

Future-proofed homes

The AECB – the Sustainable Building Association – is convinced of the need to embrace a low carbon future. We have committed ourselves to developing a roadmap and directions to get us there. The intelligent and guided application of the skills, products and services contained within the 1,400 strong AECB membership will be needed. Before starting on any journey, we need to know where we are. Buildings are responsible for half of the UK's CO₂ emissions¹ and the domestic sector for almost 30% of them.

As a major contributor to emissions, the domestic sector is a target for government climate change policies. The main policy tool is Building Regulations, the latest version of which came into force on 1st April 2006. Subsequent revisions are to be heralded by the voluntary higher levels of environmental performance to be established by the forthcoming Code for Sustainable Homes.

However, energy use in homes continues to rise. One of the reasons is that Building Regulations focus largely on the building fabric, space and water heating, and some lighting, whereas CO₂ emissions reduction targets focus on domestic sector emissions as a whole – including all other energy uses in homes such as appliances, computers, and communication and entertainment technologies.

The AECB is therefore arguing that we not only need more rigorous energy performance targets for homes, but that the targets should be focused on domestic sector energy use in total. This is a key element of the AECB's proposals.

In addition, research shows clearly that, whilst U values have been revised downwards, domestic buildings do not perform as well as predicted. This is generally due to poor detailing and standards of construction. And while Building Regulations are an important policy tool, they are not in themselves adequate for our needs in an increasingly carbon constrained world.

Counting all energy uses is important for three reasons:

- Consumers' main link with their energy consumption is their fuel bills, which do not distinguish between uses to which fuels are put²;

How much CO₂ do our buildings emit at the moment?

Mr. McCarthy: "It is worth being aware of the Part L building regulations improvements which have secured a 40 per cent improvement in the energy efficiency of new housing in the space of only four years."

ODPM SELECT COMMITTEE: Housing, Planning, Local Government and the Regions Subcommittee hearing Extract on climate change: Tuesday 7 February 2006

Standard	Space heating	Water heating	Fans/pumps	Lighting	Cooking	Appliances	kgCO ₂ /m ² /yr for a 90m ² semi-detached house
Average dwelling stock as a whole	37	15	0.9	4.3	2.2	13	73
ADL1-2002	30	14	0.9	3.8	1.9	13	63
ADL1-2006	24	14	0.9	3.8	1.9	13	57

Notes:

1. Emissions for ADL1 '02 and '06 are AECB estimates of total 'real world' emissions for homes built to these standards, based on results from AECB research. ODPM comparative figures are:

	S	W	F/P	L	C	A
ODPM ADL1-2002	14.5	10.3	0.8	3.3	0	0
ODPM ADL1-2006	11.6	7.9	0.8	3.3	0	0

How much do our buildings emit at the moment?

- If the objective is to reduce emissions, consumers need to understand and manage their emissions from all sources, not just some of them;
- Making investment decisions in renewable technologies for electricity generation is likely to be made against whole house energy demand.

Energy and climate change policies are in danger of being distorted by failures to correctly predict and measure domestic sector energy performance.

Now where are we going?

But before we set off, remember that one-third of the homes that will exist in 2050 will be built between now and then. We are in danger of building ourselves now into a future that is as unsustainable as the present.

The AECB offers three routes to a low carbon future:

- A single, national set of advanced energy performance standards to deliver a real step change in the delivery of low carbon buildings;
- Development of a culture of carbon literacy in the construction industry;
- Enlisting self-builders and commercial home builders in a 'coalition of the willing' to deliver 10,000 AECB Silver Standard low carbon homes between now and 2010. This will demonstrate to government that the standard can be adopted as Building Regulations by 2010.

Properly employing energy conservation in new housing and applying whole home emissions standards could dramatically reduce CO₂ emissions, argues Andy Simmonds, Executive Officer at the AECB...

SILVER

70% reduction in CO₂ emissions from the average

Main features:

- 'Real' U Values
- Thermally-efficient airtight envelope
- Passive solar
- MVHR or whole house MEV

GOLD

95% reduction in CO₂ emissions from the average

Main features:

- 'Real' U Values
- Highly thermally-efficient airtight envelope
- Passive solar
- Solar thermal
- MVHR
- + on-site renewables

The AECB's Silver and Gold Standards

Carbon is becoming a new currency; London has become the world centre for trading carbon quotas. Currently, each UK individual generates 10 tonnes CO₂/year, which, in our fast approaching low carbon future, would have to be reduced to one tonne. The essence of carbon literacy is to understand clearly how and why we use energy, and what are the resulting CO₂ emissions. With carbon literacy, we make truly informed choices and can take effective action to reduce our emissions.

