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United Nations Forum on Energy Efficiency and Energy Security: Taking Collaborative Action on Mitigating Climate Change

Overview of Standards for Promoting Energy Efficiency in Buildings

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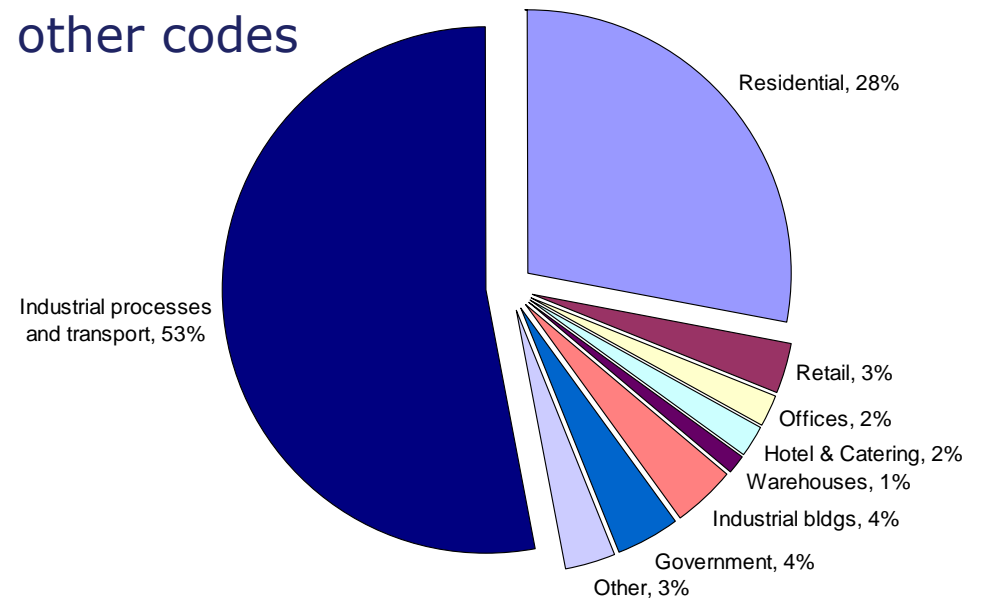
Overview

- Introduction to energy standards for buildings
- Summary of previous research
 - 1992 survey of status of standards in 57 countries
 - 1994 paper available from *Energy - The International Journal*
- Selected findings from ongoing research
 - Updating 1992 survey
- Comments on standards as a form of market transformation



