



Welcome to BRE

23rd September, 2008

SEEDA Code Training

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Sustainable Development



An Introduction to The Code



Overview



- **Single national standard for England**
- **Industry guide for design and construction for new homes**
- **Driving continuous improvement in legislation, policy and good practice**
- **A mark of quality**
- **Informed by industry consultation**

Key Objectives of the Code

As recommended by the Sustainable Buildings Task Group

- Bring about a step change in sustainable building practice for new homes
- Encourage home builders to construct more sustainable homes
- Signal the direction of future regulations

The Code differs from EcoHomes...

- It rates dwellings on a scale from Level 1 to level 6, where level 6 is the highest
- Assesses individual dwellings instead of groups of dwellings
- Establishes minimum mandatory standards for CO2 emission rates, indoor water use, materials, waste and surface water run-off, for achieving even the lowest level of the Code
- Demands higher minimum mandatory standards for CO2 emission rates and indoor water use, to achieve Levels 2 to 6 of the Code

The Code differs from EcoHomes...

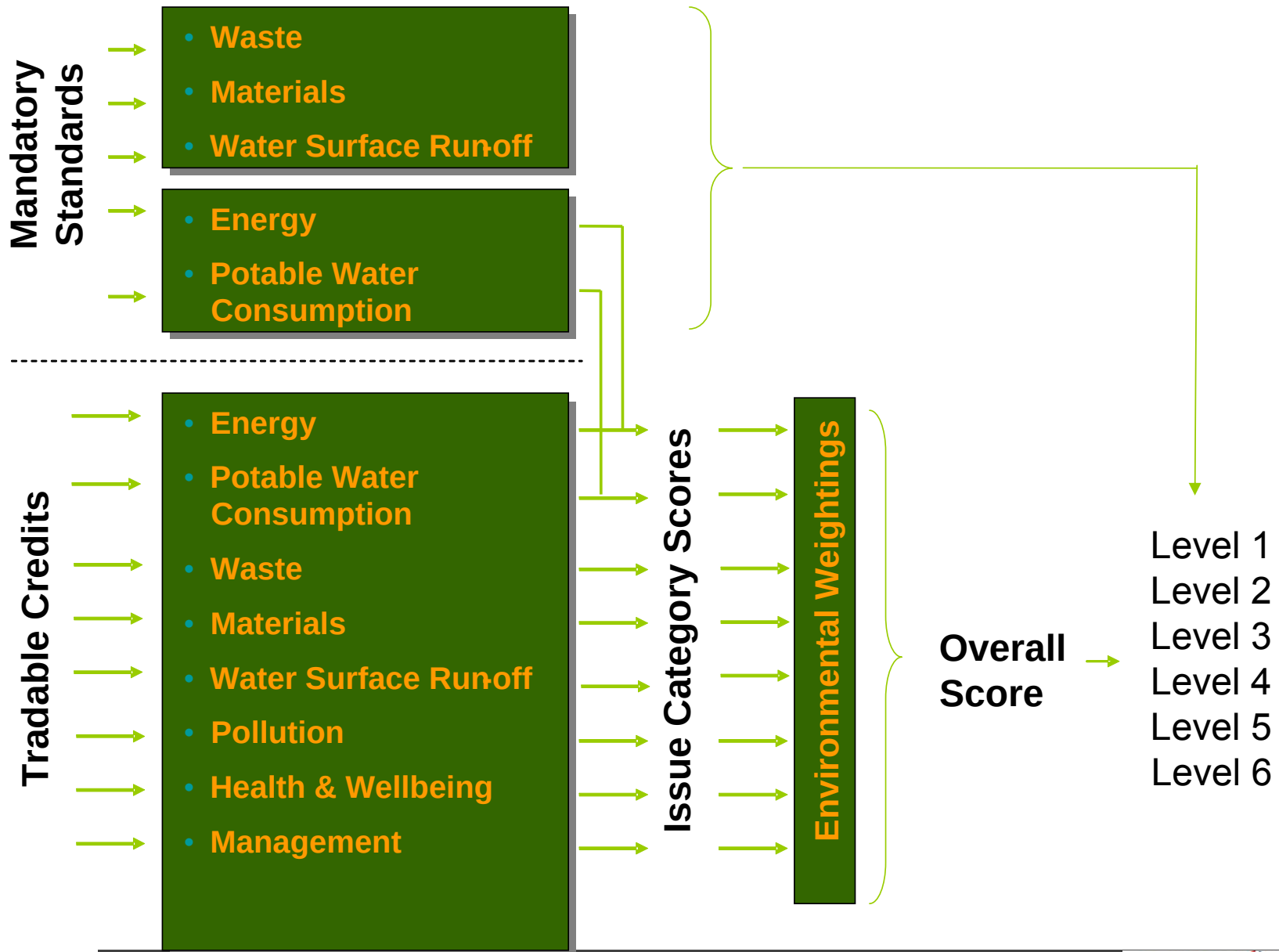
- Requires compliance with the Lifetime Homes standard to achieve Level 6 of the Code
- Assesses dwellings at both the design (DS) and post construction (PCS) stage
- Awarding final Code certificates after the post construction assessment has been carried out
- For dwellings which do not achieve the minimum Code rating, a certificate is issued which shows a summary of the performance achieved, but does not show a rating from 1 to 6
- For dwellings which are not assessed, a nil-rated certificate is issued

Important Features

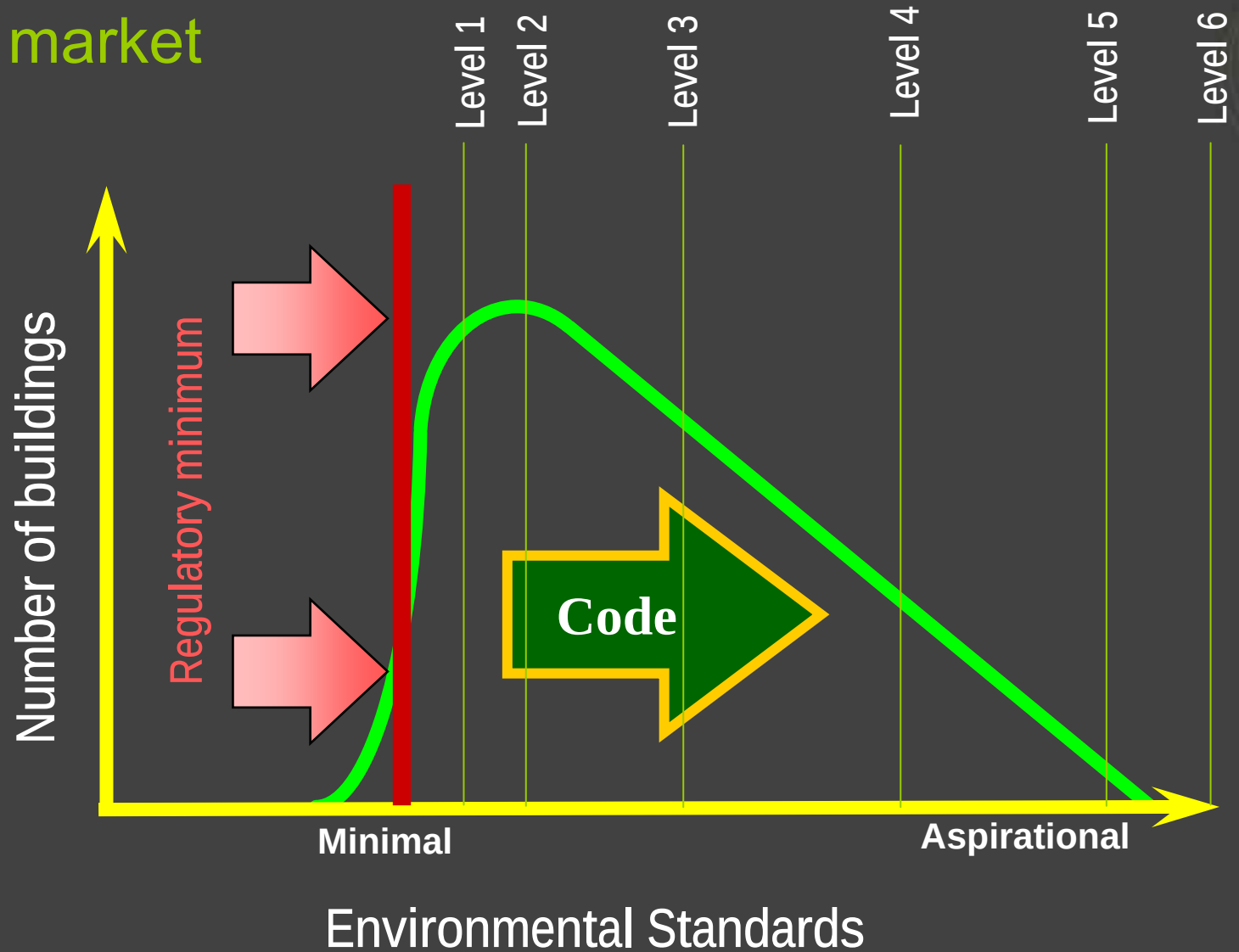
- Mandatory pre and post construction review
- Every new home MUST be assessed under the Code
 - *From 1st May 2008 it is mandatory for a Code sustainability certificate or a nil rated Certificate (where an assessment has not taken place) to be included in the Home Information Pack as information to prospective purchasers of properties in England. This would apply to all new homes that are marketed for sale,*
- Minimum standards, failure to meet these means a nil rating
- Applies to each house (code dwelling type)
- Requires a strategy from initial conception of projects
- Supply chain may be challenged

