

# **Part L 2006 – goals, mechanisms, potential impacts**

**with particular focus on ADL1a for new housing**

**Robert Lowe  
8 July 2006**

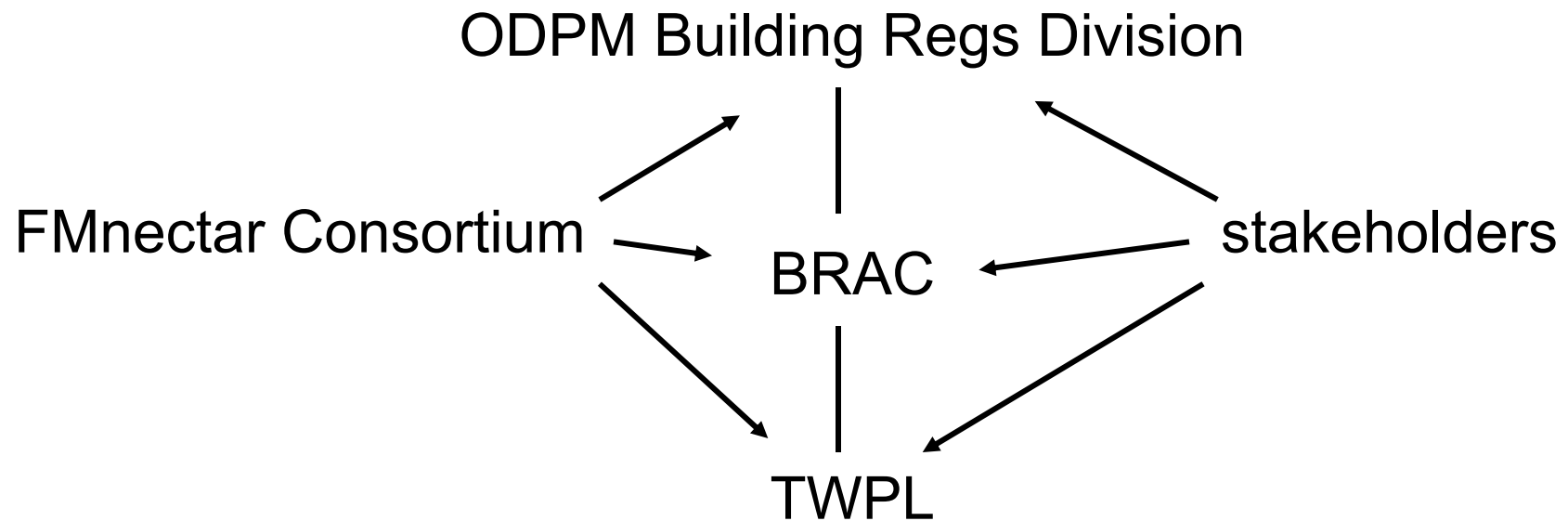
## **presentation structure...**

- Part L review process
- 4-part structure of the new Part L
- summary of changes since 2002
- criteria for compliance
- practical examples
- low and zero carbon technologies
- U values and thermal bridging
- airtightness
- implications for new build
- wider impacts on industry

## Part L review process

consultation document	July 2004
consultation process	September 2004
working up of draft ADs	October '04 – March '05
publication of draft ADs	July 2005
working up of final ADs	August '05 - March '06
publication of final ADs	March 2006

## Part L review process



## drivers and enablers

- Energy White Paper
- Energy Efficiency: The Government's Plan for Action
- EU Directive on the Energy Performance of Buildings
- Sustainable & Secure Buildings Act 2004

# Energy White Paper



- need for 60% reduction in CO<sub>2</sub> emissions by 2050
- crucial role for Building Regulations

