technology they're comfortable with.

Code for Sustainable Homes – Costs for Code 3

- 2010 Part L = Code 3 energy

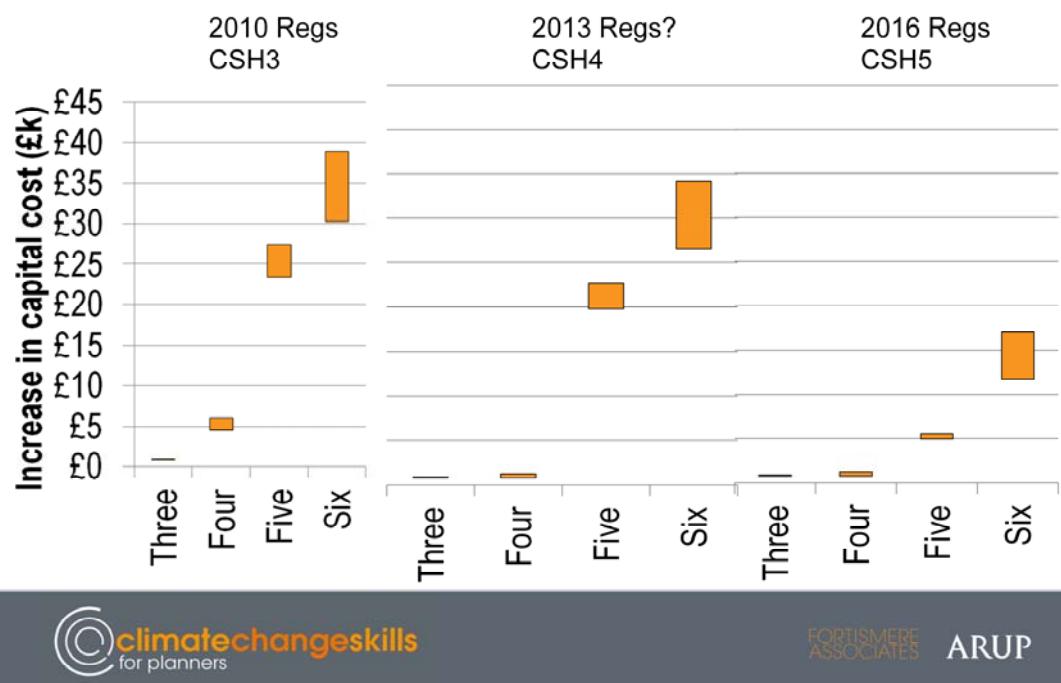
£10M What are the non-energy costs?



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These are the non-energy costs of meeting Code3. Energy costs are mandatory because of building regs

CSH Costs – higher levels and policy going forward



As regulations progress, the achievement of the levels will get cheaper. However, levels 5 and six will always add a premium that the market may not be willing to pay for. Shows the financial implication of going for more wide-ranging policies rather than just carbon.

BREEAM & CSH in policies

- BREEAM & CSH – policy or supplementary text?
- Barnsley MBC Core Strategy CSP 1
 - **Policy:** “All non-residential development will be expected to achieve at least **BREEAM** standard of ‘very good’ or equivalent.”
- Sheffield CC Core Strategy CS64
 - Policy: “All new buildings and conversions of existing buildings must be designed to reduce emissions of greenhouse gases, function in a changing climate ... and use resources sustainably”
 - **Supporting text:** To satisfy the policy... should achieve **BREEAM** ‘Very Good’ as a minimum

Activity 3: Local Priorities

- Determine the environmental weightings that are locally relevant
 - Are there any others you'd include
- Using the BREEAM category weightings, calculate the effect on the score Doncaster Civic Office would have achieved
- 15 mins

Multiply these two to get this

Category	Credits available	Credits achieved	% of credits within category achieved	Environmental weighting	Weighted Score
Management	10.00	10.00	100.00%	12%	12.00%

Add these up to get the total



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Internal note – materials required:

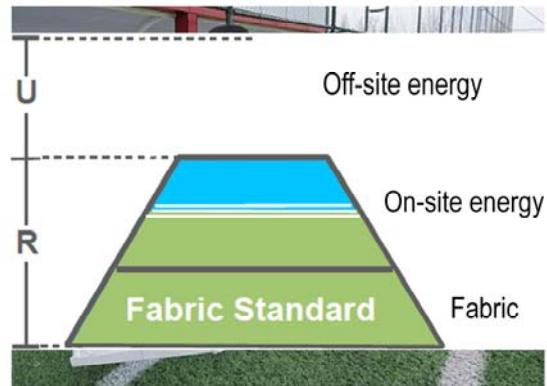
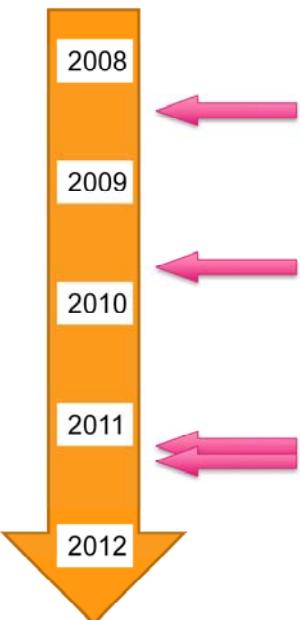
- Printed sheets for each group – One A3, one A4
- 100 counters, buttons, sweets or markers of some kind to make determining of weightings more interactive