Key Issues

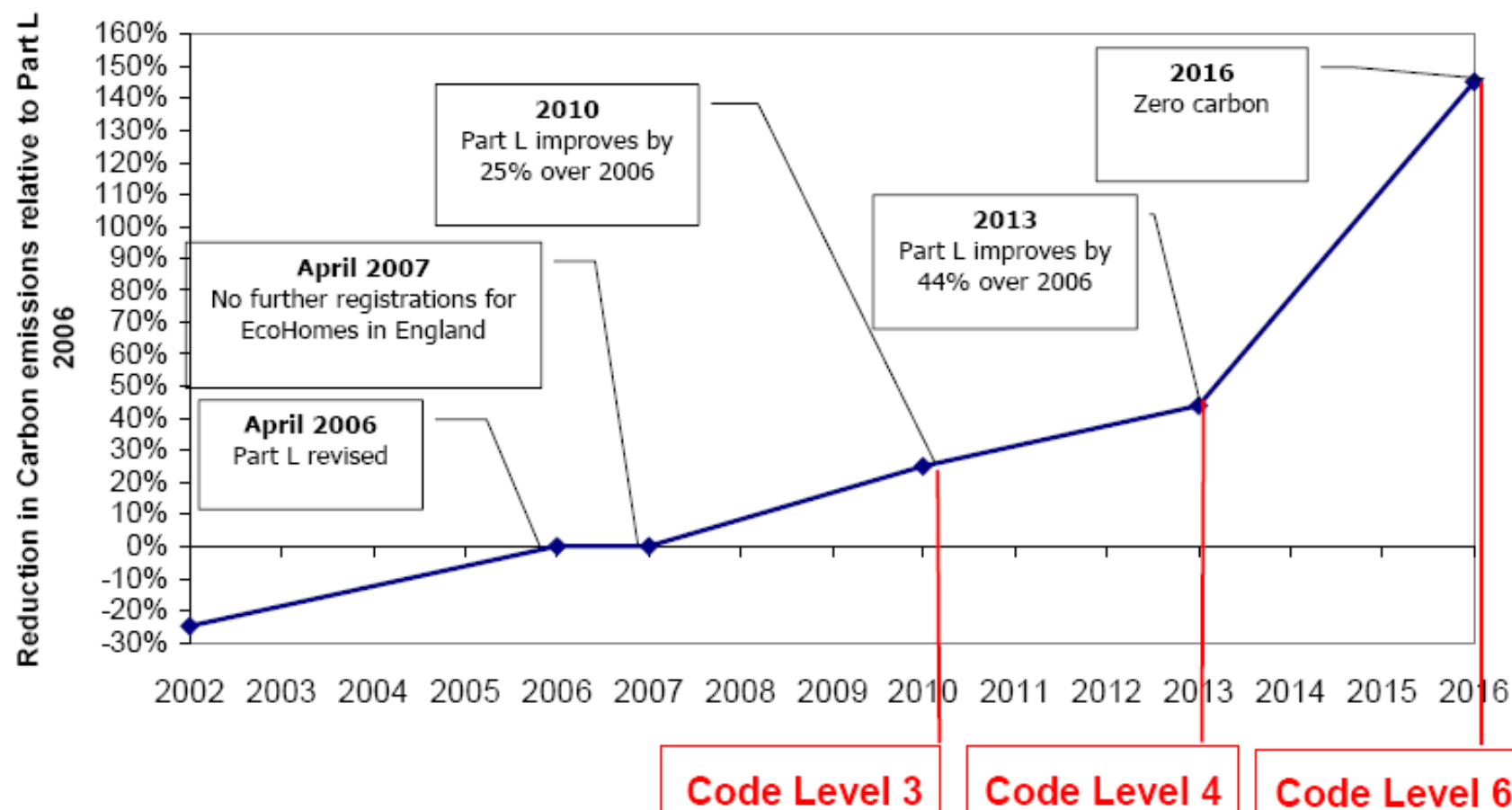
- Mandatory performance levels for 6 key issues at entry level:
 - **Carbon dioxide emissions/energy**
 - **Water Efficiency**
 - **Surface Water Management**
 - **Site Waste Management**
 - **Household Waste Management**
 - **Use of Materials (Green Guide)**
- Higher minimum thresholds for Energy and Water at upper levels of the Code
- Additional credits available for achieving higher levels of improvement over minimum requirements



Mass market



Key dates for Housing



The Carbon Neutral Standard

- Precisely *which* carbon emissions must be zero?

Current Definitions:

- zero carbon from space heating, water heating and lighting (Code for Sustainable Homes Level 5),
- totally zero carbon including cooking and domestic appliances too (CSH Level 6)

Code Thresholds – Points Scores

Level 1	36 Points (Mandatory + 33.3 Points)	• Above Regulations • EcoHomes 2006 Pass • EST Good Practice
Level 2	48 Points (Mandatory + 43.0 Points)	• EcoHomes 2006 - Good
Level 3	57 Points (Mandatory + 46.7 Points)	• EcoHomes 2006 Very Good • EST Best Practice • Conventional Water fittings
Level 4	68 Points (Mandatory + 54.1 Points)	• Grey water/Rainwater • PassiveHaus (approx)
Level 5	84 Points (Mandatory + 60.1 Points)	• Zero SAP • Significant Renewables
Level 6	90 Points (Mandatory + 64.9 Points)	• Zero Operational Carbon • Most Code Credits achieved

To gain a Code rating, you need to meet the minimum standards

	1	2	3	4	5	6
Energy (% improvement over ADL1 2006)	10%	18%	25%	44%	100%	Zero Carbon
Water (litres per person per day)	120	120	105	105	80	80

To gain a Code rating, you need to meet the minimum standards

- Mat 1: Green Guide

Assessment Criteria		
	Mandatory	Credits
Where at least three of the following five key elements achieve a relevant Green Guide rating from the 2008 version of <i>The Green Guide</i> of A+ to D: • Roof • External Walls • Internal Walls (including separating walls) • Upper and Ground Floors (including separating floors) • Windows	All Levels	
Where the <i>Code Mat 1 Calculator Tool</i> is used to assess the number of credits awarded for the five key elements described above		1 – 15
Default Cases None		

To gain a Code rating, you need to meet the minimum standards

- Surface Water Run Off

Criteria		
	Credits	Mandatory Elements
Ensure that the peak rate of runoff into watercourses is no greater for the developed site than it was for the pre-development site (see definition). This should comply with the Interim Code of Practice for Sustainable Drainage systems (SUDS) (CIRIA, 2004), or for at least the 1 year and 100 year return period events. For sites of less than 200ha, the calculation of Greenfield runoff rates should be in accordance with Flood estimation for small catchments (Marshall and Bayliss, 1994) and any subsequent updates. For sites of 200ha and more, the calculation of Greenfield runoff rates should be in accordance with the Flood estimation handbook (Centre for ecology and hydrology, 1999) and any subsequent updates. An allowance for climate change should be made in accordance with current best practice (PPS25, 2006). Ensure that the additional predicted volume of rainwater discharge caused by the new development, for a 1 in 100 year event of 6 hour duration including an allowance for climate change (PPS25, 2006), should be reduced using infiltration and/or made available for use in the dwelling as a replacement for potable water use in non-potable applications such as WC flushing or washing machine operation. Where this additional rainwater volume cannot be prevented from being discharged for any reason, for all events up to the 100-year return period, the peak discharge rate from the site should be reduced to:	None	All Levels

- the pre-development site's estimated mean annual flood flow rate (Qbar); or 2l/s/ha; or - a minimum flow rate (litres per second), based on good practice guidelines to prevent easy blockage, by ensuring the outlet throttle is not too small. If rainwater is discharged to a public sewer or adopted surface water sewer, flow rate requirements will be defined by the Sewerage undertaker.		
2 credits are available for using SUDS to improve water quality of the rainwater discharged or for protecting the quality of the receiving waters by: - Ensuring no discharge to the watercourse for rainfall depths up to 5mm (follow guidance in the Interim Code of Practice for Sustainable Drainage systems (SUDS) (CIRIA, 2004). or - Establish agreements for the ownership, long term operation and maintenance of all sustainable drainage elements used	2	
Default Cases: Credits can be awarded by default if the site discharges rainwater directly to a tidal estuary or the sea, because compliance with discharge flow rate requirements will not be required.		

