

## Module 7

# Achieving climate change mitigation and adaptation in small scale development

Andy Sheppard

## Housekeeping

- Fire alarms
- Assembly points
- Toilets

## Aims and agenda

- Aim of the course is to provide an understanding of...  
“...the principles of sustainable and climate adapted design and retrofitting as it applies to small scale development”

1. Designing sustainability
2. Challenges with small scale developments
3. Code for Sustainable Homes
4. Assessing developments
5. Refurbishments
6. Sources of further information

## Aims and agenda – overlap with other modules

- Necessarily some overlap
- Module 3 – renewable and low carbon energy
- Module 4 – construction
- Module 10 – regulation
- To a lesser extent
  - Masterplanning, viability

What we're not going to cover in too much depth as it's in elsewhere.

Will cover some of these aspects but will focus specifically on small scale developments

## Quick opening discussion

- What are your experiences of implementing climate change planning policies for smaller applications
- What questions do you hope the module will answer?

# Session 1

## Designing Sustainability

## RIBA Stages

- All stages are approximate
- Often done concurrently or out of order
- Highly dependant on procurement route
- Preparation and design are most relevant

Stage	
Preparation	A Appraisal
	B Design Brief
Design	C Concept Design
	D Design Development
	E Technical Design
Pre-construction	F Production Information
	G Tender Documentation
	H Tender Action

### Fully designed project single stage tender



Design teams think of design in terms of relating to the RIBA Stages. There are many versions depending on complex procurement routes but the classic version is the single stage tender. Line between consultants and contractors are blurred on smaller jobs  
Source: RIBA Plan of Works

## RIBA Stages

Stage	
Preparation	A Identify sustainability aspirations
	B Masterplanning; Building lifespan determined; Surveys
Design	C Initial energy assessment; project-wide strategies inc. materials
	D Development of environmental strategies
	E Details for air-tightness, insulation continuity etc.
Pre-constr.	F Robust sustainability tender clauses
	G-H Choose a good contractor
Construction	J Get contractor buy-in inc. SWMP
	K Monitoring of quality, effective hand-over
Use	L Review and feedback e.g. energy consumption in use

B – lifespan impacts on adaptation

C – includes BREEAM or CSH assessment to define actions (if not at B). Also effect of major decisions on construction methods

D – is just developing what was decided in C so it's too late in a lot of respects

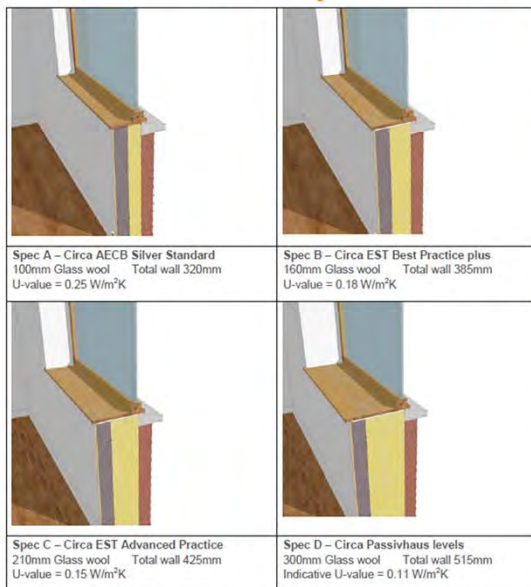
E – areas where lots of detail is required to ensure compliance of contractor. Also thermal bridging etc.

F – passing over of requirements to contractor

G – don't do this right and everything else might not have been worth anything!



## Fabric First – Beyond Building Regs



	2010 Regs	2013 Regs	'Zero Carb.'
Walls	0.25	0.18	0.15
Roof	0.13	0.13	0.13
Floor	0.18	0.18	0.15
Windows	1.40	1.4	0.8
Air tightn.	10	3	3

Source: Zero Carbon Hub

Building regs present the minimum standard

Walls are the major element that are affected by the increasing standards. Roofs are already pretty good. Floors can be improved with little impact on internal space.

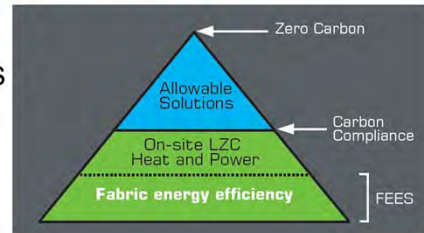
Windows are just a matter of throwing more money at it.

Only adding about 50mm between 2010 and 2013 standards.

Walls of 0.15 are PassivHaus recommended levels

## Building Regs 2013 for new-builds - FEES

- The forcing of passive design measures



Fabric energy efficiency levels in the Standard

39 kWh/m<sup>2</sup>/year    46 kWh/m<sup>2</sup>/year



A similar build specification could meet the target in all house types except detached, where a slightly higher specification will be needed.

Source: Zero Carbon Hub

## Air tightness

- Howe Wood Park – Milton Keynes. Most airtight ever?



0.065 air changes per hour!

3 House with integral garage

Source: Architect's Journal

Source: EST GPG224



Air tightness is a mixture of detail design and construction quality

Start with the basics

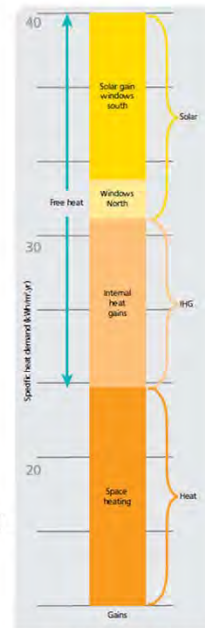
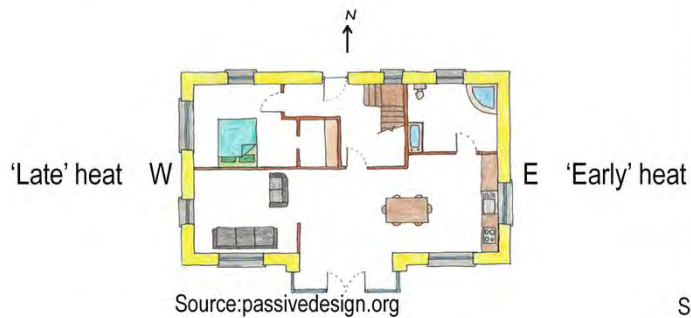
Then move onto the detail

Check before things get buried

Planning – outline app can have the zones thought about. Detailed app should have drawings with the barrier line identified

## Solar gain in domestic buildings

- More glazing on the South
- East-West axis so light/heat can penetrate
- 'Comfort' rooms on South (mainly lounge
  - For 'normal' buildings



How to do it in normal buildings  
Be careful about solar shading  
Can be most of the heating!

## Solar gain in domestic buildings

- E
- T
- T
- L
- T



NORTH FACING WINDOWS  
GOOD DAYLIGHT  
MINIMUM SOLAR HEAT GAIN

EXTENSIVE SOUTH FACING GLAZING  
GOOD, PASSIVE SOLAR HEAT GAIN  
GLAZED BUFFER SUN SPACE  
MINIMUM NORTH GLAZING FOR  
DAYLIGHT.



FORTSMERE ASSOCIATES ARUP

climatechangeskills  
for planners

Extreme examples of solar gain

Both using conservatories. Can see on bedzed how sun won't penetrate living spaces.

Due to opaque roof and intermediate floor



## Glazing

	Normal glass	One low emissivity coating		Two low emissivity coatings	
		Air	Gas	Air	gas
Double	2.5	1.8	1.6	1.8	1.6
Triple	2	1.5	1.3	1.2	1.0

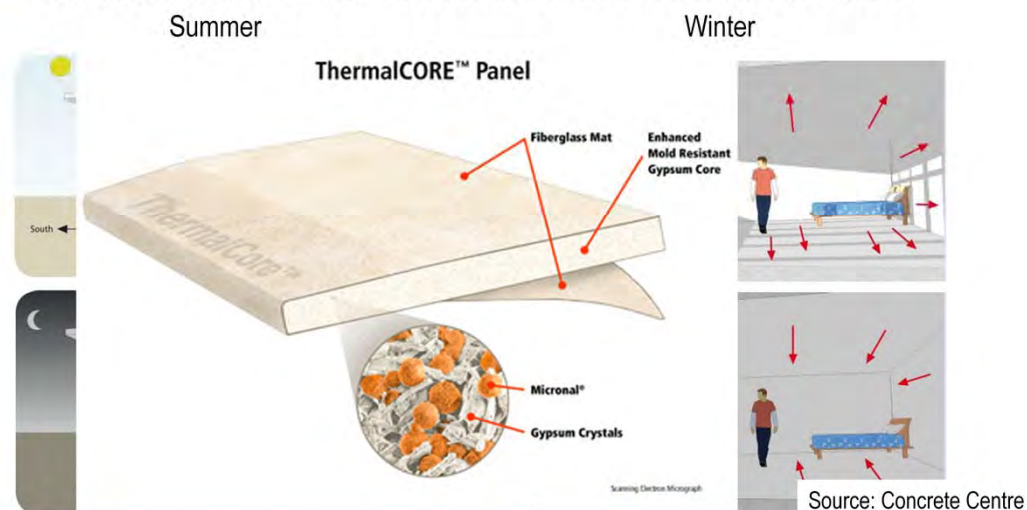
- Effective thermal breaks in the frame can reduce U-values by a further 0.2



Blindly going for triple glazing isn't enough  
There are lots of other factors

## Thermal mass

- Well insulated and sealed with thermal mass means cool in summer



This is how it works. Reduced peaks. Lags not as effective as in non-domestic as evening peaks can be uncomfortable

Only 80-100mm of concrete is needed – don't need to make walls 3 feet thick

Could use phase change materials if you've got deep pockets

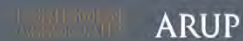
Are lightweight buildings a problem for the future – adaptation?