Session 4: Measuring Sustainability



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Definition of zero carbon

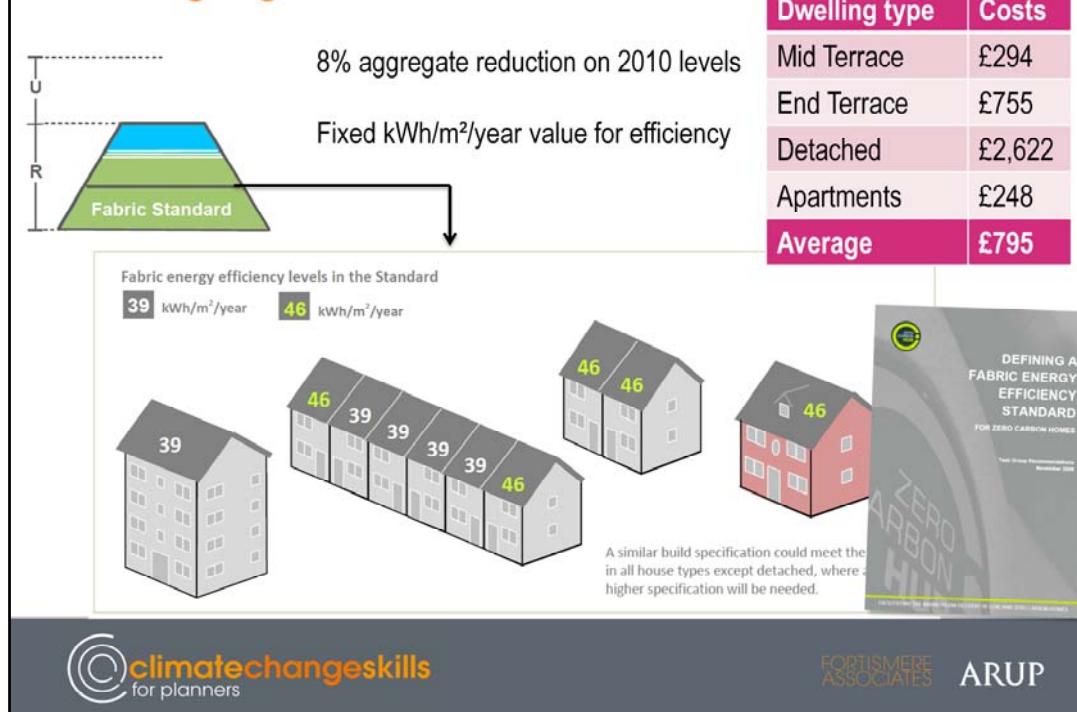


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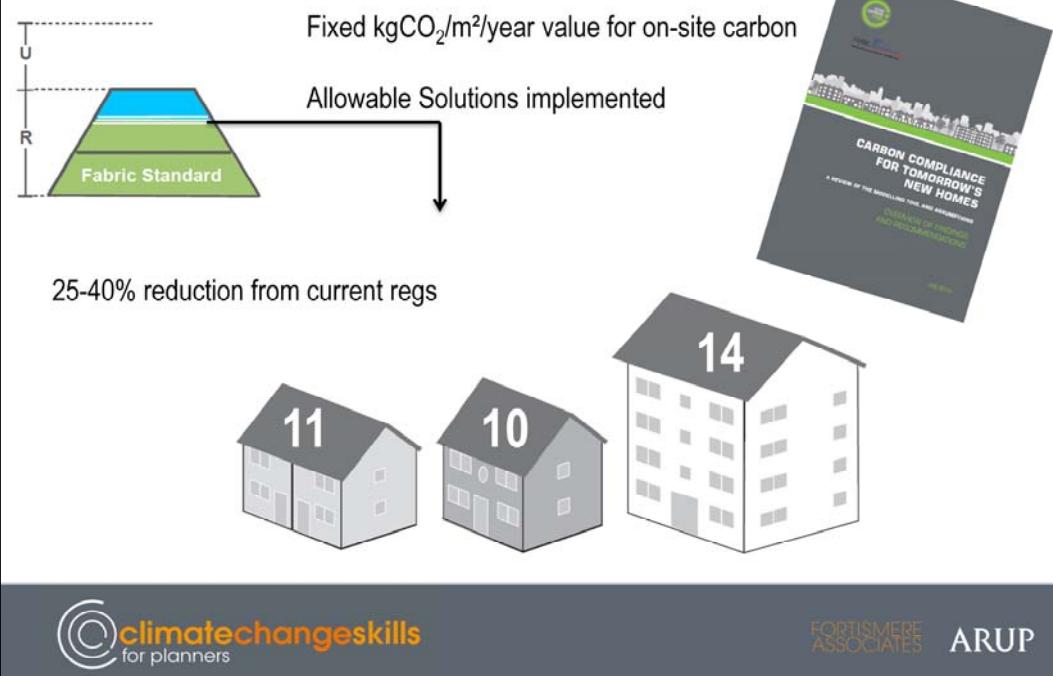
How the definition of zero carbon has changed over time to highlight that the industry and government are still grappling with the details of what's going to happen.

Building regulations 2013 – domestic



How the new energy efficiency standards are going to be applied to the 2013 regs that are being consulted on at the moment.

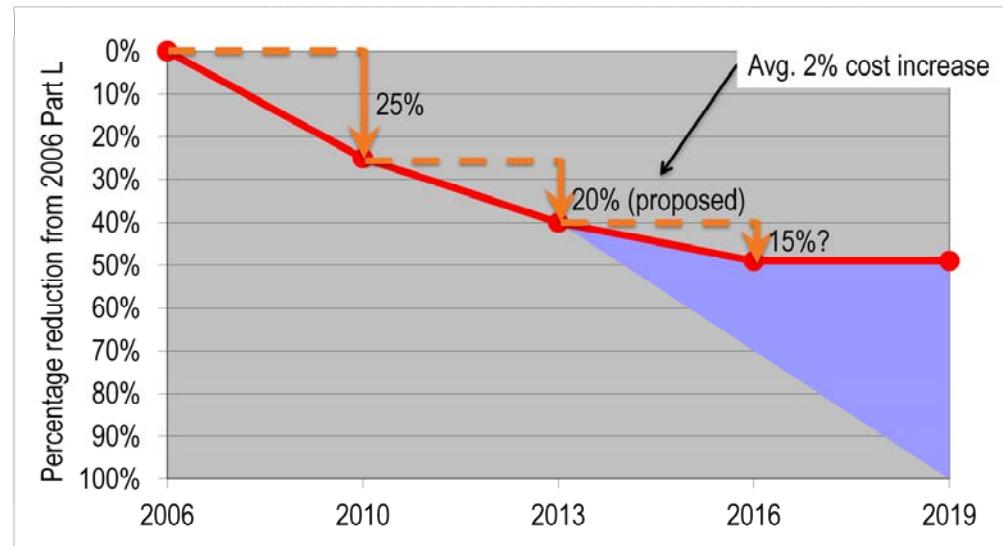
Building regulations 2016 – domestic



How the carbon compliance (on-site energy) levels might be set for 2016 regs

Anything above these requirements will be Allowable Solutions

Building regs future – Non-domestic



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Fabric energy efficiency not specifically covered in future non-domestic regs but this the projection as it stands at the moment. Blue wedge is Allowable Solutions