To gain a Code rating, you need to meet the minimum standards

- Household Waste

Criteria		
	Credits	Mandatory Elements
Storage of non-recyclable waste The space allocated for waste storage should be able to hold containers with a volume of containers provided for waste storage should be at least the minimum recommended by British Standard BS 5906 (British Standards, 2005) i.e. 100 litres volume for a single bedroom dwelling, with a further 70 litres volume for each additional bedroom. A Local Authority recycling scheme offering containers equal to or greater than this volume would meet the requirement, providing adequate external space is allocated to accommodate them. If the Local Authority provides containers with a smaller volume, or if no Local Authority scheme exists, the developer will need to ensure and demonstrate that the minimum recommended volume is met. All containers must be accessible to disabled people (Checklist Was 1), particularly wheelchair users, and sited on a hard, level surface. To allow easy access, the containers must not be stacked.	None	All Levels

To gain a Code rating, you need to meet the minimum standards

- Construction Waste

Criteria		
	Credits	Mandatory Elements
Mandatory Element: Site Waste Management A <i>Site Waste Management Plan</i> must be developed and implemented. This will require: Monitoring and reporting of waste generated on site in defined <i>waste groups</i>, and compliance with legal requirements as set in SWMP regulations 2008 for and with <i>best practice</i>. The plan should include the setting of targets to promote resource efficiency in accordance with guidance from WRAP, Envirowise, BRE and DEFRA. Specific targets are not required.		All levels
Default Cases For a development where the cost of construction is less than £300,000, this element will be awarded by default.		
Minimising Construction Waste The <i>Site Waste Management Plan</i> must include procedures and commitments for reducing waste generated on site in accordance with <i>best practice</i> and the defined <i>waste groups</i>. AND The <i>Site Waste Management Plan</i> must include procedures and commitments to sort and divert waste from landfill (reuse, recycle, compost or otherwise recover) according to the defined <i>waste groups</i>. This must be performed either on site or through a <i>licensed external contractor</i>, in accordance with <i>best practice</i>.	1 1	
Default Cases None		

Key Issues – flexible credits in design issues

- Daylighting
- Waste and cycle storage
- Materials specification
- Development types and mix
- Risk and complexity
- Supply chain
- Availability
- Space
- Ownership structures
- Maintenance and reliability
- Value to the occupier!

Food for thought...

- Energy and Water Targets are difficult but achievable!
- Level 5 and 6 are very high standards
- Intrinsic to this at the higher levels are energy strategies and broader development objectives

How does this effect working practices?

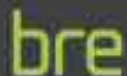
Considering energy efficiency is now an integral part:

- Engagement
 - Does the client understand the requirements?
- Brief/work with design team
- Options appraisal
- Feasibility study
- Detailed design
- Review tender packages
 - Assistance may be required
- Onsite checks
 - Review equipment, installation and construction details
 - Review fit out and assess quality control standards
- Review commissioning and handover

How does this effect the design process?

- U Values and Thermal Bridging
- Air permeability
 - Air permeability 10 m³/m²h at 50 Pa current limit
 - 5 highly likely future maximum, 3 or less more typical.
1 generally needed for CSH level 6
- SAP – essential design tool and compliance checker

Green Building & Living



But...

- **REMEMBER** The Code is one standard that should be considered with other standards and guidance
- Lifetime Homes
- Secured by Design
- ANGSt (Accessible Natural Green Space standard)
- LEAP (Local Equipped Area for Play)
- Urban Design Compendium
- DCLG Developing Accessible Play Space

Summary

- Major changes in both build quality and build design needed beyond Level 3
- Clear and major environmental improvements
- Cost is dominated by the energy requirements
- Site wide energy strategies can reduce costs but planning is the major issue
- Development becoming as much about infrastructure provision as house building
- Standards must be raised!

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...any questions?



Introducing Sustainability throughout the development

Code Dwelling Types

- Final Certificate is per dwelling
- Assessment costs/time reduced by categorising criteria:
 - Site Wide Criteria
 - Credit Defined Criteria
 - Detail Defined Criteria
- Building Level Assessment of some criteria for flats
 - i.e. Materials credits



Energy

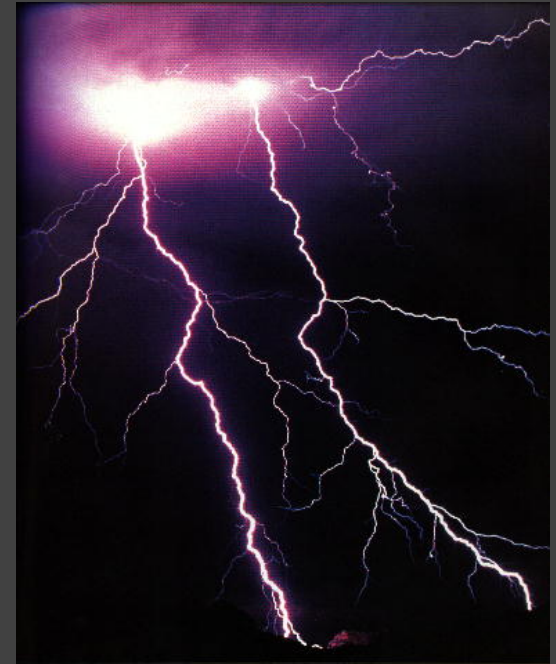
- Dwelling Emission Rate - % Improvement over Building Regulations
- Building Fabric - Heat Loss Parameter
- Internal Lighting
- Drying Space
- Energy Labelled White Goods
- External Lighting
- Low/Zero Carbon Technologies
- Cycle Storage
- Home Office



Ene 1 - Dwelling Emission Rate

- **% Improvement DER over TER**
- Defined by AD L1A
- Calculated using SAP 2005
- **DER – Dwelling Emission Rate**
 - Estimated CO₂ emission/m²
 - Normalised for 'typical' use patterns
 - Space / Water Heating and Lighting.
- **TER – Target Emission Rate**
 - Maximum allowable CO₂ emission/m²
 - Normalised for 'typical' use patterns
 - Space / Water Heating and Lighting.