Principal Approaches to Energy Standards for Buildings

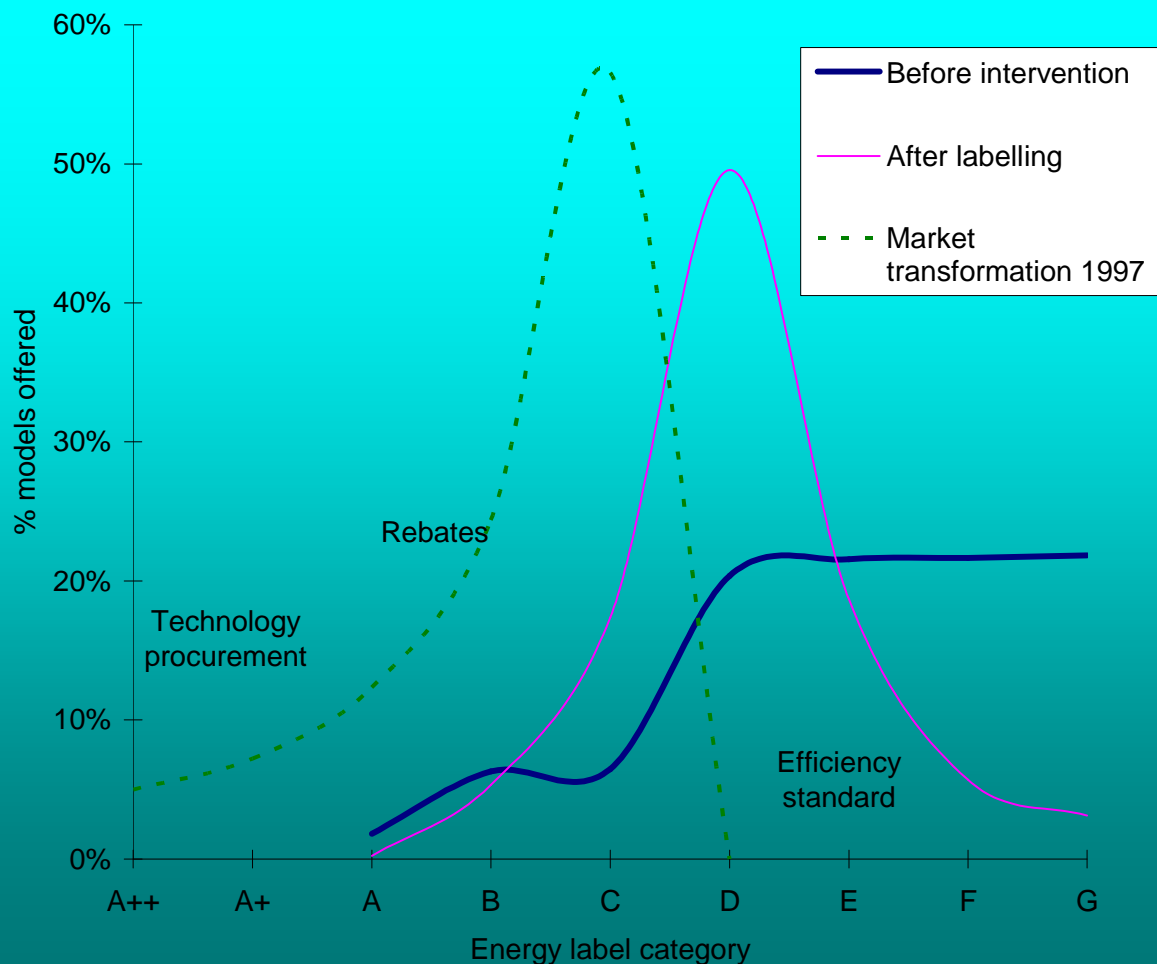
- A set of rules that direct how a building uses energy
 - Separate or subsumed within other codes
- Mandatory or Voluntary
- Design
 - New buildings, what sector?
- Performance
 - Existing and new
 - What sector?
- Green buildings
 - What role does energy play?



Buildings just under half of UK CO₂, of which two thirds are residential buildings