Allowable Solutions

- The use of regulated carbon offsetting
 - Examples of allowable projects

Investments

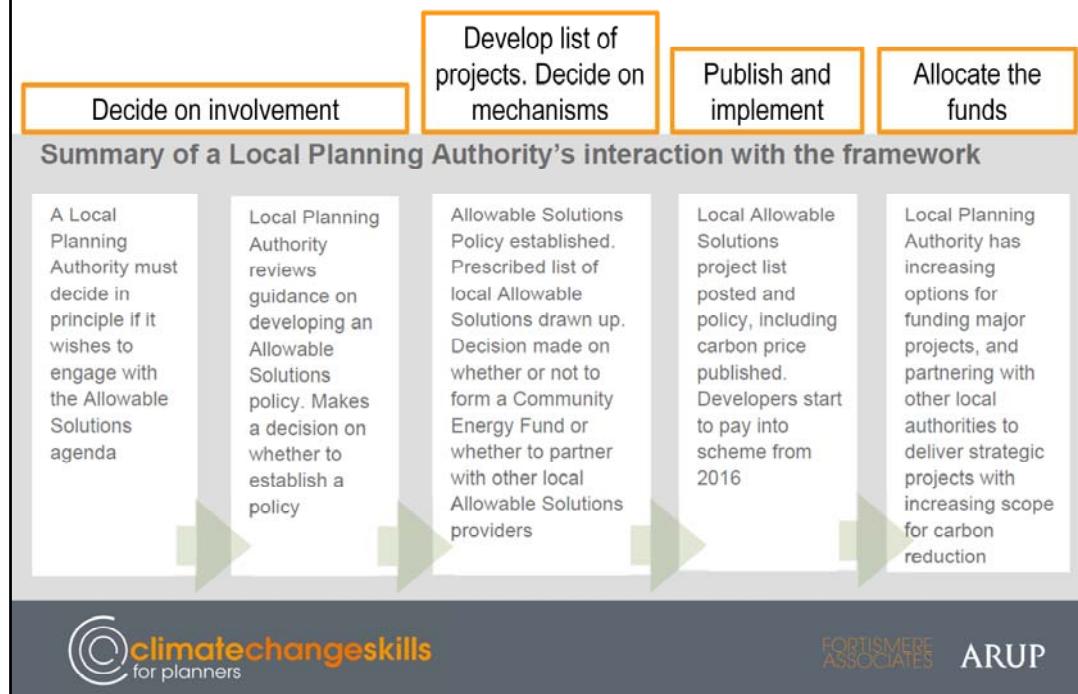
Option	On-site	Near-site	Off-site
Smart appliances	Y		
Use of biomethane	Y		
Electric vehicle infrastructure	Y	Y	
Waste management	Y	Y	
Low carbon street lighting	Y	Y	
Flexible demand	Y		Y
Heat / Electricity storage	Y	Y	Y
Reducing emissions of community buildings		Y	Y
LZC energy generation		Y	Y
Embodied energy reductions			Y
Low carbon cooling			Y



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These are the projects that have been given as examples of allowable solutions but the exact framework has yet to be developed.

Allowable Solutions – LPA involvement



This is from the Zero Carbon hub's document.

Carbon and energy metrics

- 15% reduction in development's emissions
- 10% of their total *regulated* energy
- 10% of predicated energy requirements
- 10% of their *predicted* energy needs
- 30% increase in the energy efficiency
- 10% of energy *supply* to be provided from *decentralised* renewable or *low carbon* sources
- 10% by using on-site renewable or low-carbon energy technology
- 20% of their expected energy *demand* from *on site renewable energy*
- 10% of the energy should be produced from CHP and/or on-site renewable energy sources

- Definitions need to reflect and reinforce the aims of the policy

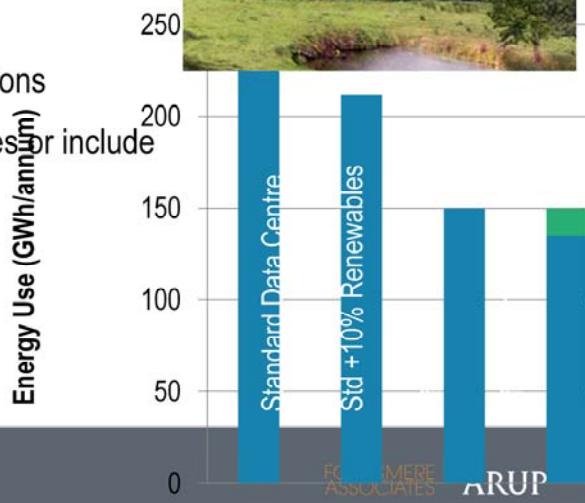


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There's a big mix of policy definitions out there in the region. Were these deliberate considerations of policy direction?