<http://www.dti.gov.uk/energy/whitepaper/ourenergyfuture.pdf>

## EU Directive

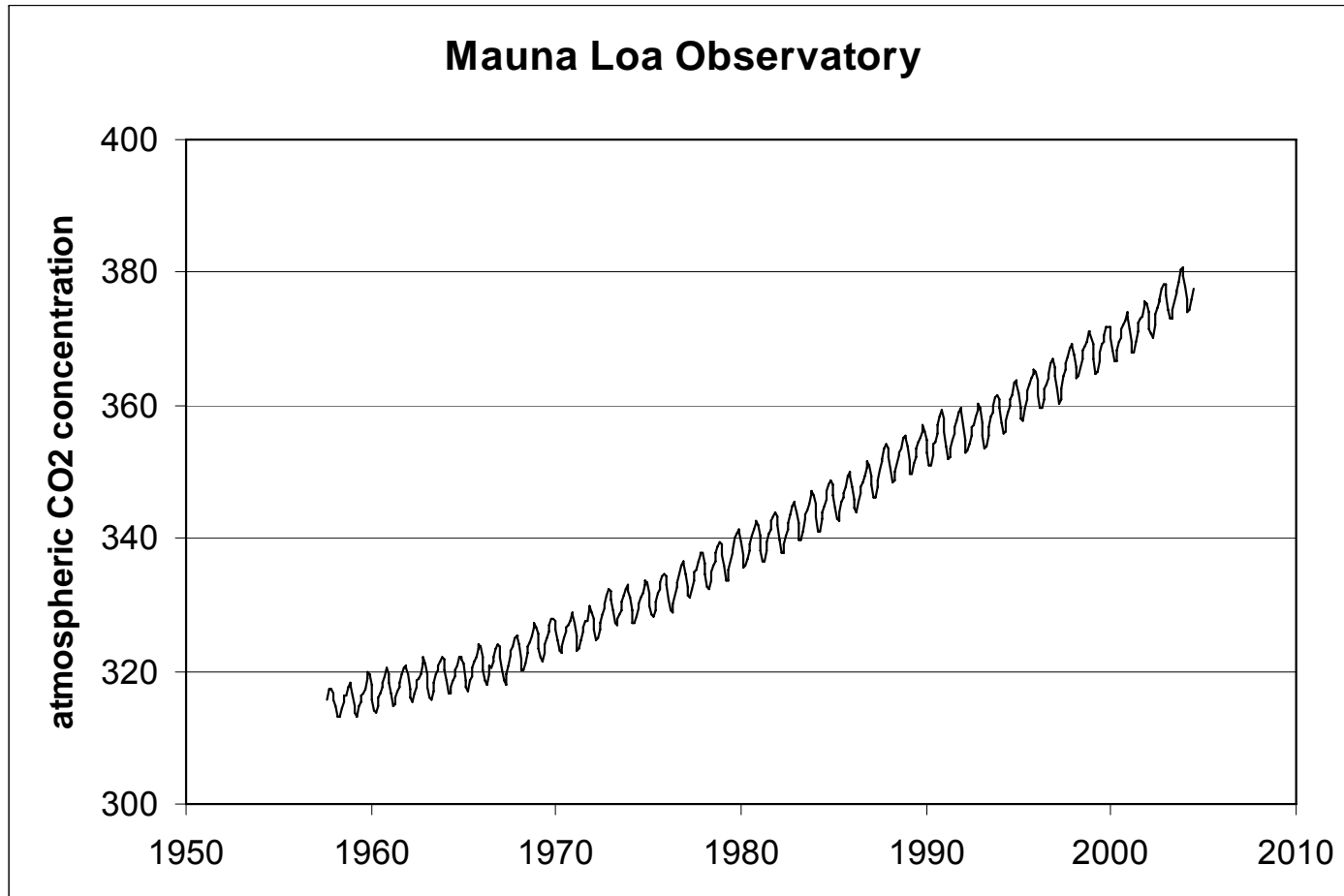
Article 3: requires a single whole-dwelling energy performance methodology – SAP 2005 / iSBEM

Article 4: requires standards to be set for new and existing buildings

Article 5: requirements for new buildings

Article 6: requirements for existing buildings

Article 7: energy performance certificates





# Draft Approved Documents July 2005 (<http://www.odpm.gov.uk/>)

The Requirement  
L1A Work in new dwellings (2006 edition)  
Conservation of fuel and power – Approved Document L1A

## L1A Work in new dwellings (2006 edition)

Please note: this is the current working draft of AD L1A. We recognise the importance of making stakeholders aware in advance of the changes that are due to come into effect on 08 April 2006. We have therefore released this draft document to ensure that stakeholders have adequate time to consider its contents. It is not, however, a final document and it may be subject to change. When the final AD is published, we intend to publish a summary of any changes made to this draft.

Text giving an introduction to the main changes to be inserted here.

- Requirement**  
L1A. Reasonable provision shall be made for the conservation of fuel and power in buildings by:
- a. limiting
    - I. heat losses through the fabric of the building
    - II. excessive solar gain; and
    - III. heat gains and losses from pipes, ducts and vessels used for space heating, space cooling and hot water storage;
  - b. providing energy efficient and properly commissioned fixed building services with effective controls;
  - c. providing to the owner sufficient information about the building and its building services so that the building can be operated and maintained in such a manner as to use no more fuel and power than is reasonable in the circumstances.

- Limits on application**  
With respect to the provision of services or fittings in existing dwellings, this Part applies only to:
- a. the provision of a window, rooflight, roof window, or door (basing a door which together with its frame has more than 50% of its internal face area glazed); and
  - b. the provision of a space heating or hot water service boiler, but this limit on application does not apply to the provision of any services or fittings in an extension to an existing dwelling.

Please note: this is the current working draft of AD L1A. It may be subject to change.