AECB offers training and research to develop the knowledge base. Increased carbon literacy, making carbon visible, would affect decision-making at all stages of domestic-scale design and construction, as well as energy-efficiency in non-domestic buildings and transport.

The AECB's Silver and Gold Standards

The AECB proposes its own rigorously developed improved energy standards as a model for those willing to tackle low carbon design and construction immediately.

The predicted energy use and CO₂ emissions are based on accurate predictions of building energy performance and homes energy use in total. And what will these standards achieve?

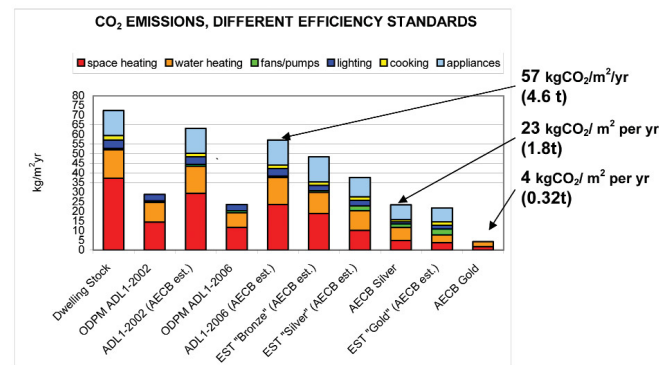
Currently, the average UK house produces 5.8 tonnes CO₂/year; a Silver Standard house reduces that to 1.8t/yr; go for Gold and it's down again to 0.32t/yr.

What of the 2006 much trumpeted step change to Part L? That produces, by AECB estimates, a new home that still emits 4.6 tonnes. Put like that, it doesn't seem so much of an advance on what went before, particularly as the Silver Standard costs very little more to build and does not include any expensive solar add-ons.

The AECB SussEd (Sustainable Skills and Education) initiative has developed challenging courses in energy-efficient design and construction. These explain not only the physics of energy use within buildings, but also how misinformed design choices

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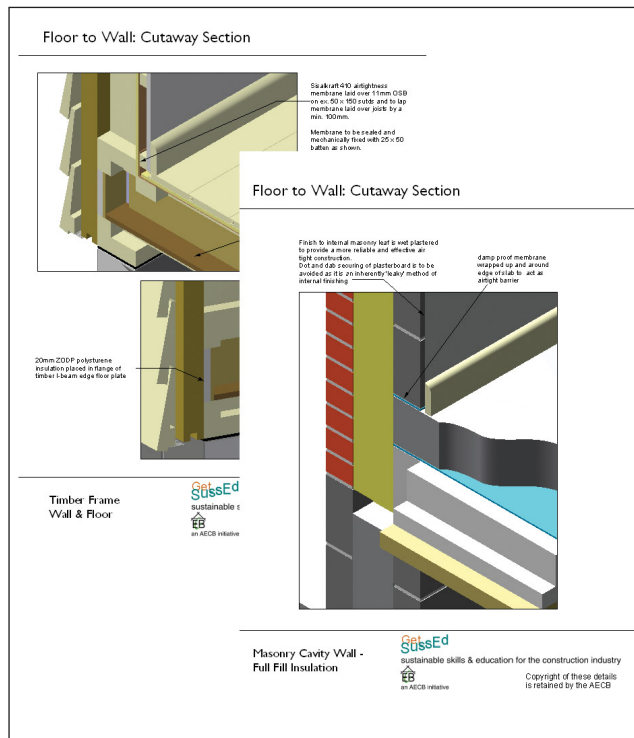
CO₂ EMISSIONS FOR DIFFERENT EFFICIENCY STANDARDS



- NOTES:
1. Whole home emissions for a typical home built to each standard are AECB estimates of likely 'real world' emissions, based on results from AECB research. AECB standards cover ALL energy. EST standards and Building Regulations exclude cooking, electrical appliances, a proportion of lighting etc. The table compares total domestic emissions for homes built to each standard. See AECB Paper 3: 'EST AECB and Building Regulations Standards 17/02/06' and Paper 1: 'Minimising CO₂ emissions from new homes' 16/02/06 at www.aecb.net/energyinbuildings.php
 2. Emissions relating to average dwelling stock in 2003 are taken from the measurements in DTI Digest of UK Energy Statistics, 2004 coupled with housing stock floor area data collected by Dr. D. Johnston, Leeds Metropolitan University.
 3. NOTE: New dwellings to ADL1-2002, ADL1-2006 and EST Good Practice are assumed to use a mixture of gas, LPG, oil and electricity for heating, electricity or gas for cooking and electricity for lighting, HVAC pumps and fans and appliances. The ODPM figures are obtained for a house with mains gas heating, using all the standard SAP procedures.
 4. All figures are modeled on a typical home, an 80 m² semi-detached house.