## Modern Methods of Construction

- Why?
  - Cost certainty
  - Time certainty
  - Reducing on-site duration
  - High quality
  - Address skills shortages
- Why not?
  - Higher capital cost
  - No economies of scale
  - Complex system interfaces
  - Unable to freeze design early
  - Nature of UK planning system

“the slow process of obtaining planning permission ...is inhibiting the use of Offsite-MMC.”

“the planning system needs to be more flexible to consider Offsite-MMC techniques”



Various MMCs and their benefits with respect to the small developer  
Do you need to be ordering 100 houses at a time?

Info from Offsite Modern Methods of Construction in Housebuilding Perspectives and Practices of Leading UK Housebuilders Wei Pan, Alistair Gibb & Andrew Dainty  
Loughborough University

2005 data but has anything really changed since then?



# Climate change adaptation



Adaptation

Overheating

Resilience

Measure

Measure

Cost

Check the Environment Agency Flood

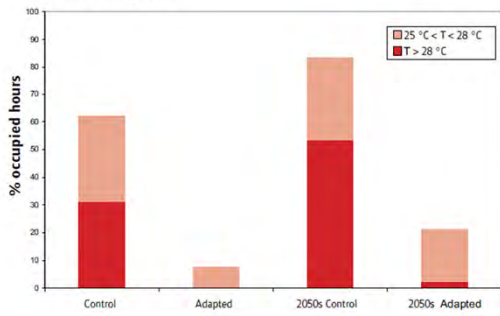
Register with Environment Agency flood warning scheme

Measures which aid overheating only

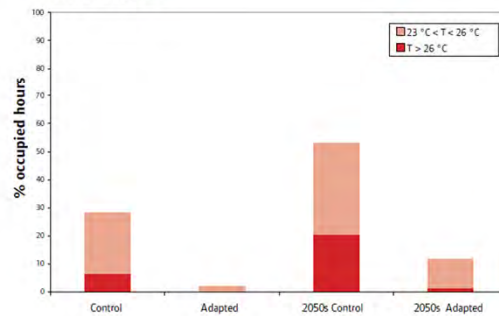
Free

Free

House Living Room



House Bedroom

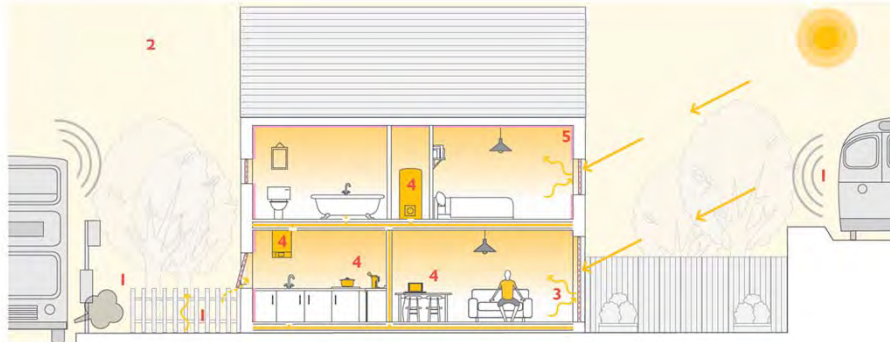


Install waterproof membrane on external walls with low-e coatings.



# Climate change adaptation

- 1. Site Context
- 2. External Temperatures
- 3. Solar Gains
- 4. Internal Gains
- 5. Building Design



## Activity 1

- When should these sustainability design activities occur
- Draw a line to match up the activities and the RIBA stages
- 20mins

Each delegate group to get a set of small pieces of paper with sustainability related design activities printed on them and a blank RIBA Stage sheet.

Put the activities in the 'right' place.

Possibly also choose one activity that is most likely to either be carried out late so affecting the ability to influence the project or not carried out at all.

## Session 2

# Dealing with small scale developments

## Low carbon energy in small developments

Energy source	Large	Small
Biomass	😊	😊
Nat. Gas CHP	😊	😊
Biomass CHP	😊	😞
Heat pumps	😊	😊
Small wind	😞	😞
Medium wind	😊	😊
District heating	😊	😞
Solar thermal	😐	😊
PV	😐	😊

- Small scale in itself only precludes biomass CHP and District Heating
- You just need to do things a bit differently

Small wind is useless nearly everywhere

Solar thermal and PV not so good on large developments as can't contribute very much of energy demand

Biomass CHP only good in Very Large Developments

Heat pumps are pretty scale independent and will be covered by another module on renewables so lets look at things that mimic the combi boiler Joe Public is used to.

## Biomass

- How viable are they really?
- Can be bigger than an average boiler
- More expensive



<£1,000



Baxi Bioflo  
12kW - £7k

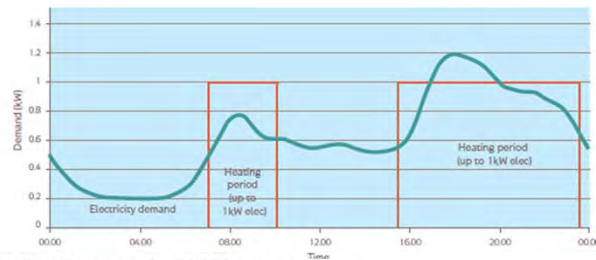


Baxi MultiHeat  
15kW - £4k

Or a wood burning stove would be fine in a well insulated new building

Comparable combi is ~£1,000

## Micro CHP



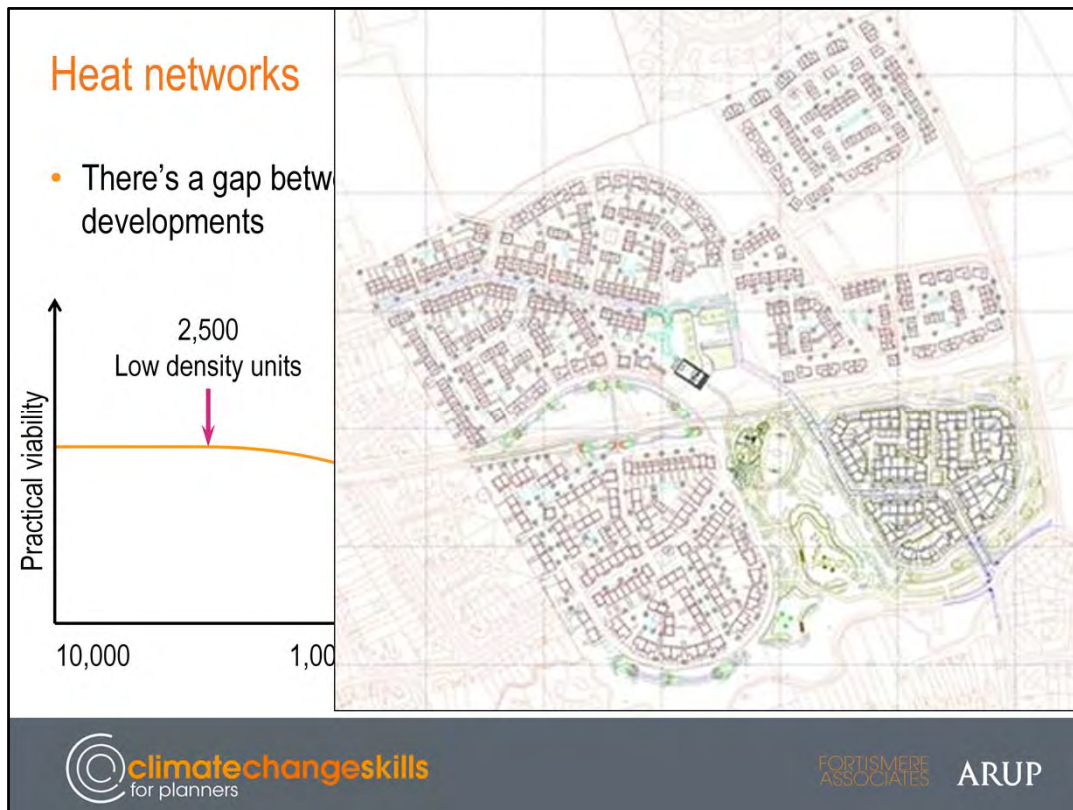
- 24kW thermal, 1kW electric
- Graph implies 24kW thermal load for 8 hours (!)
- Heat lead
- ~£7,000

Manufacturer's data – use with caution

BAXI Ecogen

I'm not sponsored by BAXI – just thought having comparable products would help!