Office of the  
Deputy Prime Minister  
Creating sustainable communities

Building Regulations 2000

### Conservation of fuel and power

DRAFT APPROVED DOCUMENT  
Draft to amendment prior to final publication

### Work in existing buildings

Office of the  
Deputy Prime Minister  
Creating sustainable communities

Building Regulations 2000

### Conservation of fuel and power

DRAFT APPROVED DOCUMENT  
Draft to amendment prior to final publication

### Work in existing buildings that are not dwellings

Office of the  
Deputy Prime Minister  
Creating sustainable communities

Building Regulations 2000

### Conservation of fuel and power

APPROVED DOCUMENT  
amendment prior to final publication

### Work in buildings other than dwellings

Draft 2006 edition  
subject to amendment

Draft 2006 edition  
subject to amendment

Draft 2006 edition  
subject to amendment

## main changes in the 2006 revision

- single primary compliance route based on updated SAP
- whole house CO<sub>2</sub> target (kg/m<sup>2</sup>/a) for space heating + water heating + lighting
- 20% reduction in CO<sub>2</sub> emissions compared with notional 2002-compliant gas heated dwelling
- accredited construction details and improved treatment of thermal bridging
- sample pressurisation testing

## main changes in the 2006 revision

### **ADL1 2002 compliance methods:**

- elemental
- target U value
- carbon rating

## main changes in the 2006 revision

### ADL1 2002 compliance methods:

- ~~• elemental~~
- ~~• target U value~~
- carbon rating

## main changes in the 2006 revision

### ADL1 2002 compliance methods:

- ~~• elemental~~
- ~~• target U value~~
- CO<sub>2</sub> targets

## **new compliance criteria**

critterion 1: predicted CO<sub>2</sub> emissions ≤ target

critterion 2: limits on design flexibility

critterion 3: prevention of excessive solar gains

critterion 4: quality of construction & commissioning

critterion 5: provision of information - O&M instructions  
and Energy Performance Certificate

## CO<sub>2</sub> targets and design flexibility

- extensive design freedom allowed within the CO<sub>2</sub> target
- target and design CO<sub>2</sub> emission rates are calculated using SAP 2005 [www.bre.co.uk/sap2005](http://www.bre.co.uk/sap2005)

## reference values for notional dwelling

- U values
- heating system design
- air tightness and ventilation system
- etc.

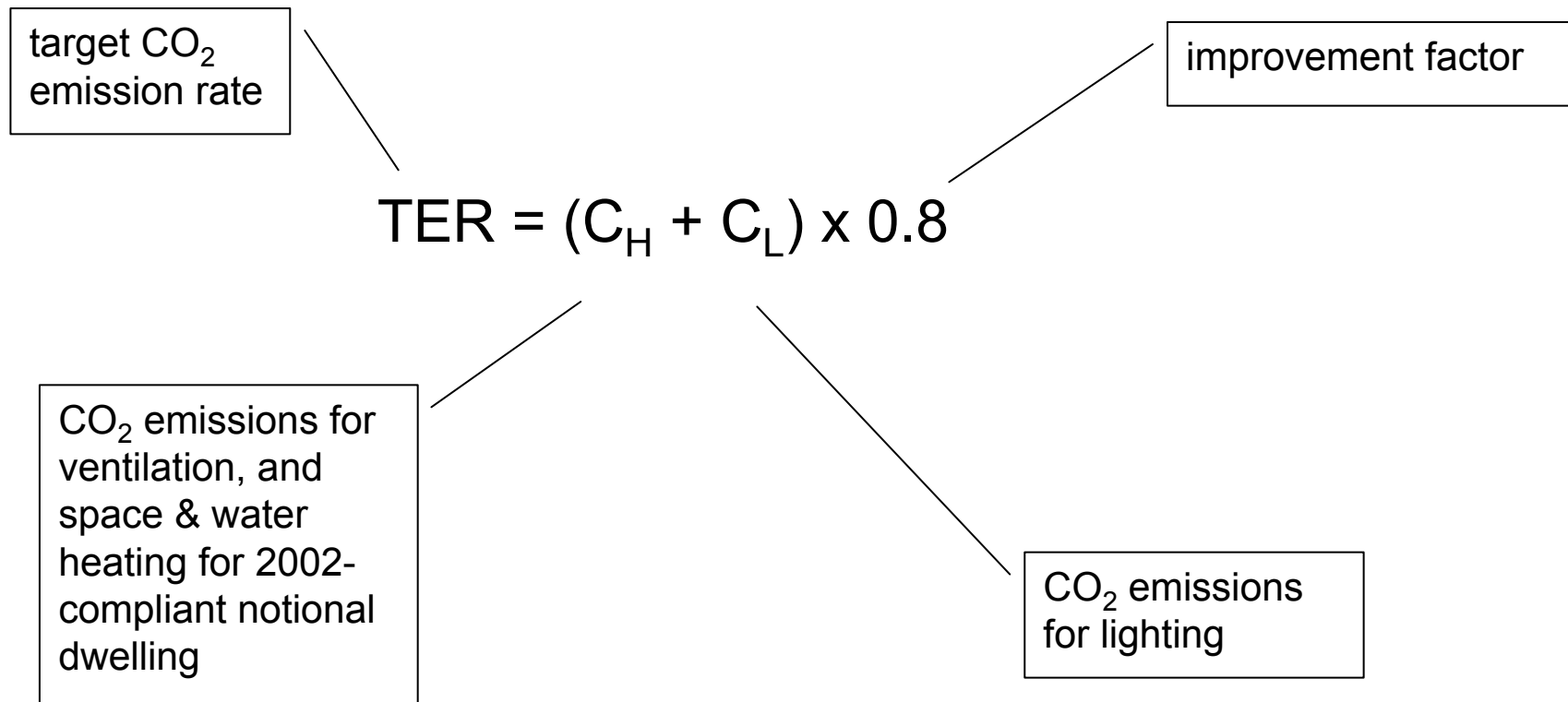
(Table R1 in SAP 2005)



