All Party Urban Development Group

promoting sustainable development and urban renewal

Inquiry 4:

CLIMATE CHANGE AND THE URBAN BUILT ENVIRONMENT

Greening existing non-domestic buildings

Spring 2008

Written evidence

All Party Urban Development Group

The All Party Parliamentary Urban Development Group (UDG) is a dynamic non-partisan Parliamentary body of MPs and Peers committed to progressing urban renewal and sustainable development in the UK.

The group was formed to raise the profile and understanding within Parliament of the urban regeneration process and the role that can be played by the private sector, particularly the property investment community.

The group's remit is to take a holistic approach in the examination of all the constituent elements that bring about truly sustainable communities, and to review policies that will increase the quality and pace of urban renewal and sustainable development nationally.

Current membership

Clive Betts MP *(Labour, Sheffield Attercliffe)* (Chair)

Rt Hon Nick Raynsford MP *(Labour, Greenwich and Woolwich)* (Hon Chair)

Lord (Richard) Best *(Crossbench, Life peer)* (Vice chair)

Robert Syms MP *(Conservative, Poole)* (Vice chair)

Baroness Scott of Needham Market *(Liberal Democrat, Life peer)* (Vice chair)

Publications

The reports and evidence of the Group are published and available on the internet at www.allparty-urbandevelopment.org.uk.

Staff

The British Property Federation has been formally registered by the Office of the Parliamentary Commissioner for Standards to provide secretariat services for the Group in partnership with the Centre for Cities, the independent research unit carrying out the Group's research.

Contacts

All general enquiries should be directed to the Group's clerk, Kurt Mueller, Public Affairs Manager at the British Property Federation, 7th Floor, 1 Warwick Row, Victoria, London SW1E 5ER, 0207 802 0128 or kmueller@bpf.org.uk.

Research enquiries or responses to calls for evidence can be directed to Paula Lucci, Centre for Cities, Enterprise House, 59-65 Upper Ground, London SE1 9PQ, 020 7803 4300 or p.lucci@centreforcities.org.

All Party Urban Development Group

The following are written submissions received for the All Party Parliamentary Urban Development Group's third inquiry into housing delivery.

Written submissions were received from:

WRITTEN EVIDENCE SUBMITTED BY 3DREID, STUART BARLOW

3DReid

3DReid is one of the UK's largest and most successful architectural practices providing a high level of expertise and service to its clients across a wide range of sectors:

Retail, Office, Industrial, Distribution, Residential, Hospitality, Health, Interiors, Education, Urban Design, Airports, Sports & Culture

Architecture is our passion. A passion which carries great responsibility; responsibility for the legacy of our past and for our future – across economies, societies and our shared environment. 3DReid have the vision, knowledge and resources to create exceptional buildings with integrity, inspiration and personality. We set out with a sense of purpose to create a body of work that reflects and responds to the needs of society.

We employ some of the best and most creative thinkers in the industry. Our business will always reflect their clear, dynamic thinking. We invest in the accumulation of knowledge, research and expertise across all sectors. We explore and use new material technologies and environmental strategies in support of the design process; consistently testing the boundaries of convention, responding to society in an ethical and sustainable manner.

We believe that sharing and retaining knowledge, expertise and experience is fundamental to our inclusive approach. We trust and learn from each other, working in partnership with our clients, communities and fellow consultants. We are driven by the belief that by working together we can achieve even better solutions.

3DReid has a combined workforce in excess of 380 people, with offices in Belfast, Birmingham, Edinburgh, Falkirk, Glasgow, London and Manchester. This has created a strong organisation in its geographical spread, design talent, depth of resources and range of knowledge and expertise. The scale, capability and sophistication of the new practice enables us to design and deliver innovative and value adding solutions on a wide range of projects up to the largest size and greatest complexity throughout the UK and internationally.

Strength of delivery and careful commercial management have been and shall remain key to our success. We do not just create beautiful concepts, we deliver beautiful buildings. Through strong project management and the completion of award winning projects spanning more than two decades we have testament to our surety. Our awards and repeat commissions speak for themselves.

Stuart Barlow – Director of Sustainability & Technology

I am currently 3DReid's Director of Sustainability & Technology. I have been an architect for over 25 years and have subsequently obtained an MSc in Sustainable Development

& Climate Change (with Distinction) from De Montfort University. I am also a CIBSE Low Carbon Consultant (Design) and a registered BREEAM Retail, BREEAM Industrial & BREAM Offices Assessor.

My work includes assisting 3DReid's Sector Groups to develop sustainable solutions such as our EcoBox sustainable warehousing, a residential EcoTower, sustainable options for 'greener retail'. I have also participation in research projects such as BRE's protocol for the handover of office buildings, published as BRE Digest 474: Hand-Over of Building Operations, so they can be run more efficiently and with greater occupant satisfaction. I have also been responsible for the development of 3DReid's Environmental Policy and our Environmental Management Systems for Designing Buildings and for Office Operations.

I was responsible for the sustainable refurbishment of our central London office which incorporated features such as motorised natural ventilation dampers under new windows, movable blinds to reduce solar gains, exposed thermal mass, chilled beams for dealing with summer peak temperature, adaptive controls, high efficient lighting, water saving sanitary fittings (including waterless urinals) and use of non toxic paints etc. A post occupation evaluation study was conducted on it as part of the Usable Buildings Trust Feedback Techniques Study. It received a Green Apples Award (2004) and was included in the 'Sustainable Architecture' book published during 2007.

The dissertation, undertaken as part of my MSc, was called "How adaptive comfort theories might influence office refurbishment methodologies" & it investigated survey evidence for the effect of adaptive opportunities on building occupants' comfort. The findings were then presented to the Network for Comfort & Energy Use in Buildings' conference 'Comfort & Energy Use in Buildings - Getting Them Right' in 2006 & was subsequently published in the July 2007 edition of Energy & Buildings.