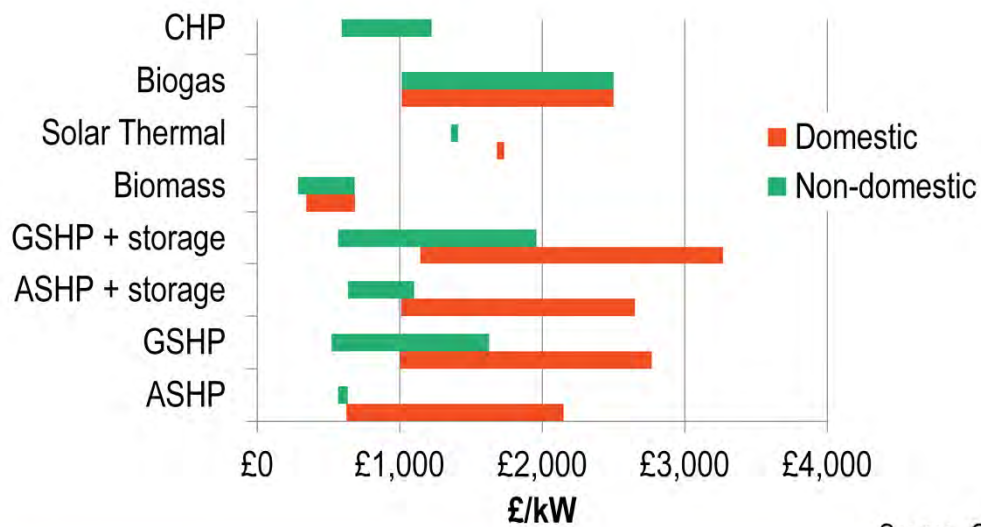
Low density – detached and semi-detached.

Commercially viable is the key. It's always technically viable to put one in but generally there's no point

Example is Derwenthorpe with each phase of 64ish houses served by the central biomass plant. Only done because JRHF are particularly forward thinking



## Costs of energy – disproportionate for small resi?



Source: CCC

Source CCC 4<sup>th</sup> carbon budget report

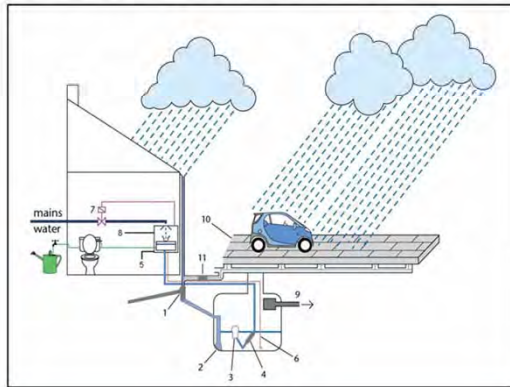
£7k for 24kWth microCHP works out as £300

Can see that non-domestic is generally cheaper due to economies of scale

The non-domestic range probably corresponds to district heating of a large resi development

## Water conservation

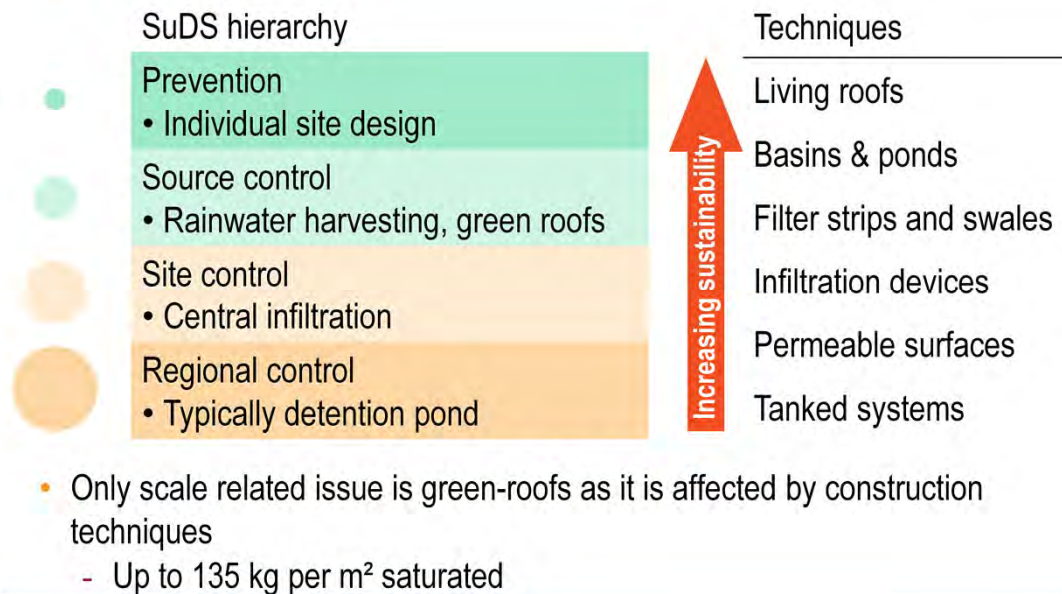
- Rainwater harvesting and low flow fittings are just as valid in small developments.
- Even on large scale developments, centralised systems are incredibly rare



Source: Environment Agency

Digging a hole and popping a local tank in is almost always going to be more viable than the large infrastructure needed for a district-wide system. Also pumping losses

## Landscaping options



Sustainability source is environment agency. Hierarchy is DEFRA

Site design is key

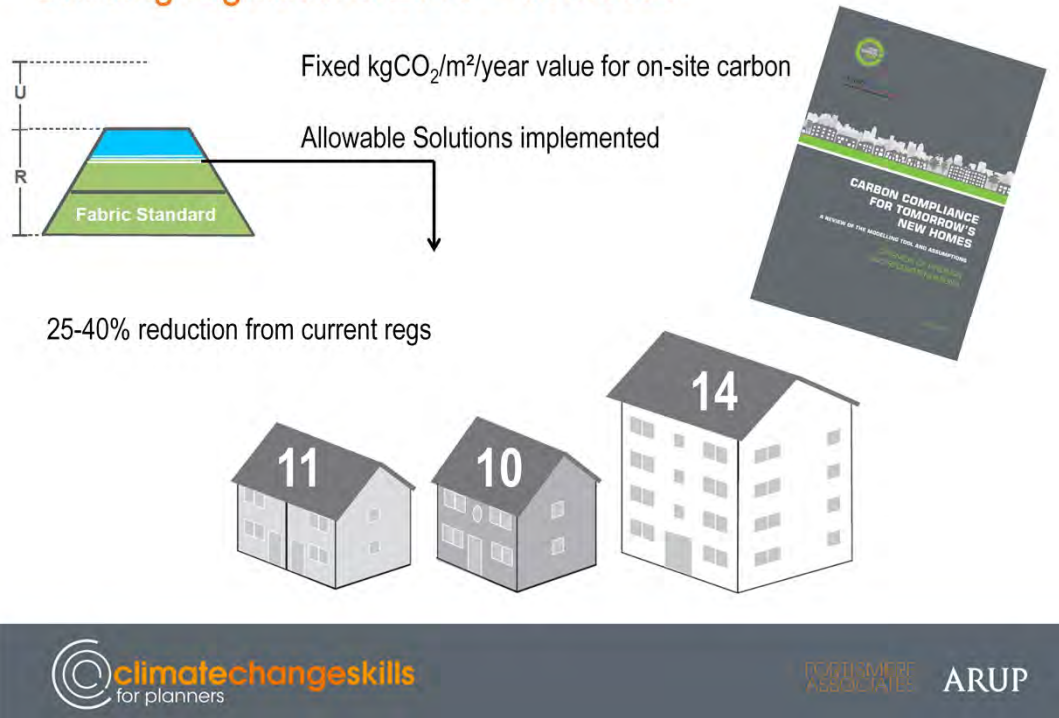
## Disproportionate cost of compliance

- CSH is done by house type
- Large developments – more of a given type
- Small developments – more individual
- More expensive per unit.