## reference values for notional dwelling

Element or system	Value
Size and shape	Same as proposed dwelling
Walls	U = 0.35
Floors	U = 0.25
Roofs	U = 0.16
Windows and doors	U = 2.0 (25% of floor area) double glazed, low-E hard coat, Frame factor 0.3, one opaque door of 1.85 m <sup>2</sup>
Living area fraction	Same as proposed dwelling
Shading and orientation	All glazing orientated E/W; average overshading
Allowance for thermal bridging	0.11 x total exposed surface area.
Ventilation system	Natural
Air permeability	10 m <sup>3</sup> /m <sup>2</sup> .h at 50 Pa
Chimneys	None
Open flues	None
Fans or passive vents	3 for dwellings with floor area greater than 80 m <sup>2</sup> , 2 for smaller dwellings
Heating fuel (space and water)	Mains gas (unless specified otherwise)
Heating system	Boiler and radiators, water pump in heated space
Boiler	SEDBUK 78% room-sealed fanned flue
Heating system controls	Programmer + room thermostat + TRVs; boiler interlock
Hot water system	Stored hot water, heated by boiler; separate time control for space and water heating
Hot water cylinder	150 litre cylinder insulated with 35 mm of factory applied foam
Primary water heating losses	Primary pipework not insulated, cylinder temperature controlled by thermostat
Secondary space heating	10% electric in notional and proposed, unless a secondary heater (gas fire, open fire, etc) is specified or provision made (e.g. flue or chimney)
Low energy light fittings	30% of fixed outlets; 30% also to be applied in proposed dwelling.

## targets for gas heated dwellings



## targets for fuels other than gas

fuel factor partially offsets higher carbon intensities of electricity, oil and lpg...

$$\text{TER} = (C_H \times \text{fuel factor} + C_L) \times 0.8$$

## targets for 2010

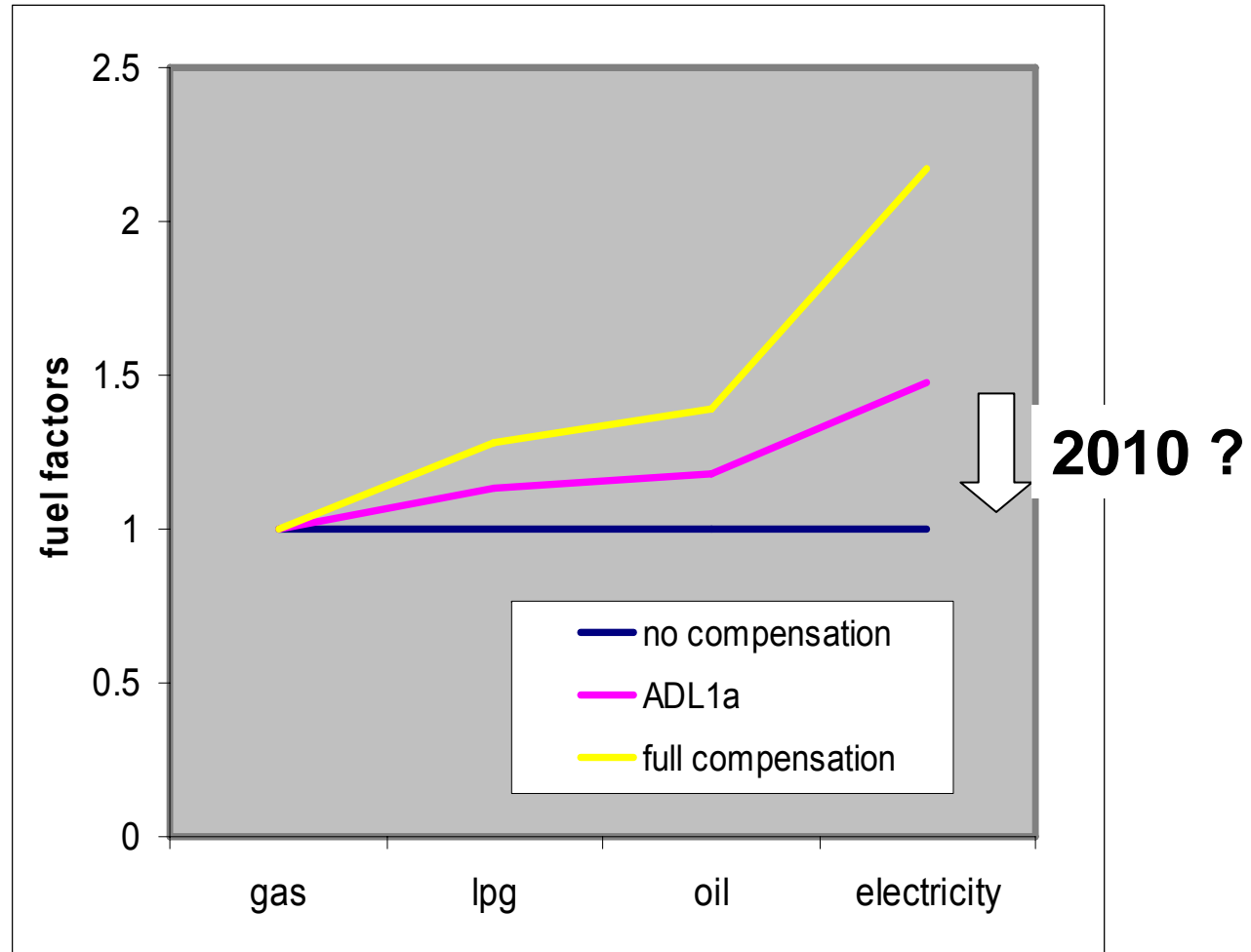
fuel factor partially offsets higher carbon intensities of electricity, oil and lpg...