Market Transformation Theory



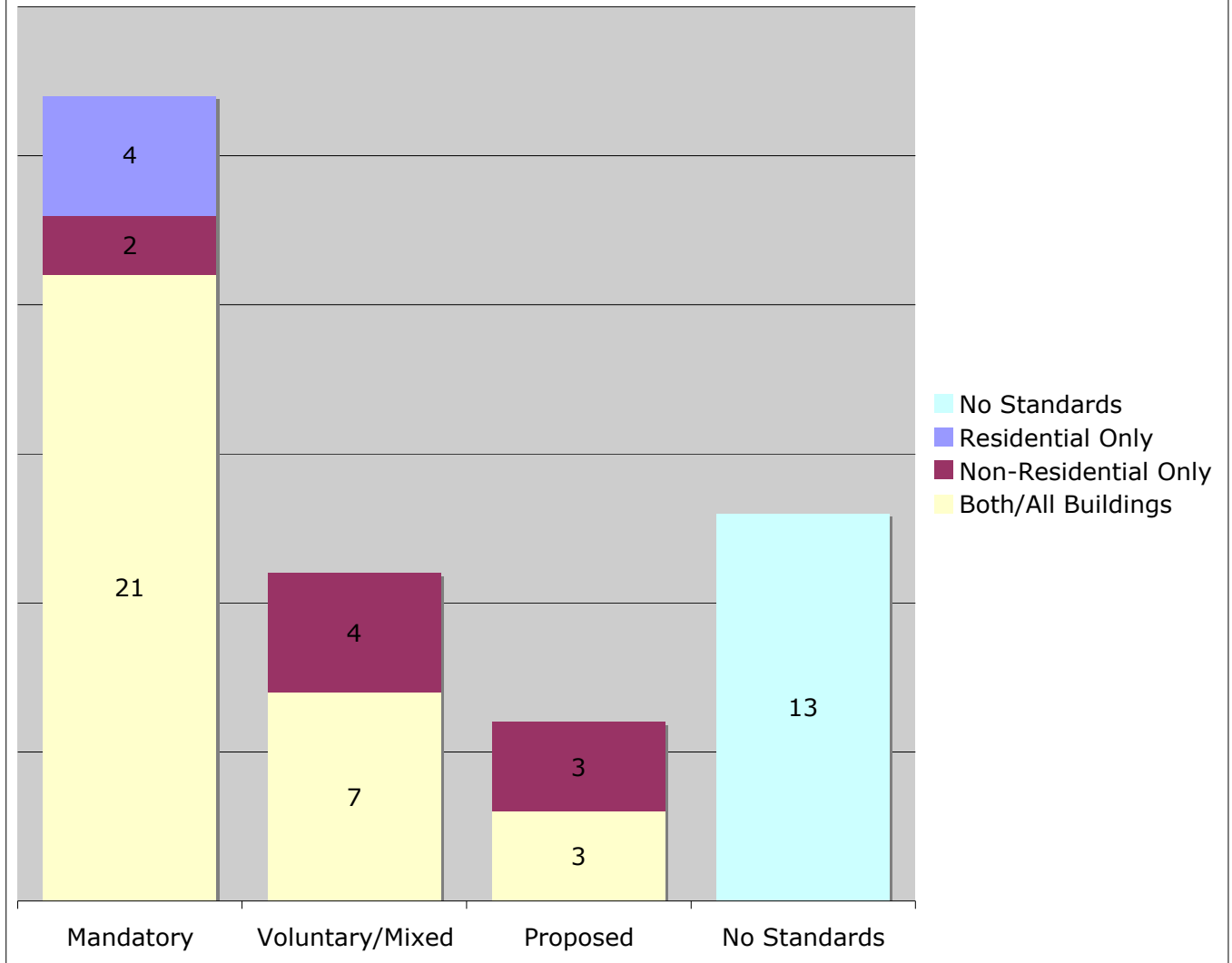
- 200 mandatory labelling and standards schemes globally over several decades
- Residential and non-residential equipment and lighting
- Further and faster with Energy Using Products Directive

Source: M. Hinnells, ECI



Who Uses Standards?

Legal Status & Coverage 1994



How Have Standards Changed?

- Different building types
 - Existing buildings rather than new
 - E.g., Energy Performance of Buildings Directive
- Different technical focus
 - carbon rather than energy or cost
 - reducing consumption, not just improving efficiency
- Social attributes
 - Focus on institutional attributes rather than physical ones
 - Adaptive comfort as a standard
- Working with industry
 - Voluntary standards as “stretch” goal
 - coupled with mandatory standards & information labeling



World Business Council for Sustainable Development Energy Efficiency in Buildings initiative (<http://www.wbcasd.org>)