## Smaller teams - lack of expertise?

- Is this where the issue really lies?
- Targets above Building Regs needs specialist expertise
  - Ecologist
  - Materials
  - Experienced energy assessor
  - M&E team for more complex builds

## 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

## C-Plan – a tool for Planning Officers

- On-line tool allowing developers to input information into a form and Planning Officers to evaluate based on criteria included in the tool.
- Charts and graphs show how the proposal meets energy requirements in planning policy.
- <http://www.sustainabilityplanner.co.uk/>



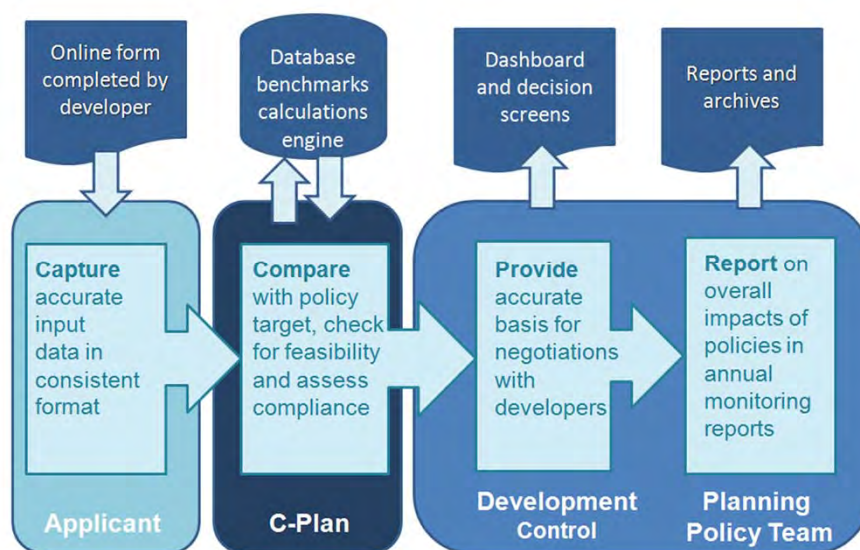
Planning authorities that have issued consents with conditions requiring scheme to demonstrate compliance with Local Planning Policy seeking carbon reductions above building regulations either through efficiency or renewables will be able to use C-Plan.

C-plan is filled in by the developer – it handles complex information and then displays it in a form that can be readily understood by planners. Charts and indicator lights explain how a development measures up against energy targets in planning policy.

They are displayed on the screen and in a report.



## C-Plan: The Process



Can be used by Development Control team to understand if developers are meeting the requirements of the policies / conditions on planning application.

The planning policy team can use the data outputs to monitor the take up of renewable policies – which is always tricky to monitor.



## 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

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

Decide on involvement

Develop list of projects. Decide on mechanisms

Publish and implement

Allocate the funds

### Summary of a Local Planning Authority's interaction with the framework

A Local Planning Authority must decide in principle if it wishes to engage with the Allowable Solutions agenda

Local Planning Authority reviews guidance on developing an Allowable Solutions policy. Makes a decision on whether to establish a policy

Allowable Solutions Policy established. Prescribed list of local Allowable Solutions drawn up. Decision made on whether or not to form a Community Energy Fund or whether to partner with other local Allowable Solutions providers

Local Allowable Solutions project list posted and policy, including carbon price published. Developers start to pay into scheme from 2016

Local Planning Authority has increasing options for funding major projects, and partnering with other local authorities to deliver strategic projects with increasing scope for carbon reduction

This is from the Zero Carbon hub's document.

## Activity 2: Development Scenarios and Energy Options

- There are five sheets of A3 paper on your table.
- Each sheet includes a development scenario and ten energy options.
- What are the top 2 most eligible technologies for each development if the target was to achieve 10% of energy load from low carbon technologies
- **Which technologies are not appropriate?**
- Please mark up the A3 sheets in front of you
- 15 mins then feedback

Facilitated discussion around the topics on the slide with the intention of the delegates understanding the common themes and issues from other authorities in their region and to share any breakthroughs they may have had

## Break

- Break – 30 mins
- Back at...
- Happy to answer queries

## Session 3

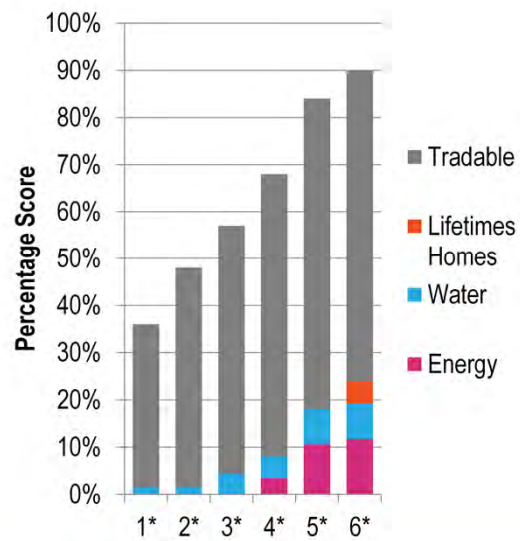
# Code for Sustainable Homes

## CSH – Score calculation and levels

- Simple calculation



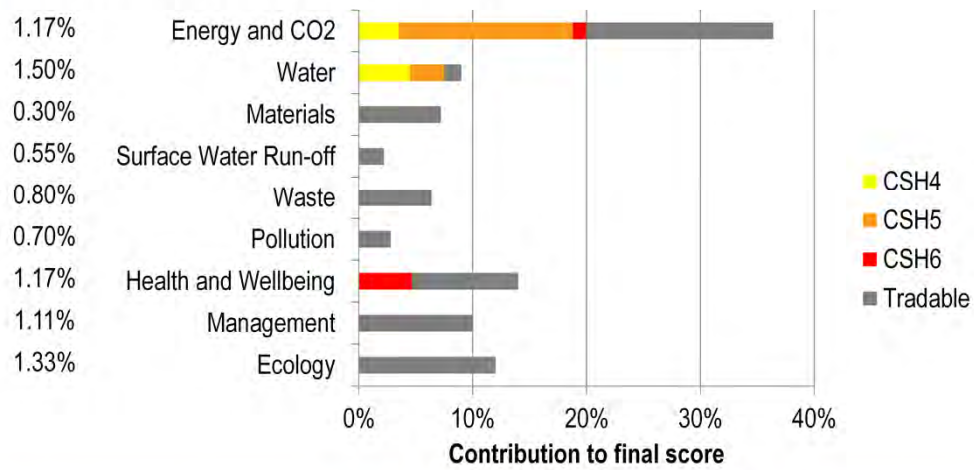
- Points = prizes
- Mandatory credits



Can see how the need for more points increases as the levels increase

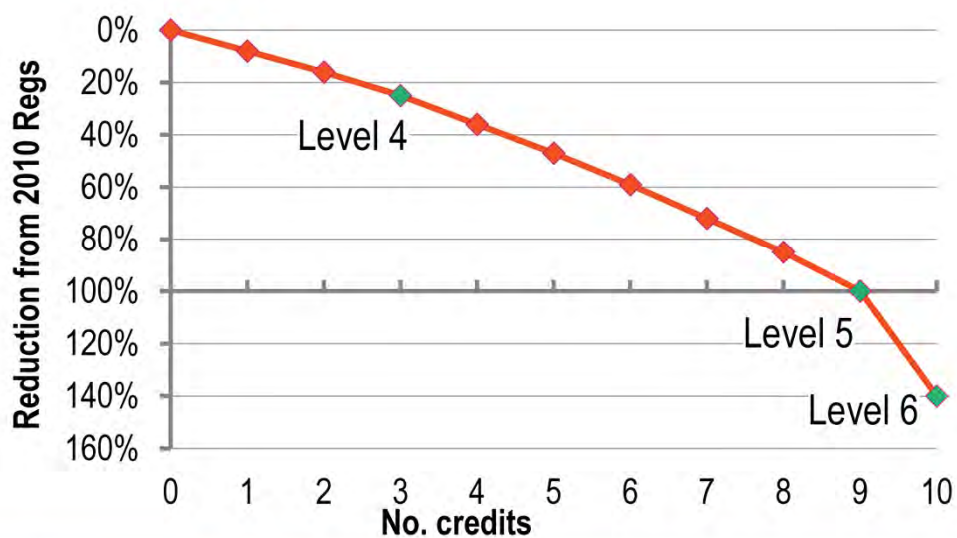
## CSH – Weightings

- Categories have varying importance



After explanation – will now go through some of the more trickier credits to achieve that are often stumbling blocks to higher scores.