I have published an article called 'Refurbished offices: West End House, Hills Place, London' in the Green Building Bible: Volume 1 (2007) & presented a talk on 'Balancing Regulation with Planning Permission to Maximise Return on Investment' at Sustainable Building Refurb/ Retrofit 07.

Barrier to reducing emissions in urban buildings:

Lack of information:
Studies have shown that 75% of the United Kingdom's (UK) building stock was constructed prior to 1980, mostly with un-insulated walls & roofs. Over 90% of the UK building stock was constructed prior to 1990 when requirements for more significant levels of thermal performance started to be introduced into the Building Regulations. Significant requirements to improve the thermal performance of existing building were introduced in the revisions to the Building Regulations in 2002. Yet the existing building stock is only being replaced by new buildings at a rate of only 1 to 1.5% per year.

BRE published ‘Carbon dioxide emissions from non-domestic buildings: 2000 and beyond’, by C H Pout, F MacKenzie and R Bettle, in 2002 which indicated carbon dioxide (CO_2) emissions from non-domestic accounted for 20% of the UK’s overall CO_2 emissions. It also indicated that a different energy profiles exist between existing and new buildings. For instance, in newly constructed air conditioned offices heating & hot water accounts for 23% of emissions, yet across the whole of the office building stock it accounts for 49% of emissions. This research needs to be updated on a more regular basis to help inform policy making.

Costs, benefits and barriers to owners/ occupiers:
While the Building Regulations now include requirements for “consequential Improvements” to existing buildings, its complexity might be acting as a barrier rather than an encouragement to energy efficient refurbishment as intended.

The introduction of the requirement, as the result of the EU Energy Performance in Buildings Directive, to issue Energy Performance Certificates for all nearly all non-domestic buildings when they are constructed, sold or leased is expected to increase the economic awareness of the energy efficiency of existing buildings. It is expected, by many in the property industry, that while highly energy efficient building may not attract a premium, energy inefficient buildings are likely to be penalised through chipping at rental rates & values. While this is a very progressive piece of legislation it might, unfortunately, impact greater on the existing building stock due to inherent energy efficiencies of un-improved existing buildings.

Breaking down barriers to ‘greening’ urban buildings:

Addressing the lack of information:
Research undertaken for the BRE study, ‘Refurbishment or redevelopment of office buildings? – Sustainability comparisons’ (BRE Information Paper 9/02), indicates that when considering like for like developments refurbishment is almost always the most sustainable option & naturally ventilated refurbishment has an environmental impact of around two-thirds of an air conditioned scheme. There is, however, a real lack of good research into how CO_2 emission can be significant reduced in existing non-domestic buildings. What is needed is a major investigation on the same to produce a serious of potential opportunities in the same way the 40% House Project did for existing residential buildings. This could also involve industry as well as academic resources for a truly comprehensive approach.

Addressing economic consequences:
It is often perceived that refurbishment is always be the cheaper option in construction, due to the fact that by retaining the existing substructure, frame, floors, roof & façade (with the exception of replacing existing windows) a refurbishment can save approximately 45% of a newly built project’s cost. While some elements are cheaper when you refurbish, you still need to allow a reasonable amount of money to strengthen or make good both existing frames and external envelopes etc. there is a clear need to

re-think the VAT situation in relation to refurbishment projects or the introduction of suitable tax breaks to encourage greater effective refurbishment.

Monitoring & enforcement;
The approach that should be adopted to reducing CO_2 emissions within the existing non-domestic building stock should follow an energy hierarchical approach of first reducing energy demand through the adoption of passive design measures, implementation of active controls & energy efficient solutions and finally the use of low or zero carbon on-site (or close to site) energy generation. The range of passive adaptive opportunities, that exist within existing buildings, include:

- Adding insulation to walls, roofs & floors, and replacing existing windows - nearly two-thirds of UK offices were constructed prior to requirements for minimum fabric U-values.
- Reducing air leakage around existing building element junctions.
- Adding fixed or automatically controlled solar shading - reduces solar gains.
- Centrally controlled replacement heating systems.
- Reducing occupants densities - reduces occupant heat gains.
- Hardware or software solutions to turning equipment off automatically - reduces heat gains.
- Time-off switching, photocell or occupancy sensors to turn of lighting - reduces heat gains.
- Centrally controlled low energy cooling systems – can be required to maintain comfort levels.
- Natural ventilation through centrally controlled grilles - removes internal heat and increases air speeds in spaces.
- Mechanical ventilation – can be required due to proximity of external pollution or noise sources.
- Automatic night time ventilation - cools a building's thermal mass.
- Centrally controlled assistance to air movement – automatically controlled ceiling mounted fans to reduce air stratification and increase air speeds within spaces.

In addition there is also a range of possible active adaptive opportunities which include:

- Adding occupant controlled solar shading - to reduce solar gains.
- Localized switching to turn off lighting - reduces energy consumption and heat gains.
- Localized control of replacement heating systems - such as thermostatic radiator valves (TRVs).
- Occupant controlled natural ventilation - opening windows providing cross or single sided ventilation to provide fresh air and free cooling.
- Occupant controlled localized assistance to air movement - to offset air stratification, increase local air speed and thus occupant convective/ evaporative heat loss.

In the next round of amendments to the Building Regulations the potential impacts of adaptive opportunities need to be more fully understood and supported.