Figure 11: Estimates of buildings' contribution to total emissions

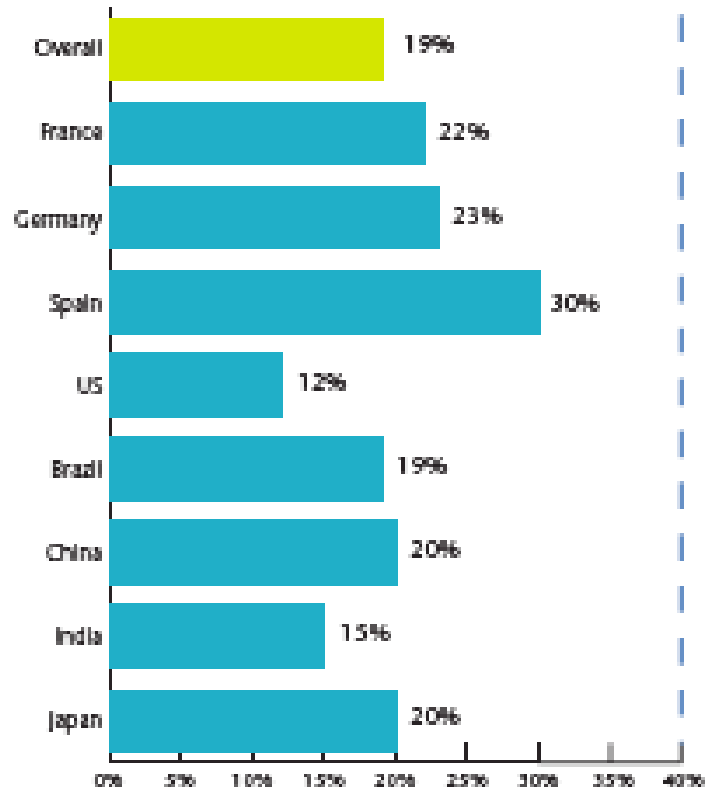
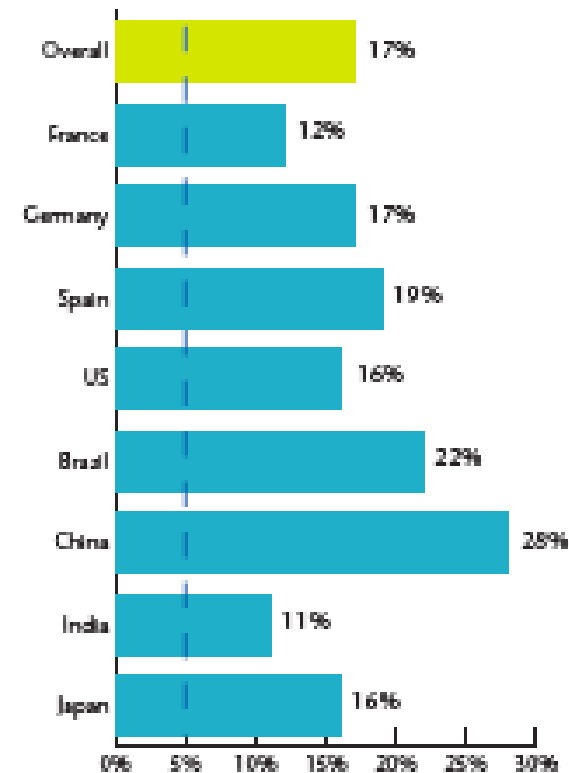