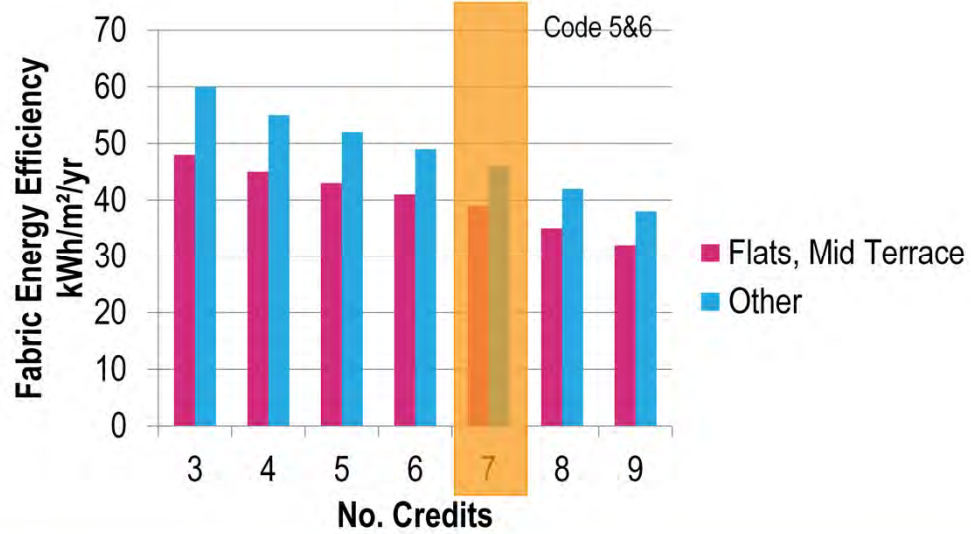
### Code – A focus on energy



Can see that significant reductions from current regs are needed  
Code 4 needs a little renewables  
5 and 6 need lots

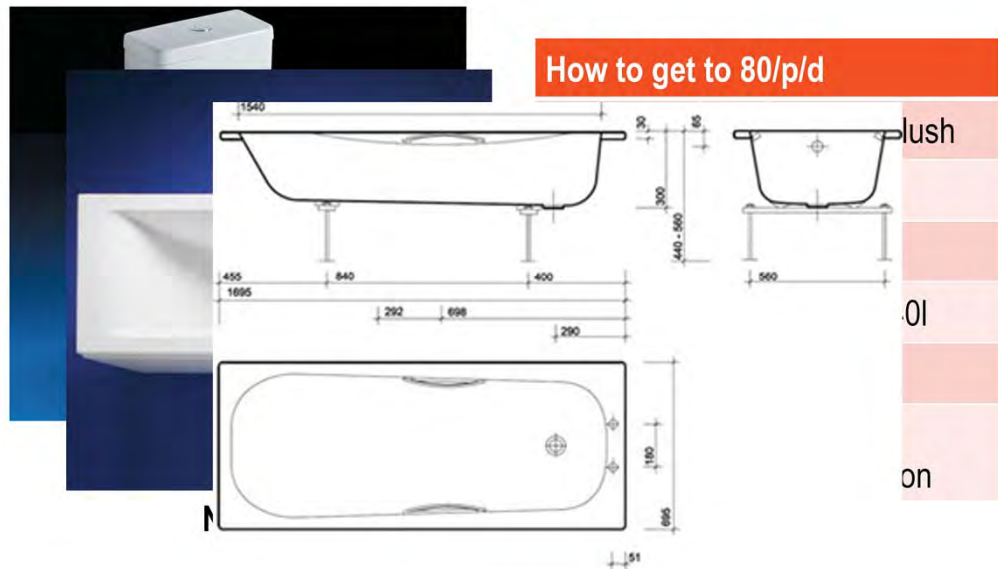


## Code – Fabric Energy Efficiency



Code 5 and 6 mandatory level is the preferred option for 2013 regs  
An alternative is the level for 5 credits

## Code – Water standards

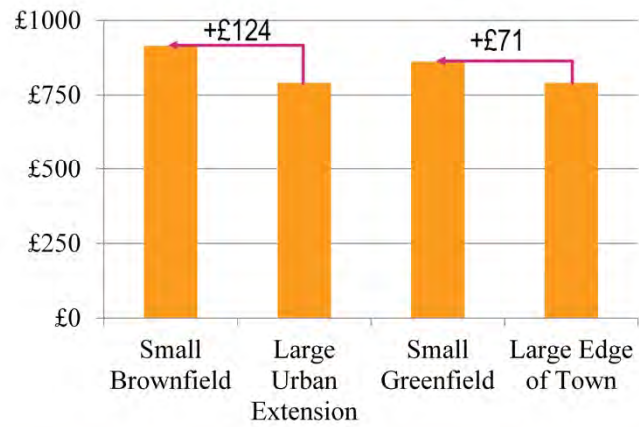


Wash hand basin taps 'normally' 12 l/min  
Showers normally 14l/min

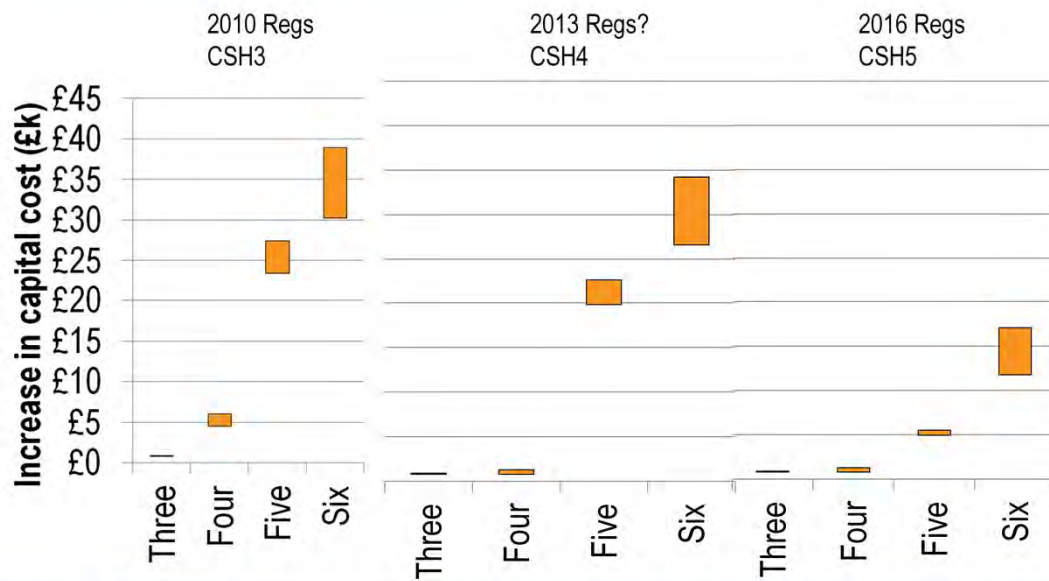
Bath 300 deep at the deepest point, 560 total width! 110 l capacity

## Code costs for small developments

- Costs to Code 3 from Building Regs 2010



## Code Costs in the future



## Effect of development type on costs



Costs are extra over for achieving Code 4 from 2006 baseline (so need some interpreting) on a semi detached

But there's hardly any difference

## Code 4 example – LILAC Leeds

- ModCell construction
- Community gardens
- Central Common House



Source: [www.lilac.coop](http://www.lilac.coop)



## Code 6 example – Airedale, Castleford

- 91 homes
- MVHR, greywater recycling, PV
- Biomass district heating
- Smart metering
- £120k build cost



## PassivHaus

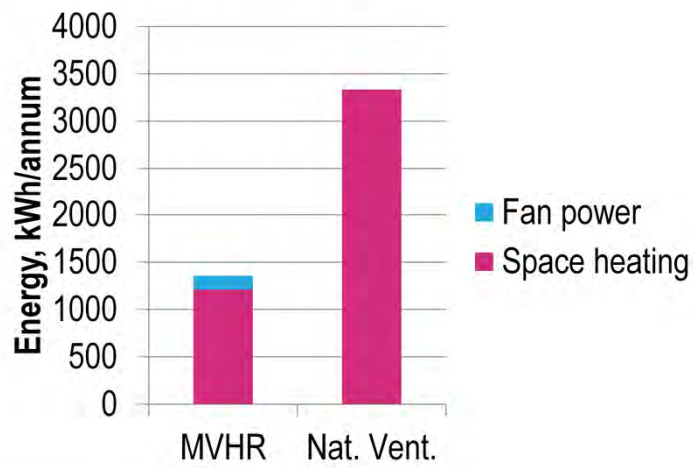
- Energy only
- Approx Code5 fabric standard
- PHPP (PassivHaus Planning Package) as opposed to SAP
  - Design tool instead of compliance checker
- Requirements
  - Space heating < 15kWh/m<sup>2</sup>/annum
  - Total primary energy < 120kWh/m<sup>2</sup>/annum
  - Air change < 0.6 ach (~<1m<sup>2</sup>/m<sup>3</sup>/hr)