15 Credits



Ene 1 - Dwelling Emission Rate

- DER/TER for individual or grouped dwellings
- **Energy Type** – Dwellings of the same:
 - Built form; Orientation;
 - Overshading; sheltering
 - Construction;
 - Heating/ventilation/lighting systems; controls;
- **Energy Group**
 - Optional approach
 - Flats and Apartment buildings only
 - Average DER/TER across dwellings in a single building
 - Same servicing strategy for all dwellings



Ene 1 – Dwelling Emission Rate

% improvement of DER over TER	Credits	Mandatory Levels
≥ 10 %	1	1
≥ 14 %	2	
≥ 18 %	3	2
≥ 22 %	4	
≥ 25 %	5	3 (ADL:2010)
≥ 31 %	6	
≥ 37 %	7	
≥ 44 %	8	4 (ADL:2013)
≥ 52 %	9	
≥ 60 %	10	
≥ 69 %	11	
≥ 79 %	12	
≥ 89 %	13	
≥ 100 %	14	5
True Zero Carbon	15	6 (ADL:2016)

Water

- Internal Potable Water Use
- External Water Use



Wat 1 Internal Potable Water

- Theoretical average water consumption, using normalised use patterns
- Data from Water Research Council
- Litres / person / day
- All data based at 3 bar pressure, from BS EN112:1997



Wat 1 Internal Potable Water

- Covers

- WC / bidet
- Basin taps
- Shower
- Bath
- Kitchen sink taps
- White goods
- Water softeners

- Grey water recycling
- Rainwater collection



Wat 1 - Internal Potable Water



Water consumption (l/person/day)	Credits	Mandatory Levels
≤ 120 l/p/day	1	Level 1 and 2
≤ 110 l/p/day	2	
≤ 105 l/p/day	3	Level 3 and 4
≤ 90 l/p/day	4	
≤ 80 l/p/day	5	Level 5 and 6

Wat 1 Internal Potable Water

Changes

- Kitchen /Basin Taps
 - 2/3 max flow rate
- Flow Restrictors
 - Calculations based on flow restriction and max tap flow
- Water Softeners
 - Based on variation from regeneration rate of efficient model



Code in practice

- **Major issues**
 - Tap flow rate
 - Bidet
 - Shower flow rate
 - W/C
- **Solutions**
 - Low water use fittings and appliances
 - Flow restriction for free flow fittings
 - Rainwater collection / Greywater recycling
 - *Limited by collection sources / possible uses in the home*

Materials

- Environmental Impact of Materials
- Responsible Sourcing of Materials
 - Basic Building Elements
 - Finishing Elements



Surface Water Runoff

- Reduction of Surface Water Run-off from Site
- **Flood Risk**
 - Recognition of existing Flood Defences



Waste

- Household Waste Storage and Recycling Facilities
- Construction Site Management
- Composting



Pollution

- Global Warming Potential of Insulants
 - Thermal
 - Sound
- NOx emissions



Health & Wellbeing

- Daylighting
- Sound Insulation
 - Minor changes to recognise new and little used Robust Details.
- Private Space
- Lifetime Homes
 - CLG Consultation (July 07) proposes mandatory compliance



Management

- Home Use Guide
- Considerate Constructor Scheme
- Construction Site Impacts
- Security



Ecology

- Ecological Value of the Site
- Ecological Enhancement
- Protection of Ecological Features
- Change in Ecological Value of the Site
- Building Footprint



Minimum Energy Standards

The Code requirements

- The % improvement in the actual emissions over the target emissions = % improvement in DER over TER for each Code Dwelling type.
- When a building contains more than one dwelling, area-weighted average DER and TER for similar types
- However more dwelling types are needed than is the case with AD Part L1a



Minimum Energy Standards

Based on SAP:2005 calculation and % improvement on 2006 Building Regulations Part LA

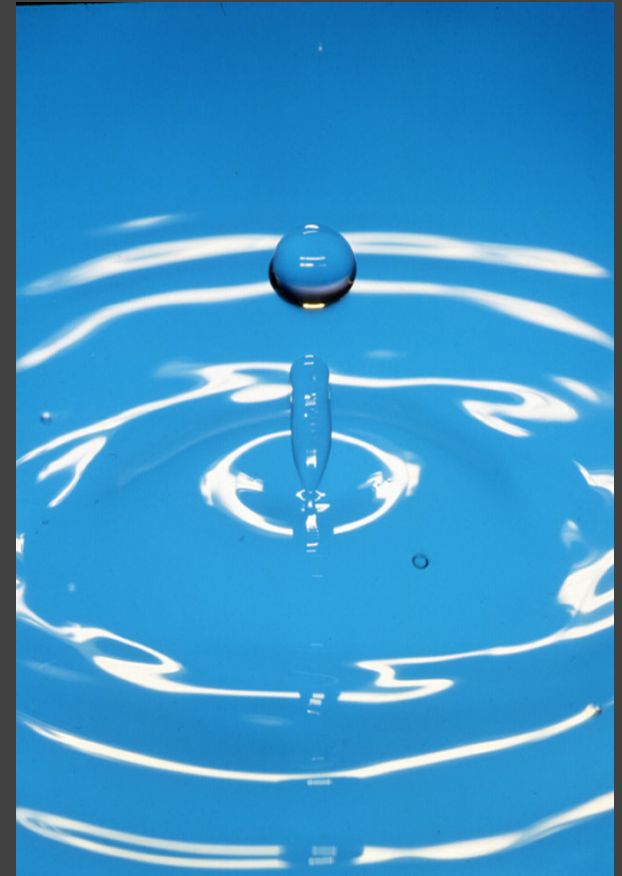
Code Level	Energy Performance	Equivalent rating
Level 1	10% improvement	EST Good practice
Level 2	18% improvement	
Level 3	25% improvement	EST Best practice
Level 4	44% improvement	PassivHaus / EST exemplary-60%
Level 5	100% improvement	
Level 6	Full Zero Carbon	

Minimum Water Standards

The Code requirements

Based on consumption of internal potable water in **litres / person / day** using the Code Water Calculator

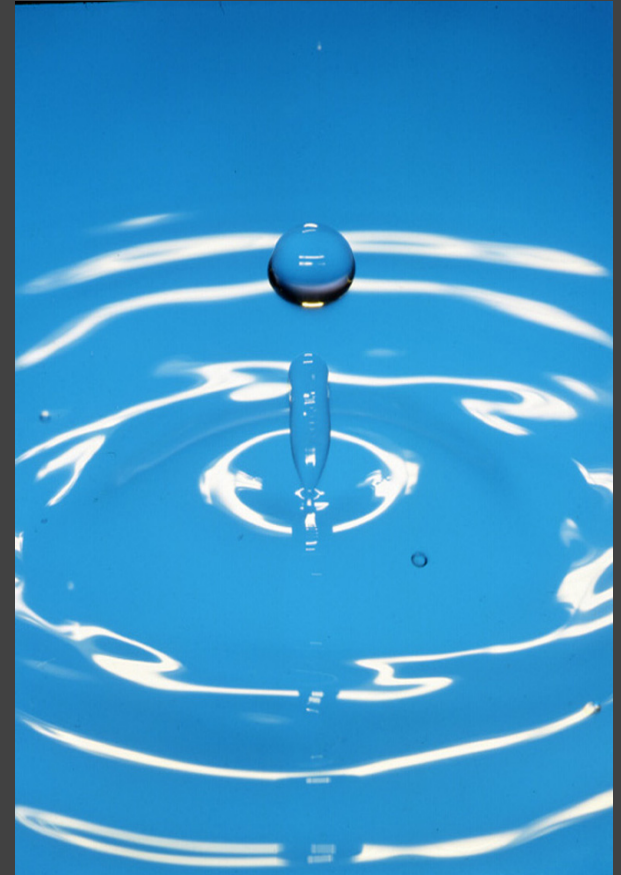
- **Levels 1 & 2** – Above proposed water regulations level (120 l / p / d)
- **Levels 3 & 4** – Cost effective water saving fittings (105 l / p / d)
- **Levels 5 & 6** – Water recycling/ rainwater collection (80 l / p / d)



Minimum Water Standards

Internal Potable Water

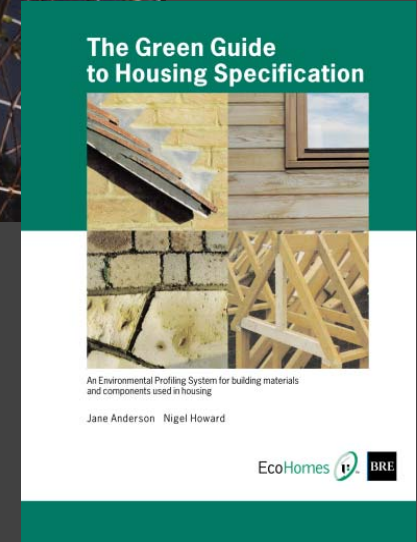
- New credit scale - litres/ person/ day
- Water use factors updated in line with WRS data
- Updated calculator tool
- The old EcoHomes Tool will produce different answers!



Minimum Materials Standards

Mat 1 - Environmental Impact of Materials

- New Green Guide is based on the Green Guide but reflects changes in Building Regulations
- Extended scope – cover more types of constructions
- Extended applications – cover more sectors; Retail, Health, Education
- Extended scale A⁺ - E
- Available from April
- Minimum standard – At least 3 of the following key elements to achieve an rating of D;
roof, external walls, upper floor, internal walls and windows and doors.