Figure 12: Estimates of cost premium for a certified sustainable building*



Source: Lippincott Research

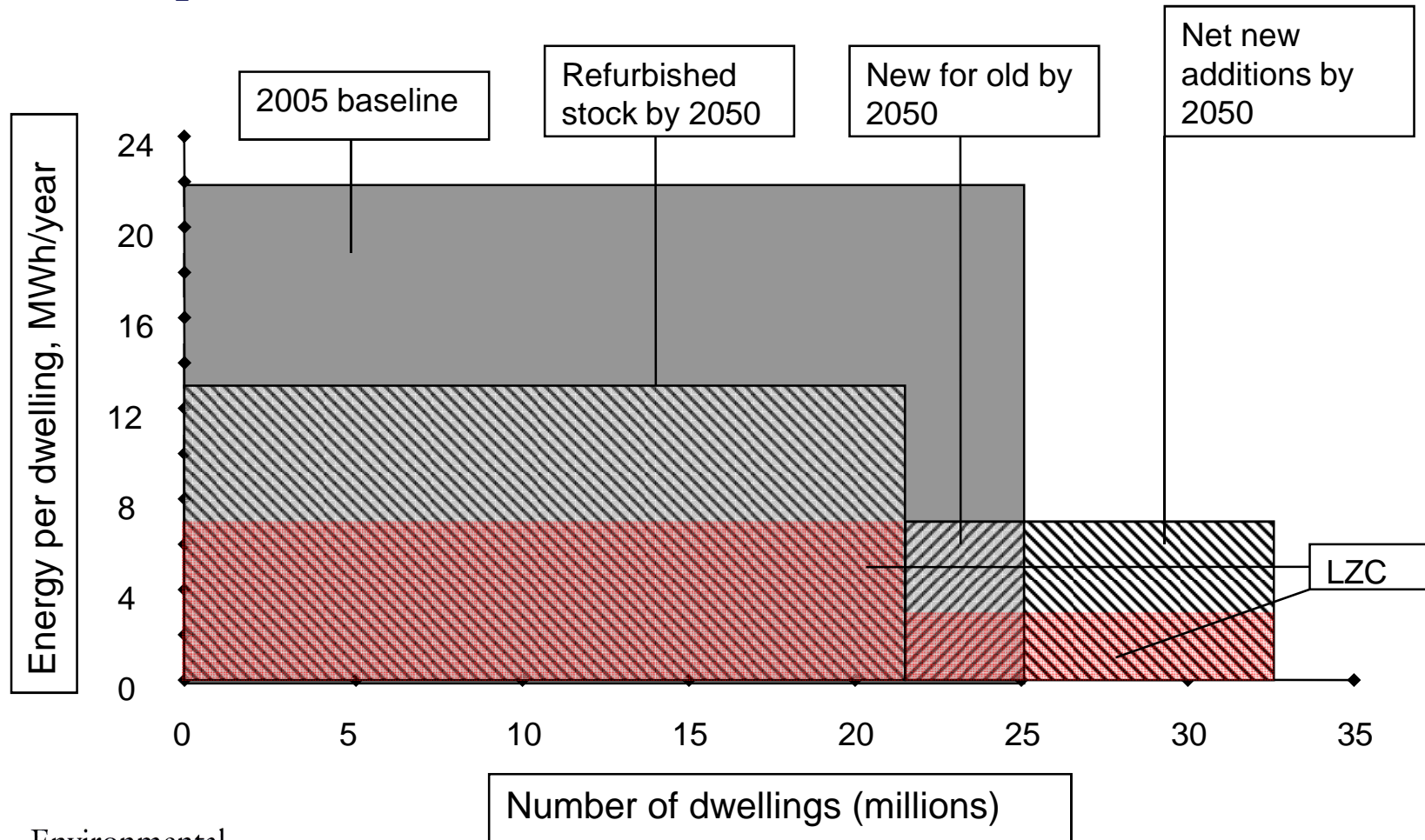


(Question: "What percentage of CO₂ emissions do you think buildings give rise to – directly and indirectly?")

(Question: "How much more do you think a certified sustainable building would cost to build relative to a normal building?")