Space heating is £60/yr based on 4p/kwh gas  
Incidentally, 0.6ach at 50Pa is about 1 air change every 30 hours under atmospheric conditions (factor of 20)



## PassivHaus – why MVHR?

- SAP recommends 0.5 air changes per hour



## Case Study - PassivHaus

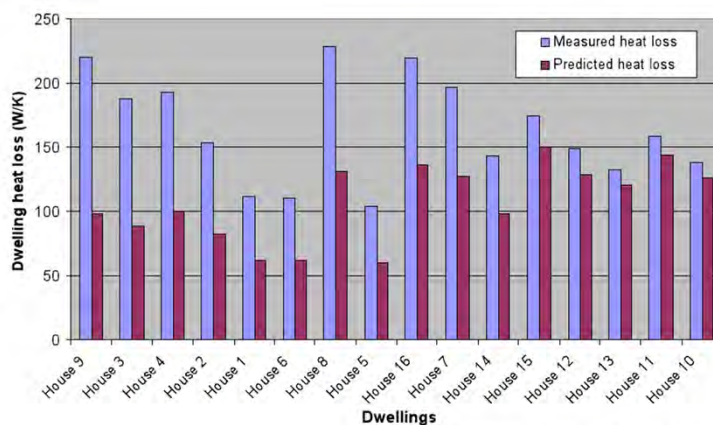
- Denby Dale
- First cavity wall PassivHaus in UK
  - Don't have to use lightweight materials
- 300mm insulation in walls
- Passive solar gains
- Needed a 1.1kW boiler to cope with -10°C



Source: Green Building Store

## Predicted versus actual performance

- Study eliminates behaviour effects
- Requirements for improvement
  - Design Stage
  - Construction



Source: Zero Carbon Hub

Whether what gets designed is what gets built

Info shows shortfall from 15 to 120%. All bar four were from buildings with a significant focus on energy efficiency. Mix of house types etc.

Info from Zero Carbon Hub study

Leads into discussions of planning vs. building control

## Session 4

# Assessing developments

## Assessing developments

- How to ensure that minor developments are doing as much as is appropriate in terms of sustainability?
  - How to tailor the requirements to smaller teams?
- Summary of main issues + additional ones from the floor
- Develop questions to ask
- Feedback and discuss

Issues to be summarised include those most commonly mentioned in policies and most commonly mentioned in the feedback from planners that informed the development of these modules

## Main issues

- Energy & emissions
  - Demand reduction
  - Low carbon energy strategy – necessary?
  - Quantified or qualitative?
- SuDS & flooding
  - EA flood map output?
  - Proportion hard-standing calcs

## Main issues

- Ecology & biodiversity
  - Simple habitat evaluation using BREEAM criteria that allows non-specialists to estimate species numbers?
  - Simple searches for SSSI's etc
- Code for Sustainable Homes
  - Robust pre-assessment
  - Evidence of activity on key items at detailed planning
  - Use calculator outputs as evidence? E.g. water consumption
- Are there any other significant issues you'd like to explore?



## Over to you – Activity 3 – Discussion

- What questions can you ask for in order for the developer to be required to demonstrate a reasonable amount of design activity at each stage?
  - Outline application
  - Detailed application
- What would the answers be that you would expect / hope for?
- Would this change if the required standards were much more onerous?
- No two people from one authority in a team
- 15mins
- Then feedback / discussion / commentary

These are the key questions for the delegates to develop answers to (in the form of more questions)

Splitting people up with the intention of getting different ideas discussed and for people to learn from each other's practices

## E.g. Energy & emissions

- Check the SAP output for the projected emissions

TER	27.42	kg CO <sub>2</sub> /m <sup>2</sup> /yr
DER	-6.11	kg CO <sub>2</sub> /m <sup>2</sup> /yr
Criterion 1	Passed	

- Does this meet the required improvement?
  - 10%, 20%?

**ENHER** L1A 2006 Regulations Analysis: Design - Draft

This Design Draft submission provides evidence of compliance with Part L of the Building Regulations. It has been carried out by an Authorised SAP Assessor. It has been prepared from plans and specifications and may not reflect the "as built" property.

Assessor Name: Mr Andy Sheppard Assessor Number: 1  
Client:  
Date Last Modified: 16/10/2007  
Address: Wilmcks Road, Haslem, Bristol, South Gloucestershire BS15 3HY

This draft L1A Regulations Analysis report is for internal purposes only and should not be accepted as evidence of compliance by Building Control.

Criterion 1: Predicted carbon dioxide emissions from proposed dwelling does not exceed the target

TER	27.42	kg CO <sub>2</sub> /m <sup>2</sup> /yr
DER	-6.11	kg CO <sub>2</sub> /m <sup>2</sup> /yr
Criterion 1	Passed	

Criterion 2: The performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits

Fabric U-values

Element	Actual U-value	Worst Acceptable U-value	Area weighted avg U-value	Worst Acceptable Area	Pass/Fail
Roofs					
Roof	0.12	0.35	0.12	0.29	Passed
Walls					
Ground Floor	0.12	0.70	0.12	0.29	Passed
Walls					
Party Wall	0.14	0.70	0.14	0.30	Passed
End Wall	0.14	0.70	0.14	0.30	Passed
Short Long Wall	0.14	0.70	0.14	0.30	Passed
Tall Long Wall	0.14	0.70	0.14	0.30	Passed
Openings					

This draft L1A Regulations Analysis report is for internal purposes only and should not be accepted as evidence of compliance by Building Control.

Page 1 of 4

SEI: Release 11.1  
File: Annex 11.1.1  
SAP 10.0.0.0 (2006 - 10.0)

Really not sure if this is the sort of thing they're after.

## E.g. Energy & emissions

Air permeability  
(m<sup>3</sup>/(h·m<sup>2</sup>) at 50Pa) 1.00

- Is this realistic?
- Could it be improved?

**ENHER** L1A 2006 Regulations Analysis: Design - Draft  
Date Last Modified: 16/10/2007  
Assessor Name: Ms Andy Sheppard Assessor Number: 1

This draft L1A Regulations Analysis report is for internal purposes only and should not be accepted as evidence of compliance by Building Control.

External lighting compliance with paragraph 45  
External lighting present:  Yes  Passed

Mechanical ventilation compliance with paragraph 40 and Table 3  
Mechanical ventilation system: Balanced whole house (with heat recovery)  
Specific Fan Power:  
Air permeability for balanced whole house systems: 1.00

Criterion 3: The dwelling has appropriate passive control measures to limit solar gains  
Tendency of dwelling to overheat  
Tendency for dwelling to overheat:  Not Significant  Passed  
Tendency must not be 'HIGH' to comply

Criterion 4: The performance of the dwelling, as built, is consistent with the DER

Full construction  
Accredited construction details approach  
Has not been adopted:  Passed  
Schedule of construction details and their thermal codes has not been assessed by this program  
Site inspection performance and checklist have not been assessed by this program

Air permeability  
(m<sup>3</sup>/(h·m<sup>2</sup>) at 50Pa) 1.00  Passed  
Sample pressure test results in comparison to design value are not assessed by this program

Commissioning heating and hot water systems  
Commissioning completion certificate is not assessed by this program

This draft L1A Regulations Analysis report is for internal purposes only and should not be accepted as evidence of compliance by Building Control.

Page 3 of 4  
1500 Release 1.1  
Plan Assessor V1.00.07  
LAP File Name (Voice: 1.00)

# Session 5

## Refurbishments

## The importance of refurbishments

- 21 million homes in the UK – 27% of UK carbon emissions
- 86% of existing homes will exist in 2050
- Represent an 'investment' in natural resources and embodied energy
  - Not to be thrown away lightly
- Societal cohesion of familiar streetscapes



## Refurbs and planning

- Permitted developments cover much of sustainability refurbishments
  - Boilers or other heat sources
  - Insulation, even external
  - Windows & doors
- Building Regulations may apply where planning doesn't
- Any local restrictions?

Would it be feasible, practical or desirable to locally raise the required standard of refurbishments above the national minimum required by building regs?  
Who would implement and enforce this – building control or planning?