$$\text{TER} = (C_H \times \text{fuel factor} + C_L) \times 0.6 ?$$

## fuel factors...

Heating fuel	Fuel factor
Mains gas	1.00
LPG	1.13
Oil	1.18
Grid electricity (for direct acting, storage and electric heat pump systems)	1.47
Solid mineral fuel **	1.28
Renewable energy including bio-fuels such as wood pellets **	1.00
Solid multi-fuel **	1.00
<p>** The specific fuel factor should be used for those appliances that can only burn the particular fuel. Where an appliance is classed as multi-fuel, the multi-fuel factor should be used, except where the dwelling is in a smoke control area, when the solid mineral fuel figure should be used.</p>	

## future fuel factors...



## lighting

- CO<sub>2</sub> emissions for lighting depend on area of windows and nature of glazing
- fixed allowance for low energy lamps – performance of lighting system is not tradable against space & water heating

***indicative performance values for gas heated dwellings...***

roofs	0.16 W/m <sup>2</sup> K
walls	0.30 W/m <sup>2</sup> K
floors	0.22 W/m <sup>2</sup> K
windows	1.8 W/m <sup>2</sup> K 25% of floor area
air leakage	7 m/h @ 50 Pa
boiler efficiency	SEDBUK band B



## practical examples



Stamford Brook  
Project:  
National Trust  
Redrow Homes  
Taylor Woodrow  
Homes  
CITB  
NHBC  
CBA  
Vent Axia  
Leeds Metropolitan  
University  
with ODPM

## practical examples



Stamford Brook  
Project:  
142 mm fully-filled  
wall cavities,  
345 mm overall...

## practical examples



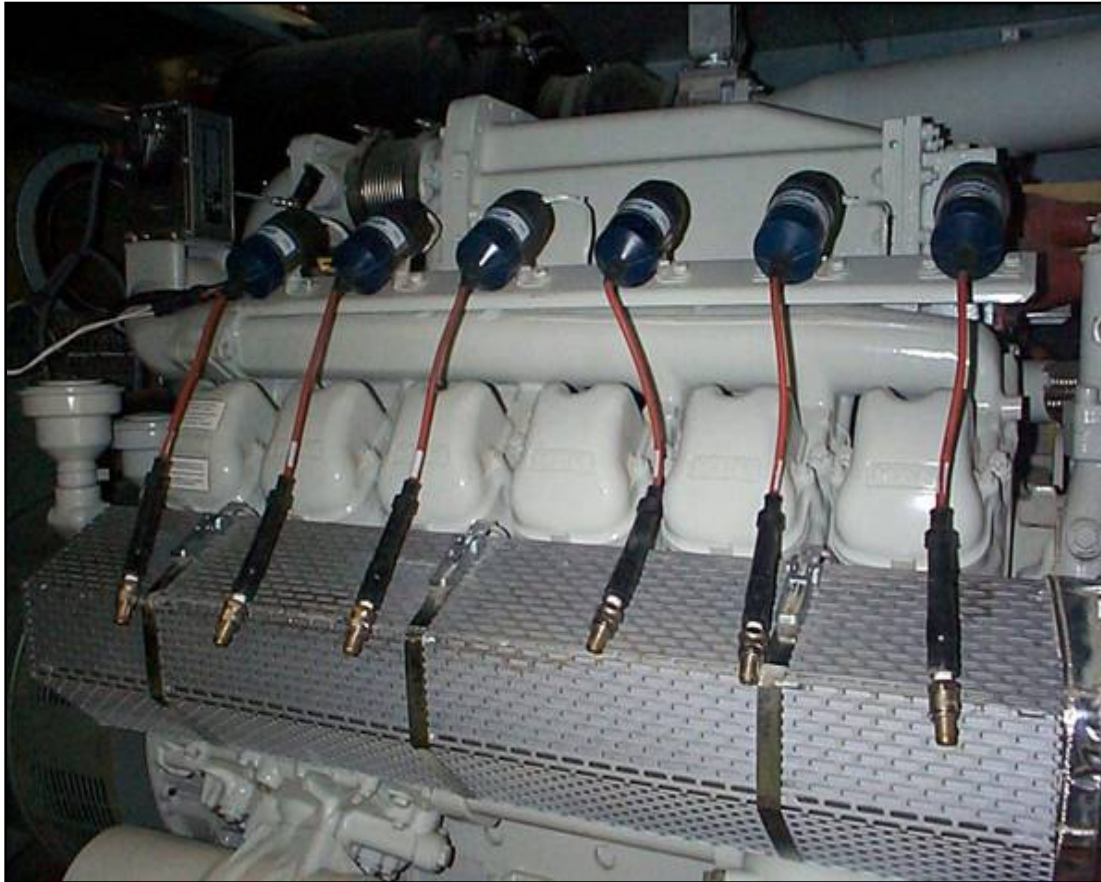
high  
performance  
windows...