Renewable energy resources

- Three provide heating & two electricity
 - Solar Thermal
 - Biomass
 - Heat Pumps
 - Wind
 - Photovoltaics



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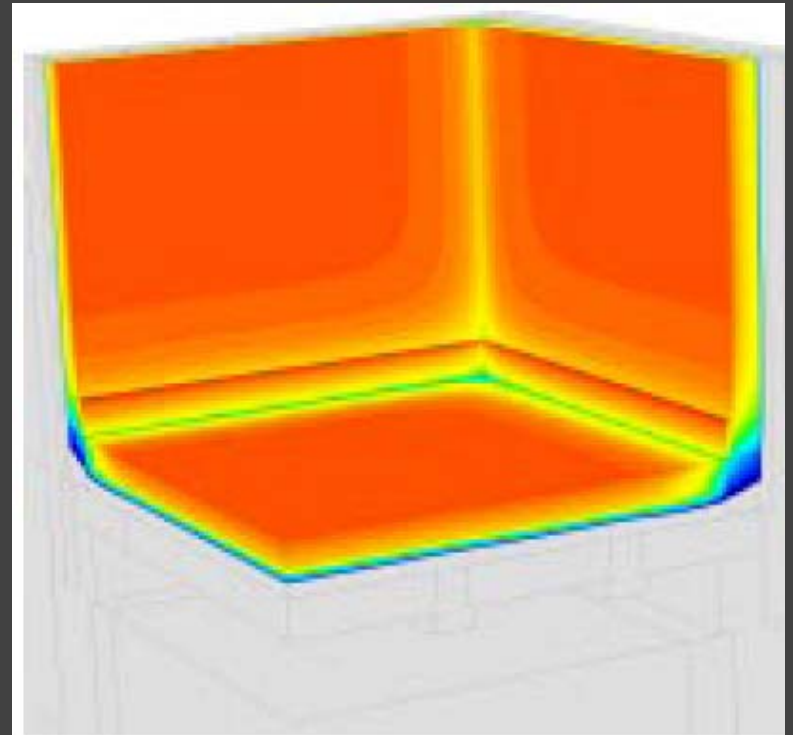
Any Questions?

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The Big Issues...

U-values and thermal bridging

- *repeating* thermal bridging included in U-values – as 2002 edition
- separate, additional allowance for *non-repeating* thermal bridges – very significant and covered in SAP calculation.
- EST best practice details
- Custom details? Assessment using thermal modelling required?



Air permeability

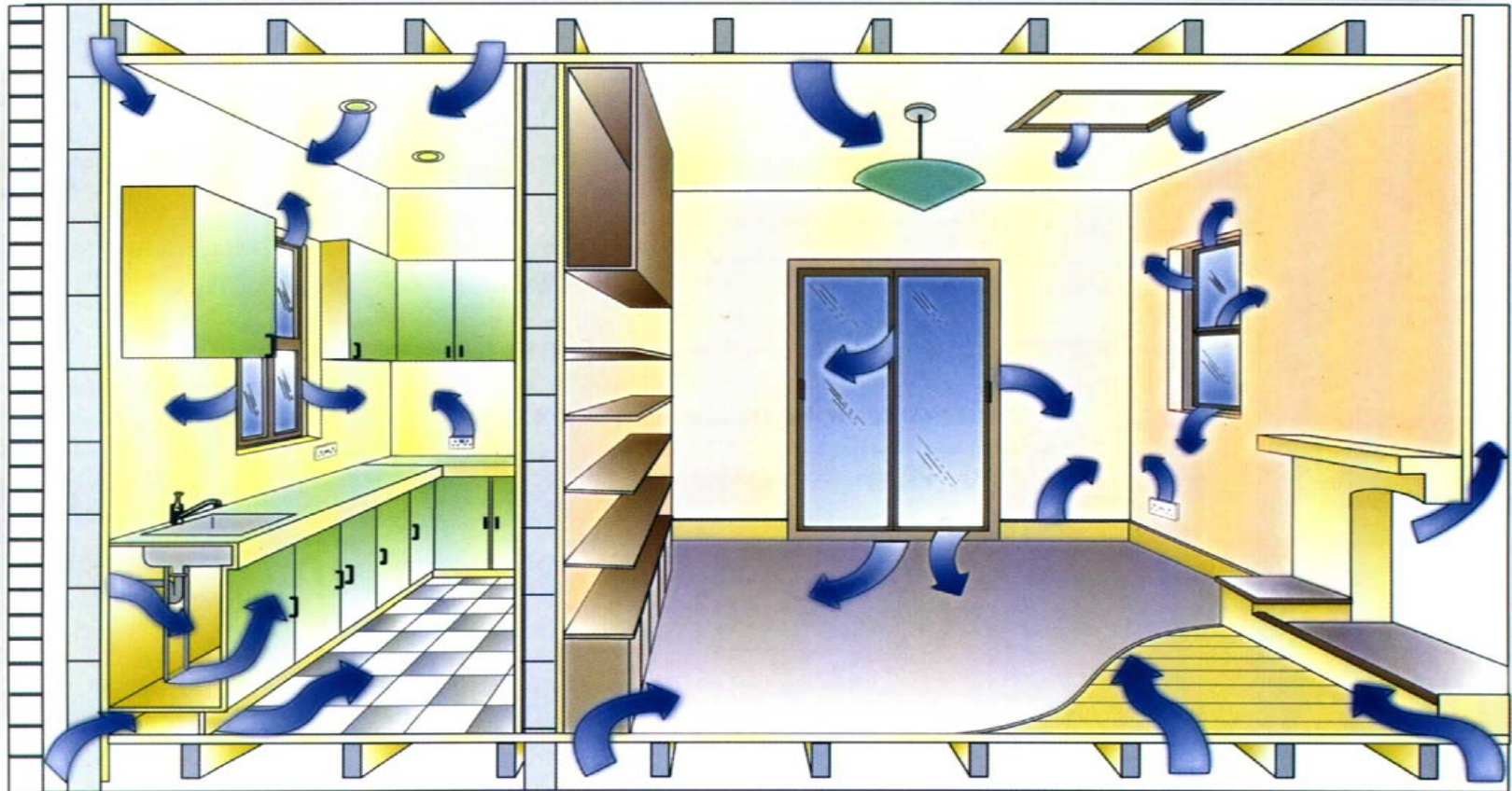
- Air permeability 10 m³/m²h at 50 Pa current limit
- 5 highly likely future maximum, 3 or less more typical. 1 generally needed for CSH level 6
- Different testing regimes



Air leakage

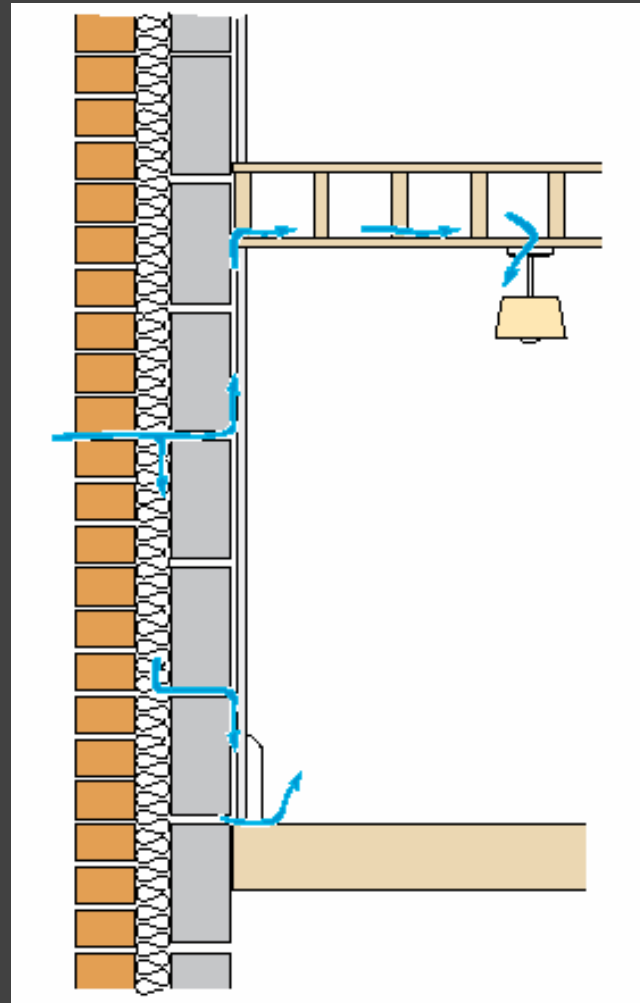
- Air leakage causes
 - Cold draughts (discomfort and dissatisfaction)
 - Heat loss
 - Wasted energy
 - Increased fuel bills
 - Can lead to condensation