Once the level of energy demand from existing buildings has been achieved through the use of passive measures, and then the introduction of effective controls & energy efficient service solutions, then there is a need for the greater encouragement for the introduction of low & zero carbon energy generation. Systems available include:

- Solar thermal: Although hot water demands are not significant in many non-domestic building types solar thermal could contribute a significant level of carbon savings from its adoption.
- Photvoltaics: Although there is a need to especially careful with the introduction of photovoltaics in order to avoid the systems being over shadowed from adjoining buildings
- Wind: While there are many problems with generating energy from wind in urban situations due to the effects of wind turbulence, cause by adjoining buildings etc., on the efficiency of horizontal axis large or micro-turbines, opportunities do exists for the use of vertical axis turbines which are not as effected by turbulence problems.
- Ground source heat/ cooling systems (including aquifer inter-seasonal storage): incorporating these kind of system tend to be more difficult in refurbishment schemes due to the need for construction space for their installation. They is clearly a need for the investigation of innovative solutions to their incorporation into existing refurbishment projects.
- Biomass heating: While the national supply of sustainable biomass fuel is ultimately limited there are still opportunities for an increase in the use of biomass heating/ hot water supply for appropriate refurbishment projects.

The introduction of these systems is currently being stifled through the often higher costs when compared to tradition higher carbon solutions. Many of these technologies could be encouraged through the introduction of either grants, tax breaks and the introduction of a statutory requirement to energy companies to provided a minimum level of buy-in tariff for the sale of surplus energy from on-site low & zero carbon energy generation.

Almost as important must the encouragement of linking a number of existing buildings into low decentralized energy district networks to provide low or zero carbon energy supplies. Initiatives such as the creation of the London Climate Change Agency need to be replicated to encourage the developments of decentralized district wide energy networks. The current restriction on the generating capacity of private wire network for these systems is stifling their development & needs to be removed.

Other opportunities for ‘greening’ urban buildings would be the encouragement for the increase conversion of roof area into living roofs. Not only would this provided increased opportunities in increasing wildlife habitation , it would also increase insulation values, reduce surface water run-off to reduce the stress on local surface water drainage networks and help to alleviate the potential for flooding.

Monitoring any improvement work is of great importance so any thing government can do to encourage or require increased monitoring of buildings through Post Occupancy Evaluation etc. will greatly benefit the ability to understand the real benefits of different

solutions and make future policies better informed. There is also a real need to increase better handover procedures so refurbished buildings are not only designed to more sustainable but continue to be run on sustainable & energy efficient lines. There is a need to encourage client's to start adopting sea trials or soft land approaches to the handover of buildings, where designers & installers are retained to help the occupiers to resolve any system deficiencies over the first year or so of a building occupation, in order to get actual energy saving performance into line with expectations.

Stuart Barlow
Director of Sustainability & Technology

WRITTEN EVIDENCE SUBMITTED BY 3DREID, TONY INGRAM

Tony Ingram – Director

I am a Director of one of the ten largest UK Architecture practices with offices located throughout the UK and a unique diversity of specialisms in every building sector. I am a registered Architect with an unusually diverse portfolio of work in historic buildings and refurbishment. Also a founding member of the South East Regional Design Review Panel (funded by Seeda); facilitator of the English Heritage initiative 'Buildings in Context' lectures particularly to lay Councillors, and lecturer in Sustainable and Urban Design (Westminster and Kingston Universities). My projects have received 3 riba Awards and 2 Civic Trust Commendations and have been published worldwide

Barriers and policy

At a rough estimate, around 80% of our building stock was constructed prior to any form of thermal regulation and therefore contributes most of the third of all CO2 emissions for which buildings are directly responsible.

Because of the absence (until very recently) of any thermal regulations whatsoever relating to refurbishment, subsequent improvements are generally limited to relatively small-scale roof and cavity wall insulation, ad-hoc services replacement and sometimes secondary glazing. The scale and breadth of the challenge is therefore immense. We have to take into account the broad range of building construction methods and the cultural and value to the community of our built heritage. In building sectors this ranges from offices, warehousing, industry, retail and leisure and education facilities. Refurbishment uses generally less than one third of energy-in-construction than new build. It is also generally more craft and labour-intensive, thereby helping preserve a diverse skill base and aiding employment.

Culture and Communities

Communities generate the built environment just as they are shaped by it. Their culture grows in part from the quality and respect of the buildings and spaces they inhabit. These qualities vary from place to place and are reinforced by the historic regional character and the use of locally sourced materials and traditional crafts founded in the locale. The continuing use of such crafts and materials is not only responsive to its context, thereby reinforcing diverse regional community identity, but also implies more labour and craft intensive building process. Locally sourced materials also imply a lower embodied energy (reduced energy-in-transportation costs).

A movement towards reducing energy use must embrace and encourage such diversity and richness and be flexible enough to accommodate such diversity without impairing local character and quality. Decision-makers in the process must be able to make the necessary judgements with appropriate knowledge and understanding. Their status in the community enables them (with the correct toolkits) to be able to balance the issues of conservation with replacement buildings, and whether new uses can be found for old buildings. What is needed, therefore, is **an holistic** approach to Building Conservation: one that fully addresses the widest issues not just of building fabric but also of energy conservation.

To address only *urban* buildings in your investigations is therefore insufficient.

REDUCING EMISSIONS

Construction Methods

These approaches repay financial investment in time but few do so within the normal industry accepted 8-10 years. As a result, application remains ad-hoc and impact low. A longer-term view must be encouraged; this may be achieved through increased energy costs, but also requires financial incentives such as a proper working grants system and legislative requirements.

At the heart of sustainable construction is the quality and integrity of each building's insulation properties. Ideally, this should be *at least* 200mm thick and 'wrap' the building so as to enhance its thermal mass on order to 'iron out' the effects of diurnal temperature change. However, this is not always practical as the qualities of external appearance outweigh such 'wrapping'. To take this further, then it is necessary to explore different generic forms of construction to identify the insulative opportunities and constraints imposed.

Timber frame/ timber roof
Existing roof construction usually adaptable economically to increased insulation. External wall construction presents significant practical and economic challenges if impositions of reduced internal room standards or effect on elevations are to be avoided.