40% House

Energy/CO₂ impacts of UK housing stock to 2050

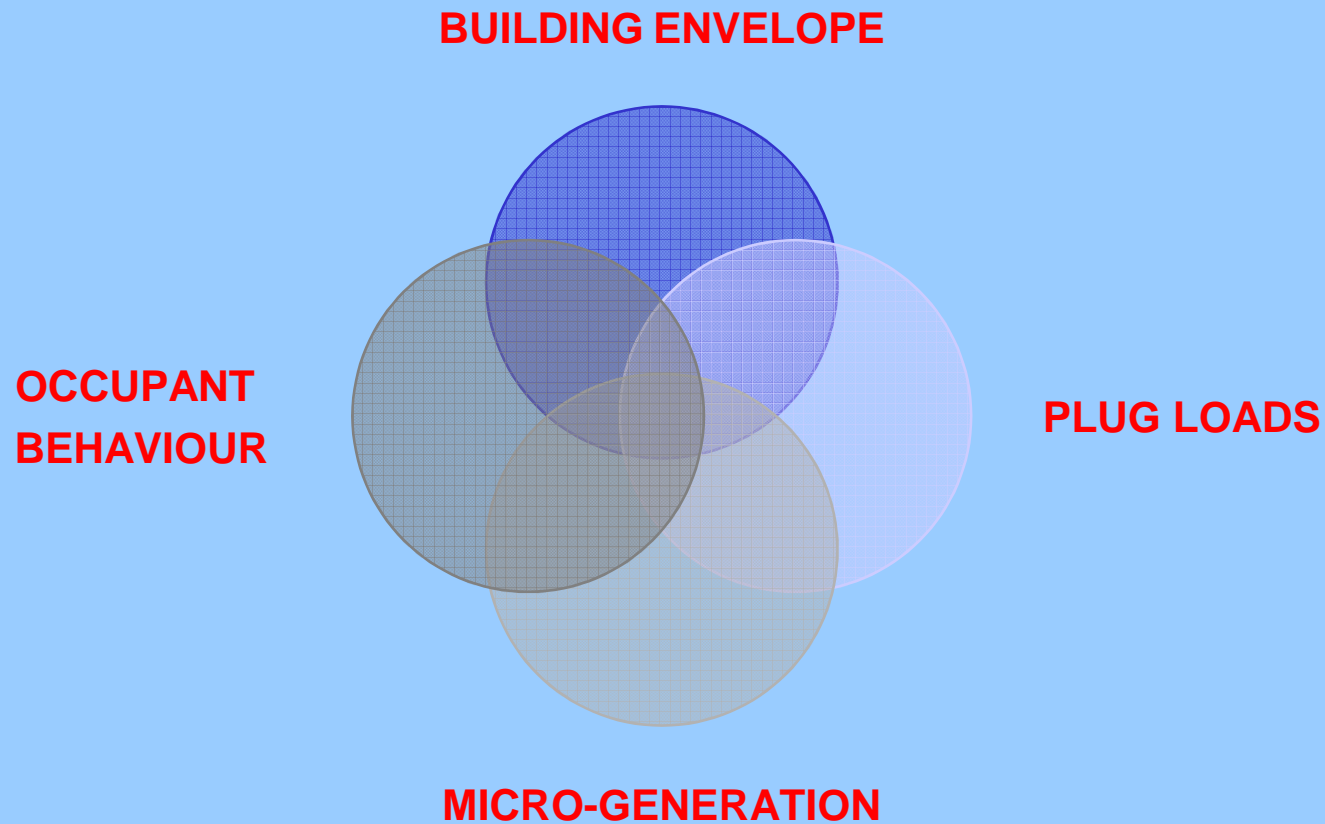


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Source: G. Killip, ECI

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An Integrated Approach to CO₂ Reductions



Source: G. Killip, ECI



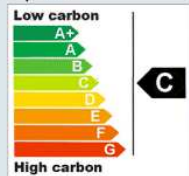
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Buildings Don't Use Energy: People Do

Monthly Carbon Rating

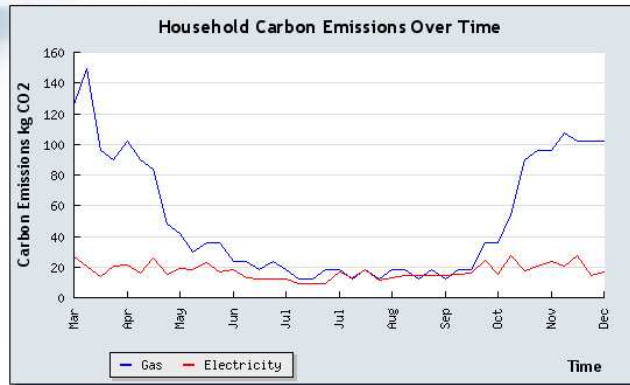
Per person



CO₂ per person 31 Kg
CO₂ for the household 123 Kg

Carbon Clubs

Club	Rank
russell's minstrels	3/8



Total household energy use and carbon emitted

The results for 'last month' and 'last quarter' are in terms of the weekly average.