Air leakage routes



Air leakage routes

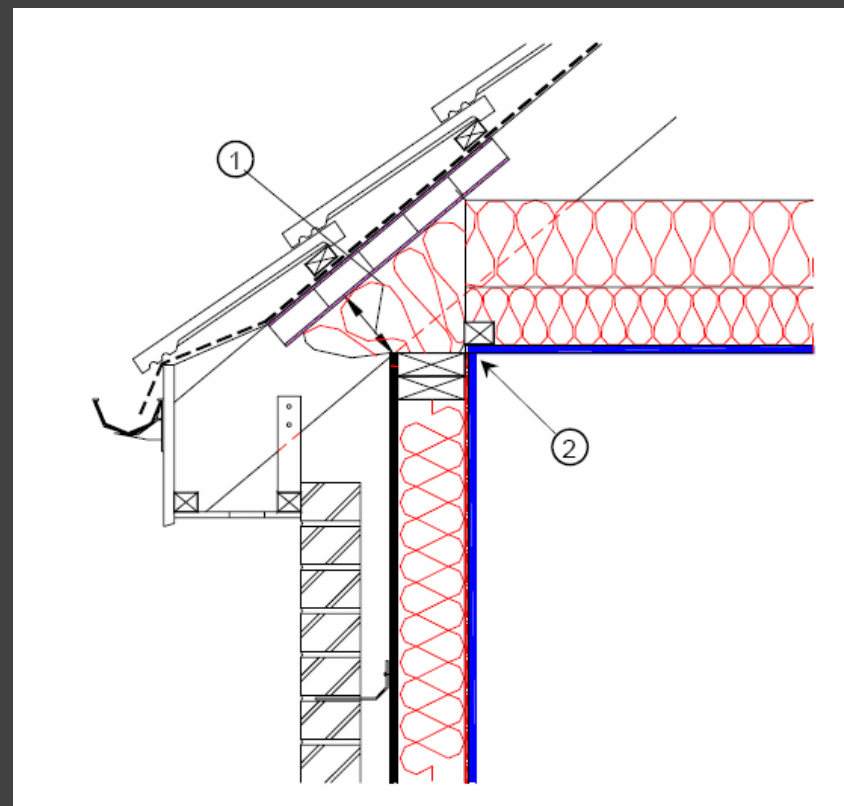
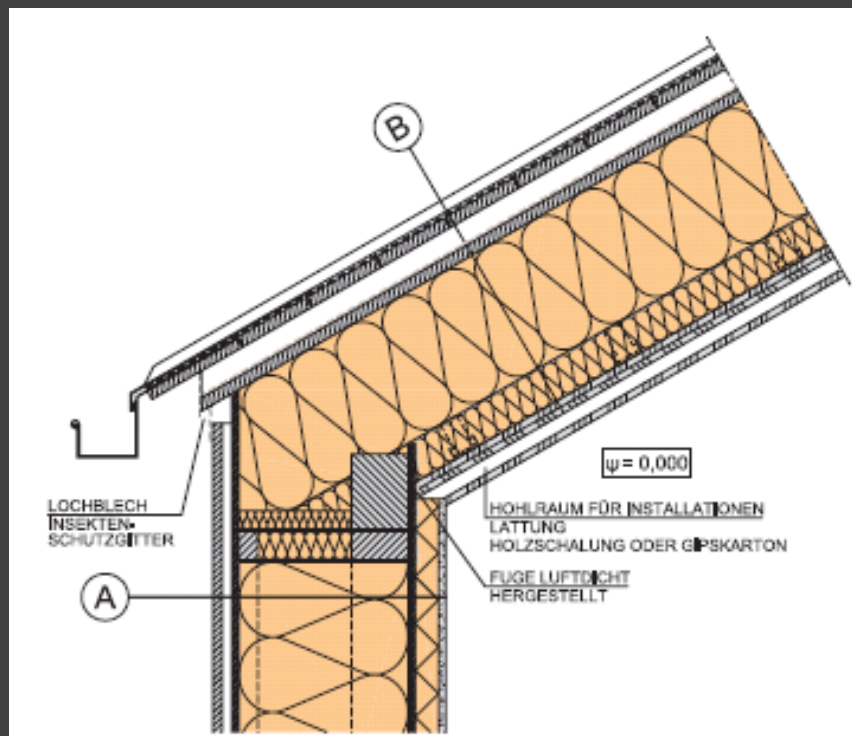
- Air leakage routes behind dry-lining

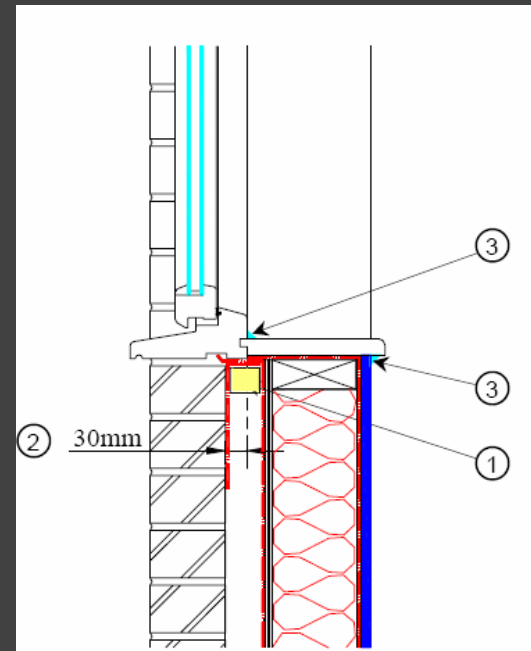
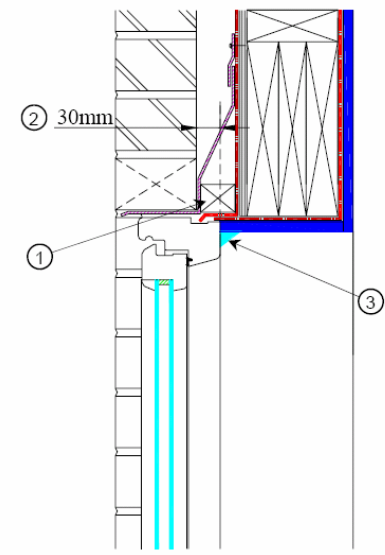
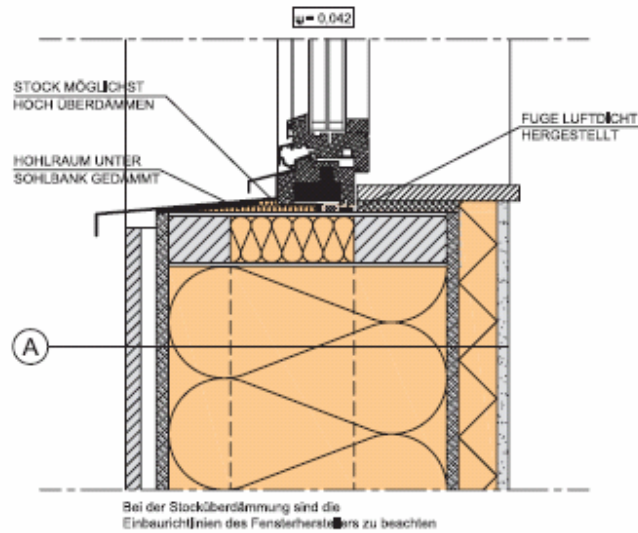
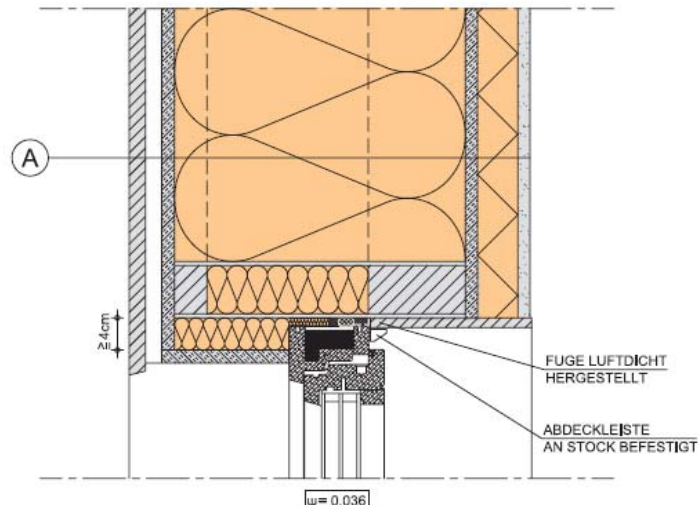