Masonry walls; timber roof
Existing roof construction usually adaptable economically to increased insulation. External wall construction presents significant practical and economic challenges if impositions of effect on elevations are to be avoided. Internal insulation unreliable due to reduced internal room standards and cold bridging.

Concrete or steel frame; 'masonry' or other Cladding

If sound, generally capable of being wrapped reasonably economically to a good standard, either by lightweight overcladding or new cladding. Good examples exist already.

There are recent additions to insulation market technologies such as thin multi-foil (space-blanket systems). Whilst these systems have enormous and radical potential, the absence of robust Independent testing has resulted in contradiction and misunderstanding in public and private sectors alike. Further new and emerging technologies (such as gels; internal 'thin insulative 'curtains') must be stimulated and encouraged and given proactive independent testing in order to refine and define their construction limitations and opportunities.

Replacement low-e windows or secondary (double or low-e) glazing systems fulfil a crucial role in increasing insulation to buildings but are costly and often unviable and need application in an informed way.

'GREENING'

There are a number of significant challenges in promoting and encouraging the 'greening' of existing building stock. Part of this is due to multiple and single ownership, and part due to a lack of understanding of the cost to benefit ratio over time.

Another significant issue in the promotion of refurbishment and energy efficiency improvements is that of VAT. Currently VAT legislation applies to refurbishment but not to new build, thus giving a financial incentive to rebuild rather than to improve existing building stock, despite the gains to be had in energy efficiency.

Energy Sources

Once adequate levels of insulation are achieved there are a wide range of additional potential means to reduce energy-in-use.

These can be summarised as:

Solar: passive

Hugely beneficial and capable of much greater exploitation in all building types through simple technologies. Health benefits too. However there is no right to sunlight…only daylight.

Solar: active

Will become increasingly viable in terms of power generation as well as heated water. Potential efficacy reduced by no right to sunlight…only dayligh

Wind and Air Quality

Wind power generally viable, and an opportunity area for innovation to address other environmental issues. A greater empirical assessment methodology may assist.

Air, Ground Source and Water Heat Transfer

Generally unviable at present and an opportunity for innovation

Alternative local Fuel Sources

An opportunity for innovation at a community level, but generally unviable at present.

Rain Water/ Grey water

Collection and treatment unviable at present

Building Sectors

It is not only buildings themselves that need consideration but also the interrelationship between them. This in itself accounts for a significant energy-cost-in-use in the form of transportation of people/materials/foodstuffs/energy etc. Further research is required to explore the potential benefits of mixed-use development in terms of mitigating and adapting in response to the challenges posed by climate change. Conservation efforts require significant funding which poses a real challenge.

Potential Policy Initiatives

- Concern has been raised recently that a shortage of specialist workers, especially stonemasons and thatchers, will have a damaging impact on the conservation of pre-1919 buildings. A report from the National Heritage Training Group claims that the future of 5million such buildings are at risk as a result. Training and development must be encouraged in these areas if we are to reduce the environmental impact of existing buildings.
- Incentives must be provided to encourage renewable energy systems, combined with an increase in taxation on non-renewable energy sources towards real-planetary-cost in order to drive change. Commensurate support should be given to improve insulation.
- Independent scientific research is needed in order to provide clear assessment and comparative information on alternative sustainable construction and materials selection.
- Institutional funders play a crucial role in the sector and must be engaged in understanding how to drive sustainability in order to assist commercial success and viability

- Research rights to *sun*light as well as rights to light in order to preserve passive and active solar systems where constructed and effective
- Training for decision-makers (eg lay Councillors) in making qualitive judgements in the planning process. For example English Heritage ‘Buildings in Context’ intensive workshops run by Kent Architecture Centre assist new Planning Committee Members and Planning Officers to understand the unique and invaluable character of the locale, and how to apply this to the decision-making process.

Tony Ingram
Director

WRITTEN EVIDENCE SUBMITTED BY THE ACADEMCY FOR SUSTAINABLE COMMUNITIES

Background - The Academy for Sustainable Communities (ASC)
ASC is the national centre for delivering the skills and knowledge needed to make better places. Our remit is to foster a shared understanding of what it takes to make sustainable communities and encourage an integrated, cross sector approach to ensuring there are enough people equipped with the skills and knowledge to develop and maintain them. ASC was established as a result of the recommendations set out in the Egan Review, "Skills for Sustainable Communities" which concluded that key factors hampering the delivery of sustainable communities were:

- A combination of a lack of generic skills and labour shortages in the core built environment professions
- A lack of opportunities for cross-sector, cross-professional learning

ASC's role involves increasing the skills base of the sector as a whole by promoting generic, technical and specialist skills amongst practitioners and by encouraging them to work more effectively in multidisciplinary, cross sector teams. The focus is on building capacity and changing working practices on the ground.

Summary response
ASC considers climate change to be an overarching issue that affects all elements of delivering sustainable communities. We recognise that to build and maintain sustainable communities there is a need for practitioners to have the technical skills and knowledge to effectively implement carbon management. For this reason, carbon management will become a generic skill, which ASC will promote along with the other generic skills. However, we would also like to make recommendations about clarity of the language used when discussing climate change and the carbon agenda, as well as make recommendations about the use of post occupation evaluation and whole life costing. Best practice examples would also help to promote the different ways in which emissions from existing commercial buildings could be reduced.

Language and definitions
ASC would recommend that there is consistency in the language used when discussing climate change and the carbon agenda. On page two of the briefing document, paragraph 3, bullet point 1 states 'making new buildings carbon **neutral** by 2019'. Our understanding is that the ambition is to make them **Zero Carbon** by 2019. This highlights the point that it is necessary to make sure that the language used is consistent and on top of this to ensure that there is an agreed definition for a **Zero Carbon** building. This will ensure that everyone is working towards the same targets. The UK GBC are undertaking work on this and will launch their findings on the 12th May, which should help to provide a useful basis for future work.