## low & zero carbon technologies



solar hot water  
at Gusto Homes  
Nottinghamshire

## low & zero carbon technologies



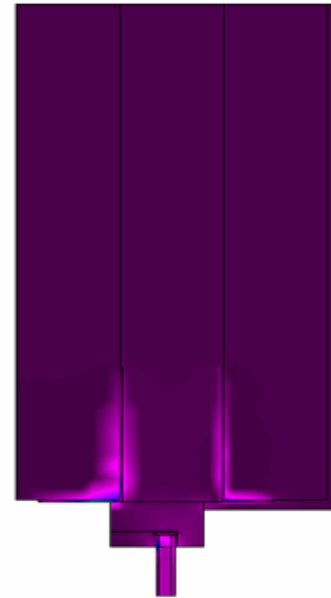
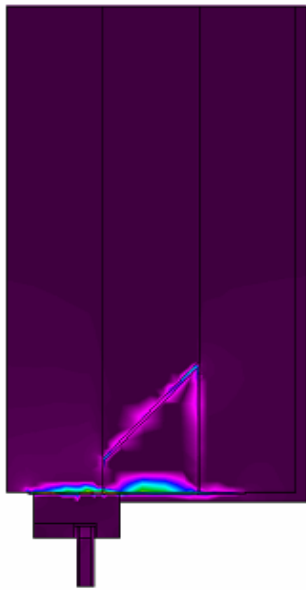
combined heat and power (courtesy of Wilson)

## low & zero carbon technologies

ground source heat pump at  
Skelton Environment Centre (LEDA)



# thermal bridging



## thermal bridging

- *repeating* thermal bridging included in U values – as 2002 edition
- separate, additional allowance for *non-repeating* bridges
- defaults depend on use of *Accredited Construction Details*
- option to calculate thermal bridges provides additional scope for innovation



## thermal bridging

if *Accredited Construction Details* are used:

- add 0.08 W/m<sup>2</sup>K to all U values, OR
- use tabulated  $\psi$  values for junctions from SAP and calculate contribution to fabric heat loss using