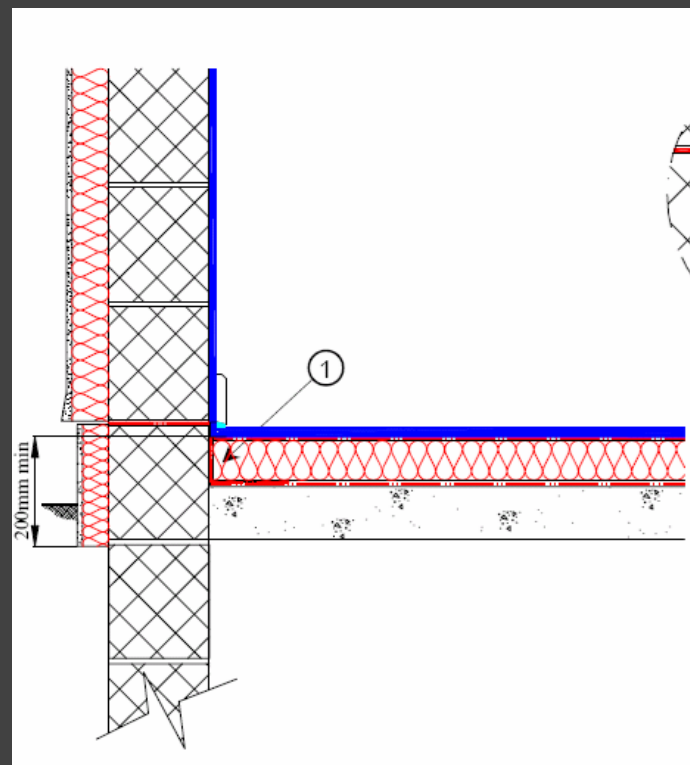
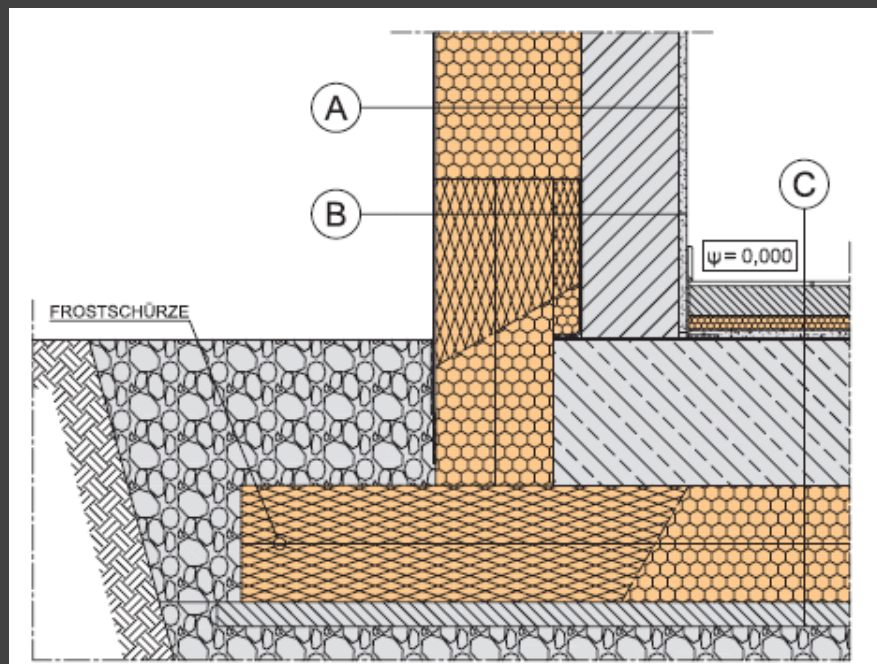
Airtightness sealing

- Ensure sealing around service pipes is of good quality











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The BRE Innovation Park The Lessons Learnt

Lots of Possibilities.....



Lessons Learnt – Design Stage Report

- Assessors rarely give advice on how to meet CSH
 - Check and/or consider hiring a consultant
- Design should not just meet minimum credits for each Code Levels but should exceed them
- SAP analysis is complex with potential for errors
 - Use reputable assessor or have double checked.
- Some credits easy to achieve than others
 - Internal lighting, drying space, energy efficient white goods, external lighting, cycle storage.
- Some credits more heavily weighted than others
 - Water, ecology, energy, health, management.

Lessons Learnt – Post Stage Report

- Contractors may not install specified products.
- Construction related issues can lose points:
 - Air-tightness (Common problem)
 - Acoustics
- Collecting evidence is time consuming
 - Make sure relevant parties know requirements from the beginning.
 - Requires perseverance to achieve Material credits
- Information needs supplying to BRE in prescribed manner.

Lessons Learnt

Fours papers on Innovation Park to be published on:

- 1) Building Fabric
- 2) Energy Sources, Overheating and Ventilation
- 3) Water Use, Harvesting, Recycling and Drainage
- 4) Architecture, Construction and Sourcing

Can be downloaded from:

<http://www.brepress.com>



Lessons Learnt

- Appearance / Building Design
 - Can use range of materials, components and systems
 - Timber cladding not necessary
 - Three or more stories
 - Mono-pitched roofs
 - Green roofs
 - Overhangs and shading devices
 - Light coloured interiors and exteriors
 - Effects of Lifetime Homes



Building Fabrics on the Innovation Park

	Ecotech	Hanson	Stewart Milne	Kingspan
Foundation	Raft	-	Piles	Piles
Structure	Timber frame	Masonry	Timber frame	Glulam frame
Floor	Timber cassettes	Composite suspended	Timber joists	Timber joists
Walls	Closed panel	Masonry cavity panel	Closed panel	SIP
Roof	Metal cassettes	Steel framed zinc clad	Metal cassettes Al clad	SIP

Lessons Learnt

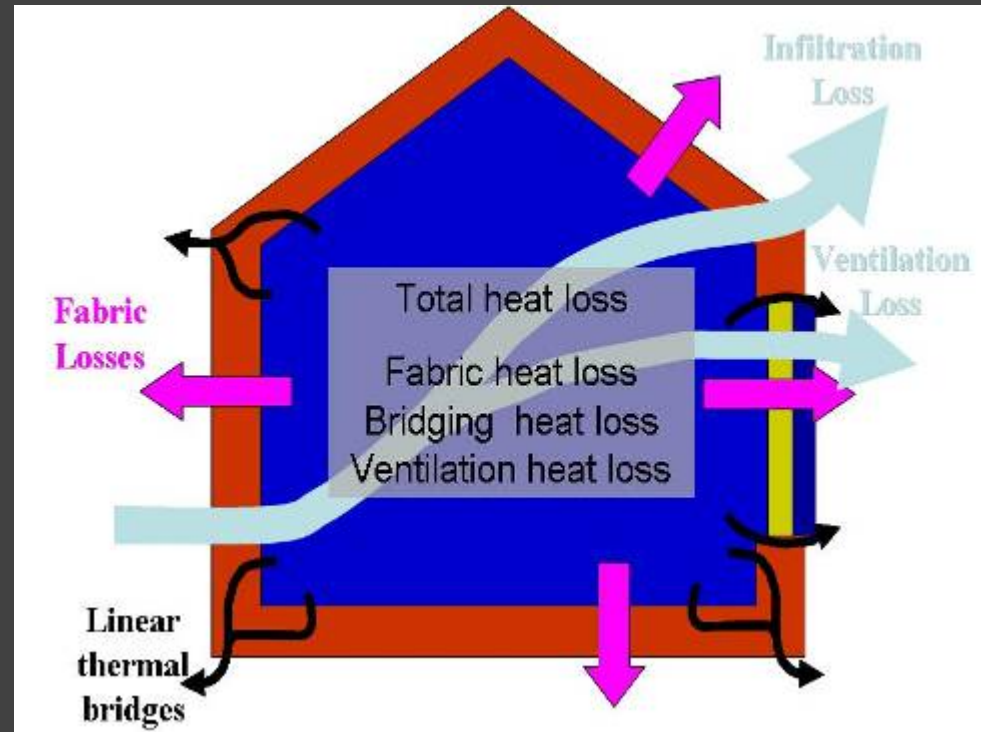
- Specification
 - Windows and doors specify for:
 - *air-tightness,*
 - *weather-tightness,*
 - *U-value,*
 - *daylighting,*
 - *solar heat gain,*
 - *sustainable*
 - *Secured by Design*
 - Sustainably sourced
 - Durable non-leaching materials