Lack of Information
With regards to a lack of information, we feel that what is missing is the **how to** and feedback on the **performance in use.** There is no recognised single preferred method for carrying out a **Post Occupation Evaluation** in the UK. There are also very few robust case studies stating what worked, and indeed what did not, as well as lessons learnt. We feel that this would be invaluable in driving forward the zero carbon agenda. We would recommend that for post occupation evaluation to work, it needs:

- Environmental information (including energy in terms of the CIBSE TM 22 survey)
- Social information (the methodology of the Usable Buildings Trust is favoured by many)
- Economic information and the challenges faced by a lack of information on **Whole Life Costing**

Whole Life Costing
We feel that whole life costing is essential if we are to deliver a sustainable built environment. Some (but not all) of the 'sustainable' items cost more in capital terms. This costing is needed to show that the cost in 'whole life' terms actually is delivered. What is needed is a mindset to deliver the Highest Whole Life Value for the lowest Whole Life Cost. Although there have been many discussions of using whole life costing this still is not happening, and we feel that this is hampering the carbon agenda. It would be useful if PFI schemes which use whole life cost could publish information about the schemes they develop, so that the learning can be shared and transferred amongst others.

A lack of skills
We feel that there are not enough people with the skills to deliver all of the zero carbon buildings and reduce the carbon in existing stock. In research commissioned by ASC[1], respondents said that although they had a broad understanding of climate change, they needed guidance on how to apply their knowledge in their job or need knowledge on specific issues. In addition, a quarter of respondents felt that they did not have enough knowledge of climate change to do their jobs effectively, and respondents tended to use the internet as a source of information about climate change. Therefore, to help promote this agenda, ASC is going to promote carbon management as a generic skill.

Tools and best practice
ASC would recommend that the BREEAM tool now is improved and rolled out further. Public buildings such as schools have the ambition to be rated excellent. This would set a good example to others. We would also recommend that BREEAM is developed so that it can be used to monitor again post construction and in use.

We also feel that there is too much focus on zero carbon buildings and not enough focus on low carbon communities. One example of good practice would be for the current £45bn BSF new schools programme to be the focus for the centre of a low carbon community.

[1] ASC (2007) Demystifying Climate Change

WRITTEN EVIDENCE SUBMITTED BY ASDA STORES LTD

1. Introduction

ASDA operates over 330 retail outlets across the UK, providing communities with high quality goods and services at an affordable price. We employ over 160,000 colleagues in the UK. Accessible, affordable and sustainable shopping is a customer expectation.

The majority of our stores are located in or at the edge of town and district centres. Our ongoing development programme is helping to revitalise cities and towns throughout the UK.

ASDA actively works within the Government's Town Centre First Policy objectives and has a range of store formats to suit the needs of any location. Regeneration is at the heart of ASDA's development programme. Our stores play an integral part in the local community – creating new jobs, stimulating the economy and improving the environment for everyone. We also work with the Government as part of its local employment partnership scheme which seeks to encourage long-term unemployed people back into the labour market.

2. General Comments

ASDA welcomes the opportunity to respond to the APUDG's call for written evidence on reducing carbon emissions and increasing energy efficiency in existing buildings.

ASDA has three key aims for its sustainable development programme:

- We will reduce new store energy requirements by 30% by 2010, based on a 2005 store model.
- We will also reduce energy requirements for our existing stores and distribution centres by 20% by 2012, again based on a 2005 store model.
- We will build wind turbines to power six of our depots by 2012.

We are making significant progress in achieving these targets by continually trialling new sustainable features and technologies in our stores. Two key projects are informing our approach to delivering sustainable retail development.

Shaw

In August 2007 we opened our first eco-store in Shaw, Oldham. The 34,313 sq ft (3,188 sq m) store marked the first stage in ASDA's new energy efficient build programme and includes a number of eco-friendly technologies which make it the most sustainable and energy efficient store in our estate.

It is England's first purpose built timber frame store, using timber from certified sustainable sources. This sustainable construction meant 500 tonnes of steel and 450 tonnes of carbon emissions were saved during construction. The store has a north-facing 'saw-tooth' designed roof which captures natural light, but not heat, reducing the store's dependency on air-conditioning which, in turn, reduces energy consumption. A

natural ventilation system ventilates the store when outside temperatures rise above 15°C. Only when internal temperatures rise above 25°C will the cooling plant operate.

The store is nearly 30% more energy efficient than a store built in 2005.

Bootle

Our Bootle store will be the second high efficiency store after Shaw, and is scheduled to open in November this year. The store will address three aspirations with regard to sustainable materials and all the major components have been assessed as to their carbon content:

- The store is constructed from and clad in sustainable timber from Finland.
- The roofing will be constructed from reusable aluminium rather than plastic.
- The concrete used in flooring and foundations will have up to 40% less cement by using pulverised fuel ash from power stations.

The store design will result in CO2 reductions in excess of 30%. This will be achieved through the combination of reducing energy consumption and using renewable technologies. The design has ensured that the building is sealed to standards that exceed L2a building regulations. The energy reduction measures include:

- Light dimming.
- Full glass doors on chilled and frozen cases (a UK first).
- The integration of our advanced building management system and substitution of air conditioning systems with more environmentally friendly cooling methods.

The renewable technologies have been carefully selected and include the use of ground source heat pumps for cooling and heating, a biomass boiler system and wind turbines to power the signage. The need for artificial lighting has been reduced significantly by the use of North lights, sun pipes and translucent KALLWALL panels.

Significant consideration has also been given to waste in the development of the Bootle store. A range of measures have been introduced to ensure that the construction waste that will result from the building of the store can be minimised or recycled:

- The waste skips are to be segregated in order to increase the recyclable material content.
- The design has been completed and the contractors engaged early in the design and procurement process in order to eliminate waste through poor design.