Carbon or energy?

- Carbon encourages action on electricity
- Definition of carbon savings going forward?
 - Renewables or low carbon?
 - Off-site installations?
 - Over-use of Allowable Solutions
- Energy – percentage renewables or include efficiency?

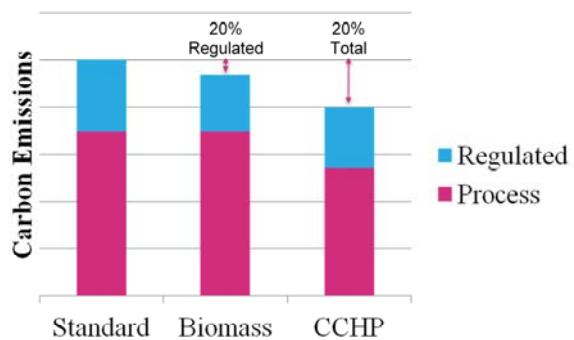
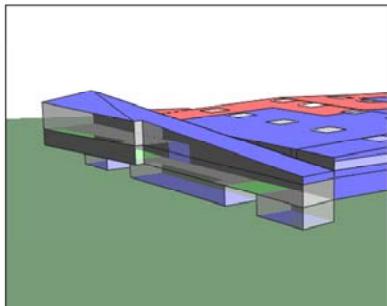


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Whether carbon or energy is targeted there are subtle differences. Case study is a data centre proposal for near York (didn't progress) showing the possibility of efficiency gains. Should these count?

Regulated or total energy?

- Total energy is a much higher burden
- Problems with defining predicted unregulated emissions
 - Except dwellings
- Does it matter what energy is supplied by renewables?



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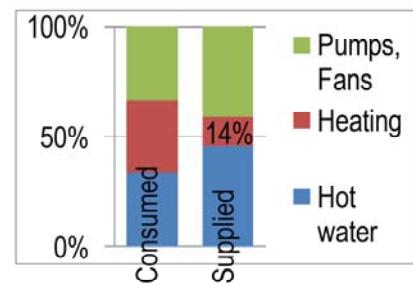
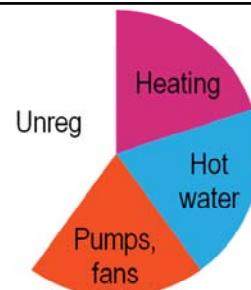
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Difference between regulated and total energy with the policy issues around each choice.

Supplied or consumed energy?

- e.g. dwelling regulated energy
- Heating is heat pump (CoP=3)
- Hot water is via gas (90% efficient)

	Supplied Energy kWh/annum	Consumed Energy kWh/annum
Pumps, fans	2000	2000
Heating	667	2000
Hot water	2222	2000
Total	4889	6000



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Pumps and fans is a too high but it makes the numbers easier!

(6000kWh per annum based on 60kWh/m²/annum and 100m²)

Percentage of energy supplied by the low carbon technology is different depending on whether the supplied energy or the consumed energy is considered.

Percentage is still above 10% but wouldn't be if unregulated energy was taken into account or if not all of heating load supplied by heat pump

Activity 4: Non-carbon policies?

- Carbon and energy are being addressed by building regulations
- The NPPF contains guidance on other measures
- How can these issues be turned into local implementable policies?
- Answer the four questions
 - What would the policy seek to achieve?
 - Would a flexible or rigid policy be more implementable?
 - What other elements of sustainability might the issue conflict with?
 - What form would an implementable policy take?
- 15mins then feed back to the group



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Assuming there is little point in driving carbon and energy reductions faster than the already quick rate being imposed by building regs changes.

How could policies on other topics (that are no less important) be implemented?

Internal note – materials required:

- Printed topic sheets for each group. Three sets of the five topics assuming maximum 15 groups

Wrap-up

- Aim of the course was to provide an understanding of ...

“...the broad context of sustainability as it relates to buildings, along with specific relevant issues in sustainable construction to enable successful policy development and deliver”



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Sources of information

- www.tzero.org.uk (low carbon domestic refurbishment)
- UK Green Building Council (often non-domestic)
- Zero Carbon Hub (domestic regulations)
- Communities and Local Government (Code for Sustainable Homes)
- Energy Savings Trust

Thank you



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