Comparison chart of different standards

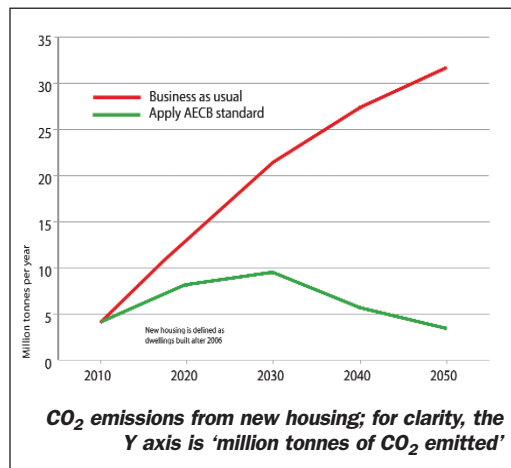
'The predicted energy use and CO₂ emissions are based on accurate predictions of building energy performance and homes energy use in total.'



and construction practices conspire to deliver buildings with energy performances differing dramatically (and expensively) from design predictions. And then the courses focus on design details, materials and techniques that can help to get it right.

The courses are tailored to both professionals as CPD, as well as hands-on for trades people.

We are publishing a first suite of six AECB Silver Standard construction details – addressing the same key issues as covered in the courses. We intend to extend and refine this technical guidance with the



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Standard	kWh/m ² yr Delivered fuels plus electricity	CO ₂ kg/m ² yr	CO ₂ % reduction against average	Date for adoption as Building Regulations	Comments
Average dwelling stock	278	73	0	-	DTI 2003 figures
ODPM ADL1-2002	130	29			Not measured
ADL1-2002	209?	63?	13?	-	AECB est.
ODPM ADL1-2006	99	23			Not measured
ADL1-2006	183?	57?	22?	2007	AECB est
CSH1* ADL1-2006 Delivered (1)	183	57	22	2007	Bond required + measured data
CSH2* AECB Bronze	135	32/40	45	2010	Aid-in-kind + measured data
CSH3* AECB Silver	84	22	70	2015	Grant aid + measured data + photos
CSH4* AECB Gold	38	4	95	2020	Grant aid + measured data + photos
CSH5* AECB Platinum	38	0	100	2025	Grant aid + measured data + photos

AECB proposed pathway to zero carbon dwellings via the Code for Sustainable Homes (CSH)

- Notes:
- * still under development
 - AECB considers that BRE's Ecohomes is the ideal vehicle for the CSH, with each energy performance standard consecutively incorporated as a non tradeable element

support of our membership through the AECB Carbonlite programme.

If the UK were to adopt our Standards, in 2050, domestic buildings, instead of producing 33 million tonnes of carbon dioxide each year, would only produce 3.3 million tonnes. It would be a future that would prevent UK householders from unavoidably continuing to squander ever increasing proportions of their income on running their homes – due to increasingly unaffordable and increasingly unavailable energy.

This could be the building sector's contribution (our contribution) to a genuinely sustainable low carbon future for our old age, our children and our grandchildren.

This issue is of such strategic importance that we continue to engage with the ODPM

and the EST in order to meld our standards with theirs.

The ODPM has said that it would need 10,000 exemplars before it could consider making the Silver Standard mandatory at the next revision of the Building Regulations in 2010.

By adopting AECB Standards, supporting our development of technical design and construction guidance, and successfully producing 10,000 future-proofed homes, we can demonstrate that there is a real appetite for change and that it is deliverable.

Please support the AECB's Carbonlite Programme – www.aecb.net/energyinbuildings.php.

- 1 Excluding flying.
- 2 Gas consumption will roughly equate to space and water heating in homes heated by gas, with probably some additional usage for cooking. But in dwellings that are electrically heated, it is not possible to distinguish between space and water heating, lighting and appliances consumption.