In addition, to ensure that we work effectively and reduce manpower waste, the main contractor and design teams are to carry out construction "rehearsals" prior to starting on site to ensure that it is built to time and on budget.

Performance

We are keen to share the knowledge and experience we have gathered from our considerable investment in sustainable construction and energy efficiency trials with local authorities, central Government, development partners and other retailers,

including our competitors. A sustainable retail sector is good for all customers and the UK in general.

Our new stores are being monitored for their energy saving per square foot against typical ASDA stores built in 2005. The table below details our performance to date against our target of using 30% less energy in new ASDA stores by 2010 (compared to the 2005 base level).

Store	Size (gross sq ft)	Energy Saving to date	Opened
Girvan	27,941	17%	August 2007
Seaham	42,118	27.1%	September 2007
Ardrossan	47,562	15.2%	September 2007
Shaw	66,316	28.8%	August 2007

We are also aiming to reduce the energy consumption across our estate by 20% by 2012. Our existing ASDA stores are showing significant results against this target. The adaptations made to these stores have included electricity metering, installing refrigerator doors and motion-sensor lighting. This table shows how some of our existing stores are progressing.

Store	Size (gross sq ft)	Energy Saving	Opened
Abbey Park	55,552	30.0%	November 2005
Fleetwood	70,576	14.3	February 2006
Lowestoft	72,500	15.8%	November 2005
Hereford	75,400	27.2%	October 2006

3. ASDA Comments in response to the APUDG Inquiry

Barriers to reducing emissions from urban buildings:

- ***Lack of information:*** **How good is the data that owners/occupiers have about their energy usage, efficiency and carbon footprint? How far are they able to benchmark their performance against that of others? If owners/occupiers lack data about their building's energy usage, what is preventing them from getting it?**

As evidenced by the examples above, we are tracking our estate's performance against internal targets.

- ***Costs, benefits and barriers to owners/occupiers*****: Even if a more comprehensive understanding of a building's energy usage could be achieved, what is preventing owners/occupiers from undertaking measures to use energy (heating and electricity) more efficiently or minimise energy wastage? What barriers (both economic and physical) do owners/occupiers face when considering the installation of low carbon technologies?**

Ground source heat is a measure that has great potential for us but to install a high efficient "open loop" heat pump (such as that we will install in Bootle) requires an up-front investment of over £200,000. There is then a six month wait to receive approval from the Environment Agency. Ground conditions are fantastic for over 100 of our stores but we cannot simply sign off a request for £20 million without a guaranteed return.

Existing planning legislation and the inconsistencies in its application by Local Planning Authorities is a further barrier to owners/occupiers undertaking energy efficiency measures. This is explained in further detail below.

- ***Costs/Benefits to the wider economy:*** **How important are the wider urban economic impacts of greening existing buildings? The majority of commercial property is occupied. A full scale retrofit would require temporary relocation for the occupants, with potential profit losses for the landlords and disruption to tenants' businesses. What are the likely impacts on cities' economies (for example in terms of job creation and business opportunities/costs in the property industry and other business sectors)?**

ASDA is implementing energy efficiency measures into its existing estate while continuing to operate its business and serve customers across the country. Our targets are challenging but place our customers first. Our approach is to reduce the amount of energy, packaging and fuel we consume and to pass the savings on to our customers. This contributes to our guiding ethos of providing every day low prices to our customers, helps to make sustainable living affordable for all and crucially enhances our role as a deflationary agent in the UK economy.

Breaking down barriers to 'greening' urban buildings:

- ***Addressing the lack of information*: What actions are needed at the industry level to produce the measurement standards needed? How can the Government support the industry in achieving this? Are there any current tools that could be adopted to improve energy measurement?**

The Government needs to push ahead with existing policies and its roadmap towards low/zero carbon buildings. We need a definitive timetable for implementation of the CRC.

We believe the private sector would appreciate a government sponsored "kitemark" or guarantee on all products claiming to be energy efficient. Far too much time is expended investigating the cost effectiveness and performance of various technologies on the market.

- ***Addressing economic consequences:* If owners/occupiers face barriers to more efficient use of current energy sources, what policy changes would allow them to overcome these barriers? What are the comparative merits of regulation, market mechanisms, fiscal incentives/penalties and educational awareness campaigns?**

Lack of clarity on the RO and ROCs makes investing in expensive new renewable technologies highly risky. Until the demand side for these technologies picks up, the supply side will continue to drive high/unaffordable prices into the market.

- ***Monitoring and enforcement*: How should policies to ensure carbon reduction be enforced? What is the most effective level of intervention for different policy options? Should it be addressed mostly through the planning system? Should they sit at national or city level? How can city leaders together with the private sector help deliver greener buildings?**

We need clarity and consistency from Government with regard to policy-making and the regulation affecting sustainable urban development. There must be further clarity on existing planning legislation and its consistent application by Local Planning Authorities. We are urgently concerned by the growing disconnect between central and local Government on renewable energy developments. This is leading to unwelcome and unnecessary costs for businesses aiming to be sustainable.

A good example would be Falkirk Council's decision to reject ASDA's planning application for a 2MW wind turbine at our Falkirk Distribution Centre. The decision was contrary to the Planning Officers' recommendation for approval and made in the absence of any objections from statutory consultees. Throughout its public consultation ASDA explained that wind turbines of this size are far more efficient than smaller models, generating greater amounts of carbon-free renewable energy - a clear policy objective and priority for both the Scottish and UK Governments.

The proposed turbine would generate three-quarters of the energy required to power the depot. The electricity generated would be transferred to the National Grid through the local distribution network, increasing the pool of green energy produced, reducing dependence on fossil fuels and improving the depot's overall efficiency.