You have been taking readings for 41 weeks

Comparing your results with the average of 34 households (All users/All housetypes)

Carbon emissions Kg CO₂

	Last week	Last Month	Last Quarter
Per person	30 (52)	31 (45)	22 (37)
Per household	119 (136)	123 (122)	86 (93)

Gas use as kWh

	Last week	Last Month	Last Quarter
Per Person	133 (205)	135 (173)	87 (141)
Per Household	533 (534)	541 (470)	350 (351)

Electricity use as kWh

	Last week	Last Month	Last Quarter
Per Person	9 (26)	10 (23)	10 (21)
Per Household	34 (68)	40 (64)	39 (53)

Standards for:

- Personal carbon allowances
- Feedback devices in homes & buildings




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Labeling

Energy Efficiency Rating

	Current	Potential
<i>Very energy efficient - lower running costs</i>		
(92-100) A		
(81-91) B		
(69-80) C		70
(55-68) D		70
(39-54) E	52	
(21-38) F		
(1-20) G		
<i>Not energy efficient - higher running costs</i>		
UK 2005	Directive 2002/91/EC 	

Environmental (CO₂) Impact Rating

	Current	Potential
<i>Very environmentally friendly - lower CO₂ emissions</i>		
(92-100) A		
(81-91) B		
(69-80) C		
(55-68) D		63
(39-54) E		
(21-38) F	37	
(1-20) G		
<i>Not environmentally friendly - higher CO₂ emissions</i>		
UK 2005	Directive 2002/91/EC 	



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The future of commercial buildings?



Source: CoStar Group



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Is Good Energy Performance Enough?

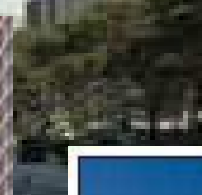
Source: S. Roaf



Brittle Buildings



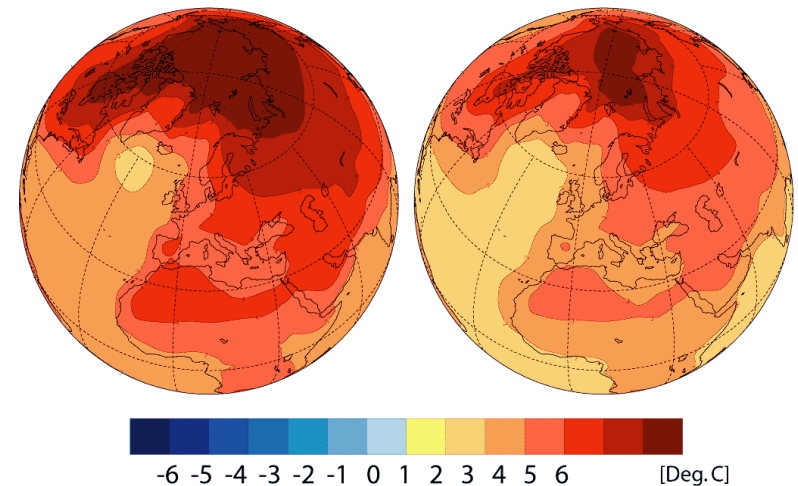
LEED PLATINUM BUILDINGS: WRONG INDICATORS?



Challenge: Life in a Post-Carbon Society

- UK has set reduction targets of 60% CO₂ by 2050
 - Some are calling for 80% reduction
- Dramatic change is needed in every sector
 - Buildings
 - Residential & commercial
 - Transport
 - Industry
- Technological change is necessary but not sufficient
 - Radical reconfiguration of our relationship with the world around us
- Resilient buildings and adaptive lifestyles

Average of all IPCC Models: Temperature Change in 2070
IPCC SRES Scenarios a2 (left) und b2 (right)



Data: IPCC 2007 / Visualization: DKRZ