Lessons Learnt

Energy Strategy

- High thermal insulation
 - Strategy
 - Air-tight materials & construction
- Reduce thermal bridging
 - Thermal breaks
 - Enhanced construction details
 - Exterior insulation
- High thermal mass (no credits)
 - Concrete and masonry construction
 - Phase changing materials?
- Add renewables
 - PV panels, solar thermal panels, air / ground source heat pump, biomass



Air-tightness



	Units	Code Home			
		Ecotech	Hanson	Stewart Milne	Kingspan
Designed	m ³ /m ² .hr	1.00	5.00	1.00	1.00
Achieved	m ³ /m ² .hr	2.77	4.83	-	1.27

Energy Sources on the Innovation Park

	Ecotech	Hanson	Stewart Milne	Kingspan
Gas boiler			√	
Biomass boiler				√
Ground source heat pump		√		
Air source heat pump	√			
Solar thermal panels	√	√	√	√
Photovoltaic panels			√	√
Wind turbine			√	

Running Costs - Detached House 104m² (£/yr)

Type of emissions	Building Regulations Compliant Gas Boiler	Code Level 6 Compliant			
		Gas Boiler, Solar Thermal, and Solar PV	Independent Biomass Boiler and Solar PV	Ground Source Heat Pump and Solar PV	Communal Gas CHP and Solar PV
DER	263	-107	98	-124	-108
Cooking and Appliances	215	215	215	215	215
Total costs	478	108	313	91	107

Running Costs - Flat 61m² (£/yr)

Type of emissions	Building Regulations Compliant Electric Heating and Hot Water	Code Level 6 Compliant			
		Electric Heating and Hot Water, Solar Thermal, and Solar PV	Communal Biomass Boiler and Solar PV	Communal Ground Source Heat Pump and Solar PV	Communal Gas CHP and Solar PV
DER	323	-31	58	-45	-13
Cooking and Appliances	159	159	159	159	159
Total costs	482	128	217	114	142

Lessons Learnt

- Low Building Fabric Heat Losses
 - High thermal insulation
 - Reduced glazed area
 - Use of low U-value doors and windows
- Product and Installer Availability
 - Some products not available locally or in quantities required
 - Installers not available or trained
 - If specialist products used may be difficult and expensive to replace.



Lessons Learnt

- Services

- Plan their location
- Running services through central core
 - *rapid installation*
 - *quick maintenance*
 - *reduced exterior penetrations*
- BMS and wireless homes
 - *Monitor energy performance/use*
 - *Control room or building temperature*
 - *Lighting*
 - *Multimedia entertainment*
 - *Security*
 - *Travel info*
 - *Wireless web connections*



Lessons Learnt

- Access and Maintenance
 - Clean and paint
 - Inspect and maintain

Particular issues with high ceilings, renewables and green roofs.



Lessons Learnt

- Weather-tightness
 - Durable materials
 - Compatible materials
 - Specify water-tightness for doors and window
 - Good detailing
 - Test on-site
 - Communication

Historically has always been an issue.



Lessons Learnt

Water

- Low use appliances
 - WC
 - Washing machine
 - Dishwasher
 - Bath
 - Shower
 - Taps

Could affect liveability.



Lessons Learnt

Use of non-mains water possible.

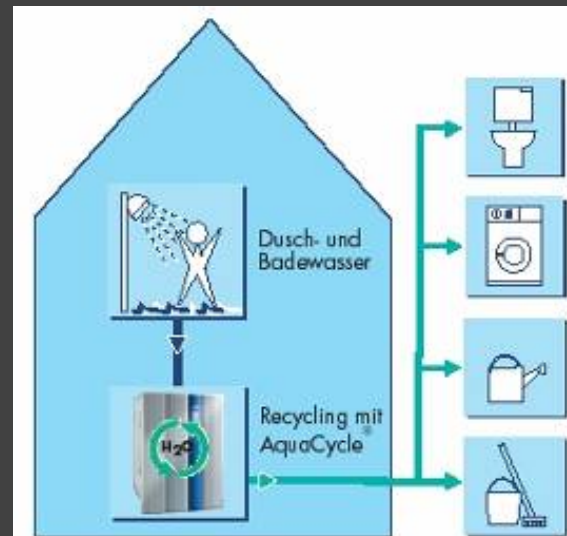
- **Rainwater Harvesting**

- Water butts easy solution
- Can be combined with SUDS
- Consider using leaf guards
- Run-off surfaces not stain water
- Washing machine limitation



- **Greywater Recycling**

- Consider location as noisy in use and may require maintenance
- Water slight discolouration
- Washing machine limitation



The Finished Buildings.....



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Questions?

Code Future

Code Future – Public Sector

Public Sector (e.g. Housing Associations and all homes built on public land);

- 2007 Level 3 mandatory
- 2008 Consultation on definition of zero carbon
- 2010 Level 4 mandatory
- 2010 CSH, SAP and SDLT exemption reviewed
- 2010 Building Reg's Part L and F reviewed
- 2013 Level 6 (zero carbon) mandatory
- 2018 All new public sector buildings planned to be zero carbon.

Code Future – Private Sector

- 2008 Assessment mandatory
- 2008 Consultation on definition of zero carbon
- 2010 Level 3 mandatory
- 2010 CSH, SAP and SDLT exemption reviewed
- 2010 Building Reg's Part L and F reviewed
- 2013 Level 4 mandatory
- 2016 Level 6 (zero carbon) mandatory
- 2019 All new non-domestic buildings planned to be zero carbon.



Fundamental Levels of The Code

Achieving Code Level 1

- Energy – 10% improvement over TER
- Meeting the Energy Requirements
 - Improved thermal efficiency of building fabric
 - Reduction in air permeability
 - High efficiency condensing boiler
 - Reduction of thermal bridging
- Meeting the Water Requirements
 - Water efficient standard fittings (WC; Shower/Bath;Taps)
- Other mandatory requirements
- Additional 33 optional points

Achieving Code Level 3

- Energy – 25% improvement over TER
- Meeting the Energy Requirements
 - Measures outlined for Code Level 1
 - Maximum benefit from cost effective ‘conventional’ solutions to fabric and systems efficiency
 - use of low or zero carbon technologies may be necessary in some cases
- Meeting the Water Requirements
 - Low Water Use WC (4/2 dual flush)
 - Low water flow fittings
 - *Taps*
 - *Shower*
 - Shaped Bath
 - Water Efficient White Goods
- Other mandatory requirements
- Additional 47 optional points

Achieving Code Level 3

- Energy – 25% improvement over Building Regulations TER
- Water – 105 litres / person / day
- Minimum requirements met for:
 - **Materials**
 - **Surface water run-off**
 - **Site waste management**
 - **Household waste management**
- Plus an additional 47 optional points

Achieving Code Level 3

- Meeting the Energy Requirements
 - Measures outlined for Code Level 1
 - + possible use of low or zero carbon technologies
- Meeting the Water Requirements
 - 4/2.5 litres Dual Flush WC
 - Flow reducing / aerating taps
 - 6-8 litres/min shower flow rate
 - Smaller, shaped bath
 - 13 litres max volume (typical practice) dishwasher
 - 49 litres max volume (typical practice) washing machine

Achieving Code Level 5

- Energy – 100% improvement over TER
- Meeting the Energy Requirements
 - High performance building fabric and efficient systems/controls
 - + significant use of low or zero carbon technologies (individual dwelling or community system).
 - Private wire renewables.
- Meeting the Water Requirements
 - As Level 3
 - Water Recycling / Rainwater Collection Systems
- Other mandatory requirements
- Additional 60 optional points

Achieving Code Level 6

- Energy – Approximately 145% improvement over TER
- Meeting the Energy Requirements
 - Optimal performance building fabric and systems/controls
 - use of low or zero carbon technologies (individual dwelling or community system).
 - Can not include use of off site renewables unless private wire.
- Meeting the Water Requirements
 - As Level 5
- Other mandatory requirements
- Additional 60 optional points



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