The submission of the planning application followed a process of public consultation, including letters to local residents and businesses, as well as public exhibitions, with 88 per cent of residents who responded supporting the plans for the turbine.

ASDA also conducted a comprehensive programme of feasibility assessments and surveys. These examined the potential impact of the turbine on archaeological and ecological sites, aviation and communications infrastructure, as well as noise levels in the area. All the results of these studies indicated that the positioning of the turbine will not have any adverse effects on the local community or bird and wildlife species.

Despite this significant investment, ASDA now has to appeal at further cost. Government needs to address this disconnect immediately and give developers recourse to a less costly and speedier appeals process as a first step.

For further information contact: Jonathan Refoy
Head of Property Communications
jonathan.refoy@asda.co.uk

WRITTEN EVIDENCE SUBMITTED BY BROOK LYNDHURST

Brook Lyndhurst is an independent research consultancy specialising in the study of sustainable development in the UK. Since 1999 we have researched and explored a wide range of issues associated with SD. We have conducted a number of studies concerned with the urban built environment, and with climate change. On the basis of those studies, and the experience we have derived, we judged that we may have a useful contribution to make to the All Party Urban Development Group's enquiry.

By way of background, our experience includes:

- "Greening the Built Environment" – a 2003/04 study for the London Development Agency, exploring the institutional, financial, operational, regulatory and economic circumstances influencing the relationship between mainstream property markets and the developing environmental agenda.

- "Indicators of Urban Sustainability" – a 2000 review of the 'state of the art' for the Royal Institute of Chartered Surveyors.

- "Liveable & Sustainable Cities" – we acted as the UK rapporteurs to the quadrennial UNECE conference hosted in Leeds in 2002 on behalf of the then ODPM.

- "Building for Health" – for the Regional Public Health Group of the London NHS, a support programme in 2000-2003 to embed the principles of sustainable development within the NHS capital development programme.

- "Low Carbon Cities" – a total of three separate studies, 2006-2008, covering cities in England, Wales and Scotland, exploring the possible implications for those cities of a 60% reduction in CO2 emissions by 2050. The results for the English cities of Brighton, Bournemouth and Manchester were presented at fringe events in those cities during the 2006 party conference season.

- "Strategic Investment Advice" – since early 2007 we have been providing strategic support and advice to Quintain Estates and Development on a range of sustainable development issues associated with their investment and development portfolios.

On the basis of these experiences, and bearing in mind the specific questions you have set yourself, I would note the following:-

I find it difficult to conclude that a 'lack of information' is a significant problem. In the case of embedded carbon, yes, there is a problem; and in terms of producing and consuming lifecycle analyses when choosing specific construction solutions, yes; but with existing buildings, CO_2 emissions are associated principally with energy consumption, the billing information for which makes calculation easy. The Carbon Trust happily calculate carbon footprints in a matter of hours; doing so for an entire portfolio would be tiresome, but not difficult.

(There are, of course, other carbon-emitting behaviours associated with the existence of a commercial building – the waste produced, the travel of employees and clients, the transport of supplies, the food eaten on site and so forth; and, further, there is a still

wider array of sustainability features that one might, in another context, wish to consider. But if we are focusing on the 'elephant in the room', then we are really concerned with the amount of energy used.)

All that said, there is a problem with benchmarking. Try to discover the average energy consumption per square metre of commercial floorspace, for example, and you will quickly discover that this is not straightforward. For any given building, therefore, it becomes very difficult to know whether your CO_2 figures (decided quickly using your energy bills) are "good" or "bad". Being advised that you should reduce them by some essentially arbitrary percentage is not especially helpful – what if you reduced them by 50% last year? Or your building is already deemed (by someone, somehow) as 'green'?

The fact that such information is not readily available suggests that vested interests are preventing its dissemination. An extremely useful exercise for the APUDG would be not merely to call for such a benchmarking data set to be available, but actually to produce and disseminate such information. Owners and occupiers could then (other things being equal) attend to the 'bad'.

It is unlikely, however, even armed with this information, that there will be a sudden Damascene happening in the UK property market. There are two main reasons:

- The vicious cycle of blame – first coined (to my knowledge) by Professor David Cadman (variously of Savills, Property Market Analysis and Upstream) this phrase refers to the process by which every institutional entity in the property sector is able to blame at least one other entity for failing to 'change'. It applies not just to climate change related issues, but to any innovation associated with short-term costs – health and safety, training, supply-chain management, waste management, master planning, the list goes on.

- Secondly, the economics of retrofit are, bluntly, profoundly hostile. It may be one thing to estimate that (use of) building X is responsible for the emission of Y tonnes of CO_2 during the course of a year; but quite another to decide on the most appropriate solutions for reducing Y. Glazing? (Which one?) Energy management system? Movement detection systems associated with the lighting? Radical insulation technologies?

The expertise required to assess a building, and these variegated solutions is not, according to our research, readily available. It is therefore expensive. Many of the solutions that might be offered are also expensive (both directly and, as inferred in your questions, indirectly in terms of opportunity cost).

Why would an occupier, owner or investor incur this considerable expense? Only if one of two things were true: future revenues were likely to rise to compensate for the short-term costs; or, prospective increased costs were likely to be avoided. For the former, the argument might be: I shall retrofit my stores because I believe this will keep my existing customers happy and I will increase my share of retail spending; or I shall be able to let this office to a major corporate if it has a really good CO_2 profile. For the latter, the argument might be: I might be penalised through higher business rates if my building is deemed eco-nasty; or (since I'm participating in the EU-ETS) the cost of carbon looks set to reach Stern-like levels and I can avoid those costs by improving the performance of my portfolio right now.

Whilst some blue chip occupiers, owners and investors might have such thoughts, the huge majority of the built stock is not in their hands, and will not be subject to these kinds of pressures. For the majority, the costs of 'retrofit' will simply dwarf any potential gains. It is a no-brainer: the UK's buildings have not been retrofitted so far, and they will not be in the future.