$$H_{TB} = \sum \psi \cdot l$$

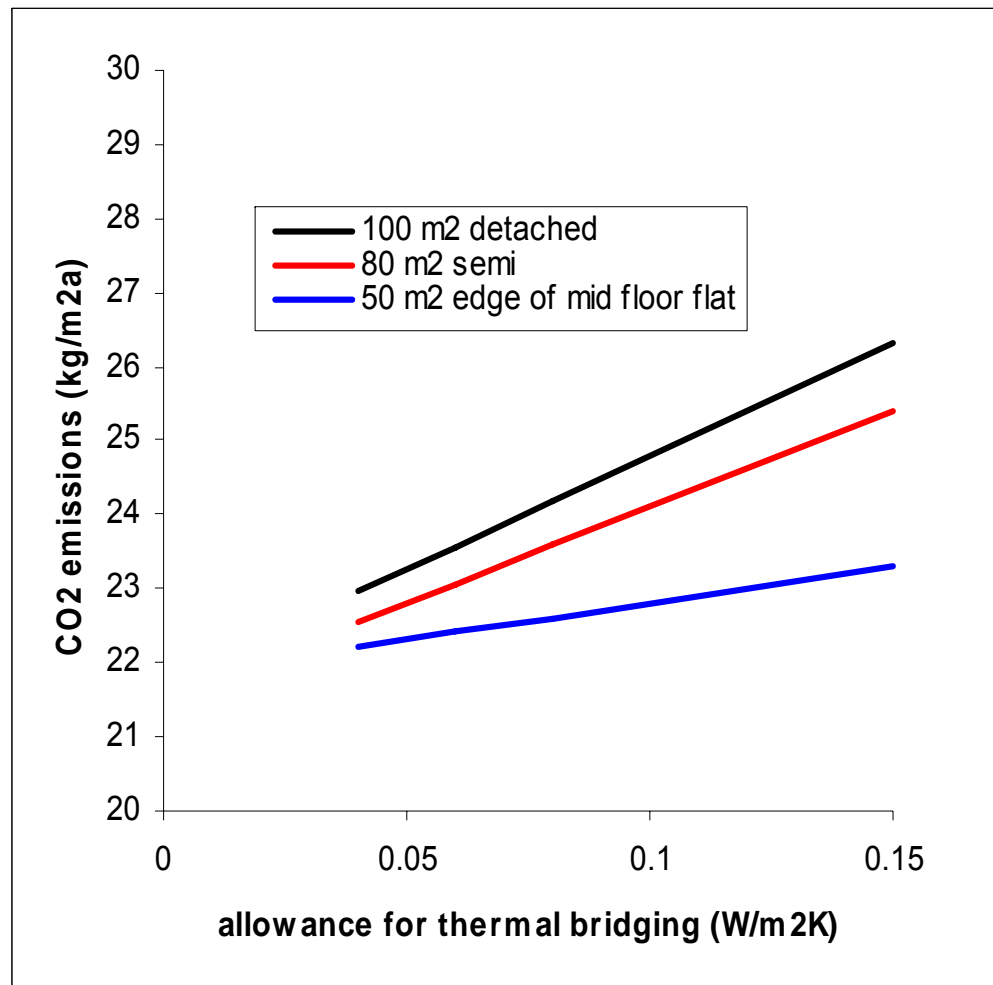
## thermal bridging

if *Accredited Construction Details* are not used

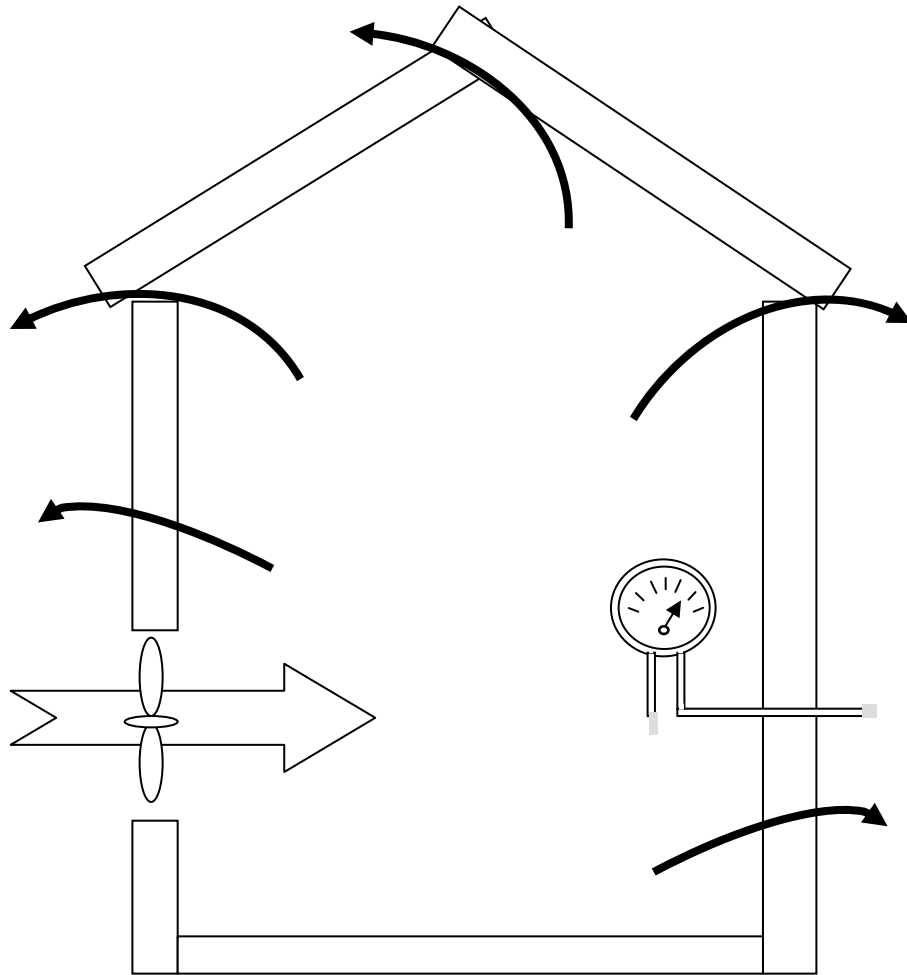
- add 0.15 W/m<sup>2</sup>K to all U values, OR
- calculate  $\psi$  values for junctions using appropriate simulation software and calculate contribution to fabric heat loss using