## Building Regs and refurbishments

	New Buildings A	Existing Buildings B	
Non-domestic L1			“at a good level, and reaching the point of diminishing returns.”
Non-domestic L2			

The image displays a 2x2 grid of building photographs. The columns are labeled 'New Buildings A' and 'Existing Buildings B'. The rows are labeled 'Non-domestic L1' and 'Non-domestic L2'. Each photograph has a large green label overlaid: 'L1A' and 'L1B' for the top row, and 'L2A' and 'L2B' for the bottom row. The buildings in the 'New Buildings' column (A) are modern, multi-story structures with large windows and glass facades. The buildings in the 'Existing Buildings' column (B) are older, more traditional structures with brick and stone facades. The quote on the right side of the grid reads: “at a good level, and reaching the point of diminishing returns.”

L1A is new build, L1B is existing. L1A and L2A for new builds have changed significantly over the last decade as the carbon agenda has increased in prominence. In comparison, changes to existing building regs have been less significant.

Don't expect any massive changes either



## What are the standards

- Extensions
  - Fabric standards are average at best
  - Glazing recommendations
  - Policy opportunity?
- Renovations
  - Fabric standards very variable
  - Lenient for walls
  - Lowest common denominator
- Consequential improvements
  - Only when over 1000m<sup>2</sup>



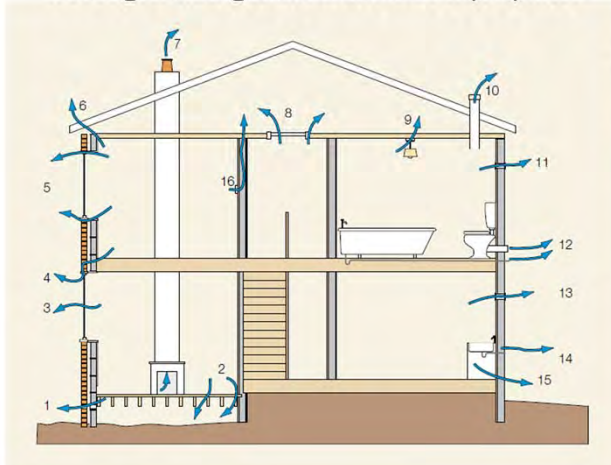
Extension fabric improvement standards are pretty poor – could be improved

Windows potentially moving to 1.4 in 2013

Walls to 0.20

## Air tightness

- L1B – “Reasonable provision should be made to reduce unwanted air leakage through the *new* envelope parts”



There are often lots of areas for improving airtightness on refurbishment projects but it's not required and is often not tackled in any coordinated way. Particularly need to think how extension join into the existing property.

## Consequential improvements

- Currently only over 1000m<sup>2</sup> but in the future...

Increase in habitable area



Boiler or window replacement



SAP Appendix T

## Opportunities for improvement?

### **Conservatory Tax? It was bonkers, insists Cameron as he pledges to veto plans that would cost homeowners hundreds**

“We’re all for going green but this is a ridiculous idea”

- Nationally not going to be implemented
- Locally..?



These were all great plans until Mr Cameron got involved

However, it does mean that there are sets of developed policies out there with impact assessments that are ripe for local implementation.

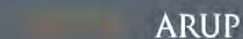
## Consequential Improvements – Case Studies



**Policy SCS6 Energy Efficiency Extensions** states that where planning permission is required for extensions to residential properties smaller than 1000 square metres proposals for extensions **must incorporate measures to increase the energy efficiency of the host building by at least 30%** unless this can be demonstrated to be unfeasible or to render the proposal unviable.

Submission Core Strategy, May 2012

A SPD will be produced to provide further information on how to implement this policy.



## Consequential Improvements – Case Studies



As part of a wider climate change policy (CP1 2a) seeks to:

Ensure carbon savings in existing developments – Consequential Improvements

‘when applications are made to extend dwellings the Council will seek to **secure reasonable improvements to the energy performance of dwellings**. This will be in addition to the requirements of Part L of the Building Regulations for changes for which planning permission is sought’.

Submission Core Strategy, August 2012



## Green deal

- Measures allowed (£10k limit)
  - Solid / cavity wall insulation
  - Loft insulation
  - Double glazing
  - Door insulation
  - Smart meters
  - PV
  - Solar thermal
  - Air and ground heat pumps
  - Biomass boilers
- Golden Rule:
  - Loan repayments  $\leq$  energy savings
- Interest rates 7.5%. Repayments up to 25 years
- Liability stays with the house if you move



Measures need to be approved by Green Deal Accredited Advisors

Some scepticism as to whether it's going to work



## Refurbishment Case Study

- Solid brick walls
- 300mm external insulation, MVHR, solar thermal
- 95% reduction in primary energy
- No mention of costs....

RefitSW	~50% red <sup>n</sup> in CO <sub>2</sub>	~£15k - £20k
TSB PassivHaus	~80% red <sup>n</sup> in CO <sub>2</sub>	~£60k - £100k

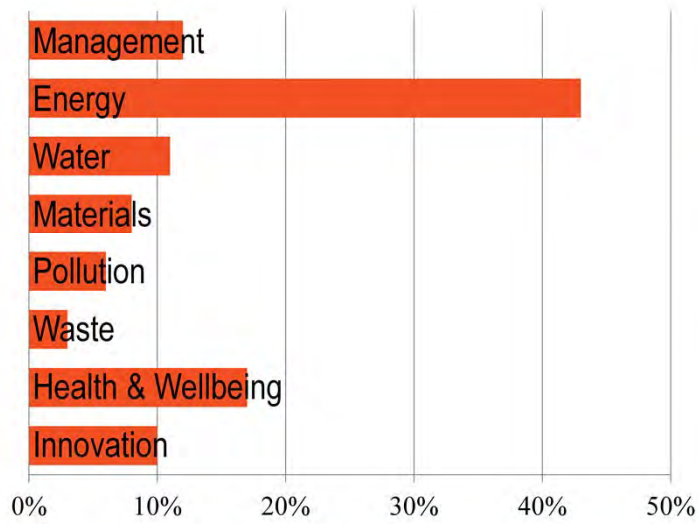


## BREEAM for domestic refurbishments

- Replaces EcoHomes
- Choice of certification routes
  - Formal assessment
  - Self declaration
- Two categories
  - Alterations and extensions
  - Conversions and change of use
- Individual dwellings or site-wide

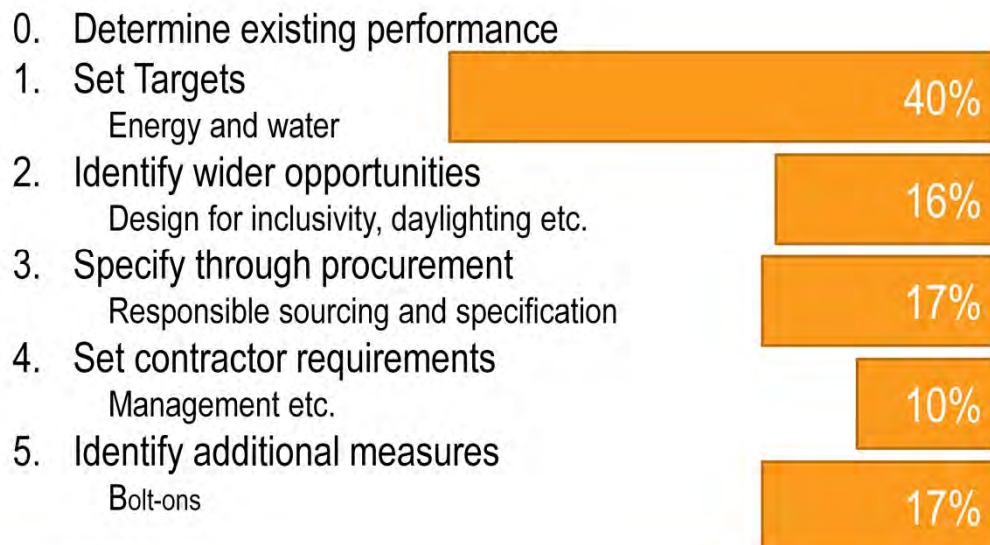


## Weightings and scoring



Rating	Score
Pass	30
Good	45
Very Good	55
Excellent	70
Outstanding	85

## Where are the credits available



## Case Study – Cornbrook Court, Manchester

- BREEAM Domestic Refurbishment – ‘Very Good’
- Additional insulation & new windows reduced emissions by 20%
- Low-flow sanitary-ware and water butts
- Lifetime Homes, rotary driers, home office



Source: [www.breeam.org](http://www.breeam.org)

## Case Study – Boleyn Road, London

- BREEAM Domestic Refurbishment – ‘Excellent’
- Internal wall insulation, MVHR, triple glazing
- Air-tightness <math>< 3 \text{ m}^3/\text{hr}/\text{m}^2</math>
- Micro CHP
- Maximum credits in Water, Waste, Management and Ecology



Source: [www.breeam.org](http://www.breeam.org)

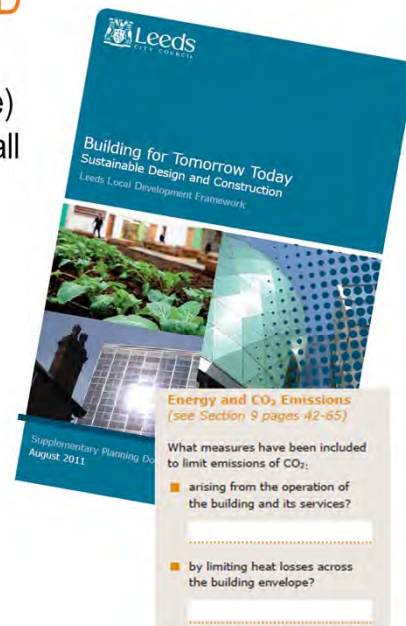
## Session 6

### Types of guidance



## Guidance Case Study – Leeds SPD

- Sets out policy (but for 10 dwellings or more)
  - Sustainable principles “applicable to small developments”
- Difficulties of small developments not specifically mentioned
- Sections based around issues
- Useful checklist for developers
- Adaptation weaved throughout sections



## Guidance Case Study – York IPS

- Flowchart guides developers to relevant sections
- Sections based around development type
- Sets out minimum standards clarifying policy



**LAF**  
**CO**  
**DEV**  
**(S**

Part h) of policy GP4a:  
Development should maximise the use of renewable resources on development sites and seek to make use of renewable energy sources, such as heat exchangers and photovoltaic cells.

**Minimum Standard (Renewable Energy):** The sustainability statement must demonstrate that at least 5% of the expected energy demand for the development will be provided for through on site renewable generation for heat and/or electricity. In addition, it should be identified how the development could accommodate renewable energy installations in the future, for example the number/area of south facing roofs.

ments

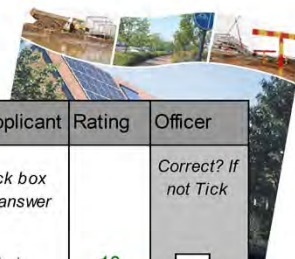
			(5 and over) Section 4 Page 27	(4 and under) Section 4 Page 32	
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Interim Planning Statement

## Guidance Case Study – Doncaster SPD

- Backed up by Sustainable Construction Checklist
  - Cross references throughout document

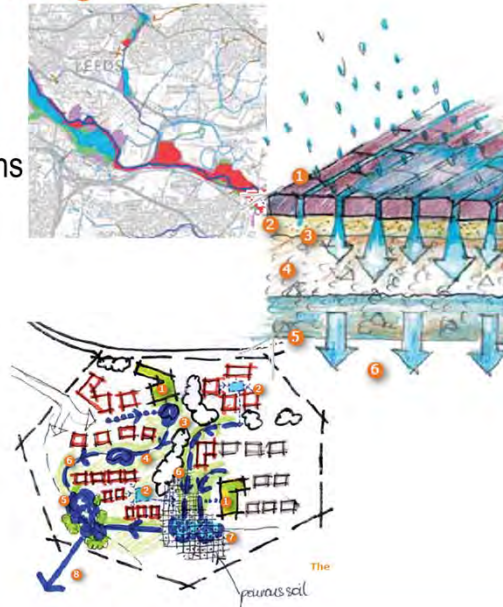
Doncaster  
Doncaster Local Development Framework  
Supplementary Planning Document  
Sustainable Construction



Addressing impact of construction activities			
4 Design of Development	Applicant	Rating	Officer
4.1 Reducing Energy Demand	Tick box to answer		Correct? If not Tick
a) The orientation of the building(s) are within 30 degrees of due south for solar gain; and/or	<input type="checkbox"/>	10	<input type="checkbox"/>
b) Main rooms with highest occupancy are located on the south of the building(s); and/or	<input type="checkbox"/>	10	<input type="checkbox"/>
c) The building(s) include glazed sunspaces (atriums and conservatories) that are thermally insulated; and/or	<input type="checkbox"/>	10	<input type="checkbox"/>
d) The building(s) includes methods of solar shading (e.g. shutters, blinds or brise-soleil)	<input type="checkbox"/>	10	<input type="checkbox"/>
e) Potential separate buildings are joined to increase thermal massing	<input type="checkbox"/>	5	<input type="checkbox"/>
f) None of the above methods have been designed into the proposal(a-e)	<input type="checkbox"/>	-45	<input type="checkbox"/>
Energy Demand SUB-TOTAL	0	Max	45

## Guidance types – focus on flooding & SUDS

- Leeds SPD
  - Background inc flood map
  - Detailed site management solutions
  - What the authority is doing
- Doncaster SPD
  - Brief site management options
- York IPS
  - Nothing



## Activity 4: Discussion

- Three different approaches to SPDs
- Copies are provided on your tables.
  - One good point from each, one bad point from each
- Should small developments be more specifically catered for?
- Next steps to developer guidance
- 15 mins then feed back

Each group to get a copy of each of the SPDs mentioned for reference

# Session 7

## Sources of further information



## Zero Carbon Hub

- Very detailed research into energy standards at low energy levels
- Backed up with excellent levels of data
- Also step outside the technical aspects
- [www.zerocarbonhub.org](http://www.zerocarbonhub.org)

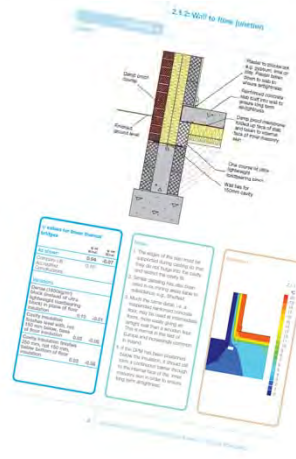


FACILITATING THE MAINSTREAM DELIVERY OF LOW AND ZERO CARBON HOMES



## AECB

- Association of Environmentally Conscious Builders
- 3 sets of standards and design guidance:
  - Silver
  - PassivHaus
  - Gold
- [www.aecb.net](http://www.aecb.net)



## Energy Saving Trust

- Generally relatively non-technical but detailed
- From guidance to myth-busting research
  - E.g. Small wind
- Grants database
  
- [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

Energy efficiency  
and the Code for  
Sustainable Homes

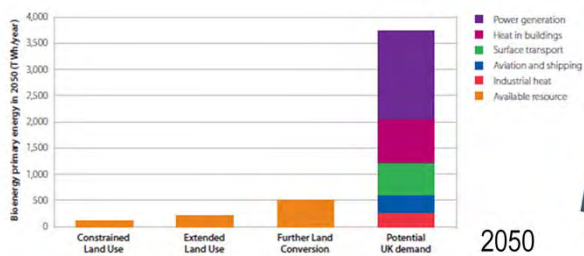
Level 4

Achieving airtightness in new  
dwellings: case studies

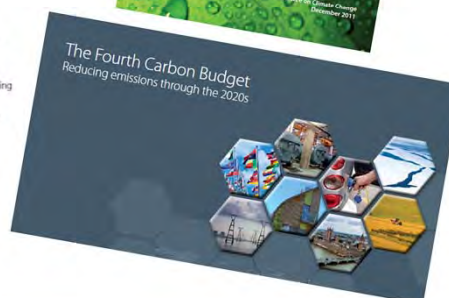
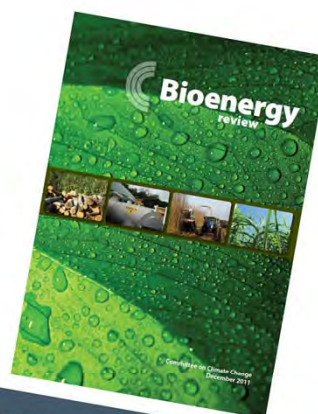
Here comes the sun:  
a field trial of solar water  
heating systems

## Committee on Climate Change

- To get a longer range idea
- Advise government and influence policy
- [www.theccc.org.uk](http://www.theccc.org.uk)



2050



For example, bioenergy report commented that we could provide 10% of our primary energy by biomass. If CCS turns out not to be viable this will not be enough to reach the 2050 targets. More biomass would require unsustainable land use changes.

## Miscellaneous

- BSRIA – Air tightness in Dwellings
- Concrete Centre – some interesting information
  - So long as you're careful
- DECC – Consultation on Low Carbon Heat in the UK
- UK Green Building Council
- WRAP
- Low energy building database – [retrofitforthefuture.org](http://retrofitforthefuture.org)

## Wrap-up

- Final questions?

Thank you