$$H_{TB} = \sum \psi.l$$

## thermal bridging and TERs



# airtightness



## airtightness – the air barrier

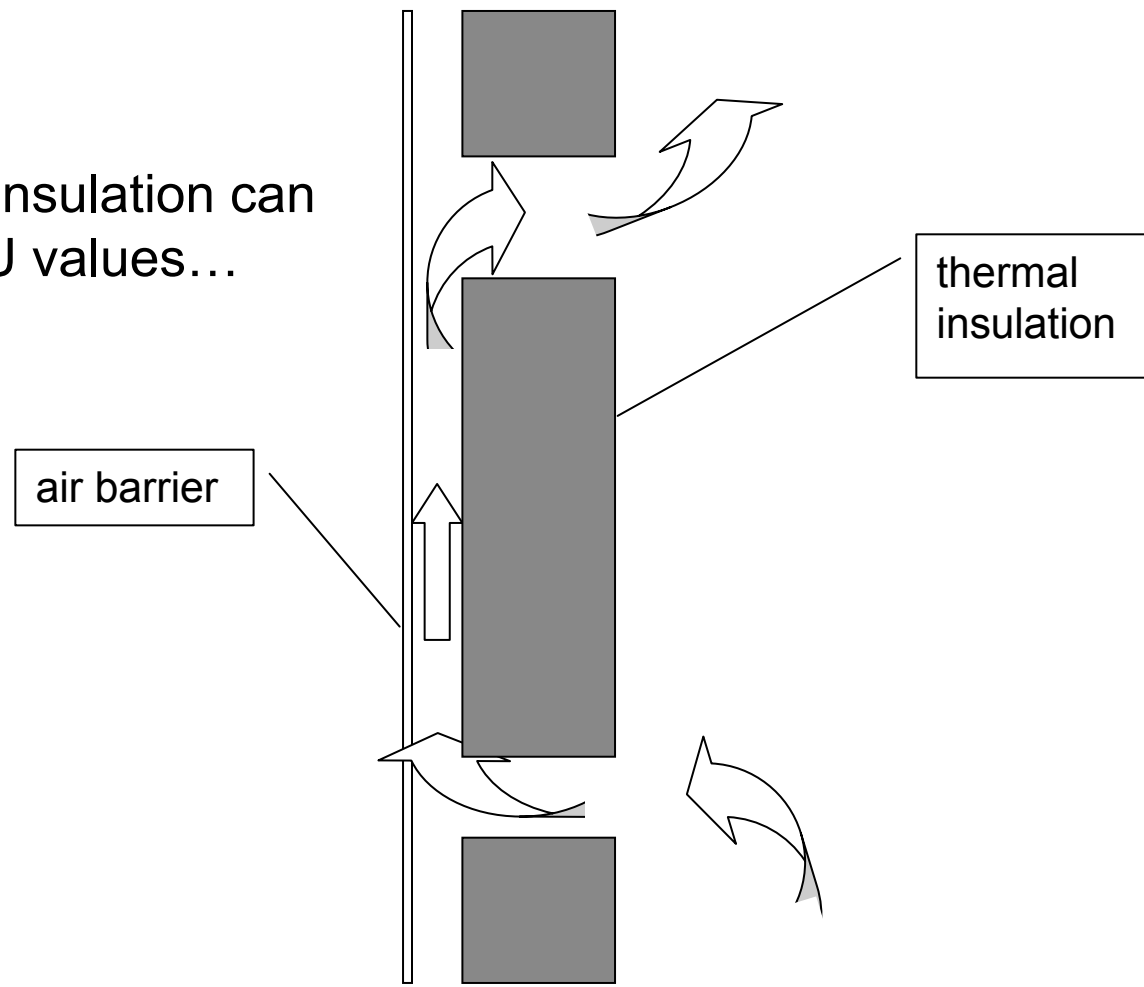


## airtightness

- air permeability better than 10 m/h at 50 Pa
- pressure testing of 2-5% of dwellings
- default air leakage of 15 m/h at 50 Pa for small builders

## construction quality

poorly fitted insulation can  
double real U values...



***indicative performance values for gas heated dwellings...***

roofs	0.16 W/m <sup>2</sup> K
walls	0.30 W/m <sup>2</sup> K
floors	0.22 W/m <sup>2</sup> K
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air leakage	7 m/h @ 50 Pa
boiler efficiency	SEDBUK band B



## **example compliance packages...**

dwelling heated with lpg, oil or electricity will need to go beyond performance indicators for gas...

## example compliance packages...

### **80 m<sup>2</sup> semi-detached house, electric heating**

- soft coat low emissivity windows, U value 1.4 W/m<sup>2</sup>K
- wall U value reduced to 0.25
- reduced thermal bridging

## **example compliance packages...**

### **80 m<sup>2</sup> semi-detached house, oil heating**

- soft coat low emissivity windows, U value 1.5 W/m<sup>2</sup>K
- wall U value reduced to 0.26
- reduced thermal bridging
- boiler efficiency raised from 86 to 90%

SECTION 6  
Possible future performance  
standards for Part L

6

### Forecast Indicative Values

Based on these arguments, indicative standards for 2010 might be around the values given in the table below:

Table 3	
Aspirational indicative U-values for 2010	
Item	Indicative U-value
Roof	0.1
Wall	0.2
Windows, doors and rooflights (average)	1.4
Floors	0.2

If this indicative set of U-values was installed in the reference 55 m<sup>2</sup> mid-terrace house, along with a SEDBUK A boiler, it would achieve a further 12% improvement on the proposed 2005 standard. To achieve the further 25% overall improvement considered appropriate for 2010 would require a 2.5 m<sup>2</sup> solar hot water collector.

ADL1a as driver of technical and structural change...

**ADL1a encourages:**

- integrated design
- partnering and collaboration
- strategic approach to innovation
- market segmentation

ADL1a as driver of technical and structural change...

**pre-requisites for success:**

- enforcement
- on-going evaluation of impacts
- continued political and financial support for change
- stability of underlying conceptual structure
- early publication of proposals for 2010



[www.odpm.gov.uk](http://www.odpm.gov.uk)

[www.projects.bre.co.uk/sap2005](http://www.projects.bre.co.uk/sap2005)