Taken together with present conditions in the commercial property market, and the sector's stubborn history of intransigence (most obviously in the case of skills) it is difficult to believe that some gentle coaxing, some improved information and a reliance on 'response to consumer sentiment' will make any serious dent in the problem. In fact, it is easy to imagine that in ten years' time another APUDG enquiry will be wondering why the UK has made so little progress in reducing its CO_2 emissions from existing buildings.

In a bid to become more optimistic, we might wonder whether changes in energy prices might act as incentives to change; or whether governmental action (such as regulation, or changes to business rates) might be appropriate.

In the case of price changes (whether arising from market forces, or from fiscal manoeuvring) elementary comparison of the relative costs of occupation shows that, for most buildings, most occupiers and most uses, since energy use is such a small share of total costs, truly dramatic changes would be required to effect changes in CO_2 emissions. It is difficult to envisage a government, of any hue, willing to effectively fine companies large sums of money for emitting too much CO_2 from their offices and factories.

It is also difficult to envisage government introducing the degree of regulatory compulsion that might be required: the combination of laissez-faire ideology and the sustained track record of insipid forward movement (viz. reforms to the building regulations, the introduction of EPCs, etc) hardly provide a platform on which to develop a strong expectation of clear and ambitious leadership.

That effort at optimism having failed, there nevertheless remain grounds for hope. I should like to suggest that there are two avenues pursuit of which could have a genuine impact on the problem:

- **Behaviour not technology**. There is a general hope abroad that technology will come to the rescue in meeting the climate change challenge. This hope is particularly well-developed in the property sector, where a penchant for 'boys toys' means that flashy, glamorous, brightly coloured and expensive solutions are seen as thrilling and exciting. However, the range of simple, inexpensive, dull and largely invisible actions that could be taken to reduce the CO_2 emissions of the existing built stock is considerable. It is conceivable that very significant chunks of the 60% reduction target could be achieved by closing windows and doors, reducing the thermostat, turning off computers, repairing leaks and so forth. Supporting and encouraging building services and facilities managers, helping 'sustainability champions' and fostering workplace CRAGs are the kinds of projects that could really make a difference – they might not 'grab the headlines', but neither would they imply the kind of costs that constitute the major block on progress.

- **Integration with normal building refurb**. Retrofit (in the instances where it is needed) should not be seen as a standalone exercise, but should instead be integrated within the normal maintenance and refurbishment cycle of a building. Why not make a VAT reduction available to refurbishments that involve a reduction of more than 25% CO_2 emissions, or some such? Or use a revolving fund (of the kind promoted by the Clinton Foundation and the LCCA) for large- and medium-scale carbon reduction components to refurbishments projects?

In the longer term, a process of normalisation has to be the objective, in which it is simply ordinary that owners, occupiers and investors of buildings are actively and continuously reducing the carbon emissions associated with their buildings. In the medium term, there is an intriguing risk that a two-tier market will emerge, with "environmentally secondary" property losing value compared to a primary market, with the consequence that normal market forces will accelerate the obsolescence of high-carbon buildings and deliver the process of normalisation just described.

In the short term, however, specific action is undoubtedly required, and the suggestions above are, in my view, worthy of consideration.

David Fell
Director

WRITTEN EVIDENCE SUBMITTED BY CB RICHARD ELLIS

The fourth inquiry of the All Party Urban Development Group (APUDG) is looking at what needs to be done – by both the public and private sectors – to 'green' existing buildings in Britain's cities.

CB Richard Ellis is pleased to supply a response to the call for written evidence.

Breaking down barriers to 'greening' urban buildings:

• *Addressing the lack of information*:

1. There are industry initiatives trying to address this. For the building occupiers the recently launched IPD Environment Code aims to facilitate the consistency and completeness of data gathering by providing a common framework that can be used at both the building and the portfolio level, nationally or internationally.1 There are other tools available and awareness is increasing but it takes time to realise the usefulness and importance of gathering the data and turning it into information.

2. Data collected to justify service charges does include information on the costs of energy but the information does not reach the people able to act on energy efficiency (or in the format that allows time comparisons and benchmarking). Owners and occupiers should ask their asset managers for energy information in an easily digestible format.

3. The government do have a role to play in ensuring that tools developed for compliance with the EPBD are able to use data gathered by other tools and that the results of both EPCs and DECs are available widely in order to facilitate benchmarking and transparent comparisons.

4. The utility companies are also in a unique position to facilitate the availability of information and they could supply annual statements of total consumption to both owners and occupiers of premises without having to be asked.

5. The provisions for sub-metering are only implemented in newer buildings in compliance with the Building Regulations and its wider installation should be encouraged in existing buildings in order to facilitate the acquisition of relevant data.

• *Addressing economic consequences:*

1. The benefits of improving energy efficiency in the existing building stock should be reflected in reduced energy costs to the occupants. However, if the occupier is not the owner of the building, unless there is an agreement for both parties to benefit, there is little incentive for the owner to invest in new plant. This can be addressed by clauses and agreements that ensure that the investment is repaid with the energy savings or the occupier contributes to the cost of the plant replacement but is also entitled to a fair share of the cost reduction. Alternative financial arrangements could be made depending on the length of the lease or the use of external suppliers via ESCOs.

2. More information on the benefits of using the Enhanced Capital Allowances (ECAs) available for the purchase of energy efficient equipment need to reach both the building manager and the financial director.
3. There is a lot that can be done by the occupier without the need for the owner to change expensive plant. The main barrier is access to information on local controls and switches and open dialogue with the building manager to develop a concerted strategy that minimises energy use without sacrificing comfort.

4. The costs of energy are rising but they are small compared with other costs of occupancy. Unless energy efficient improvements are easy to implement, there is little incentive. To overcome this barrier, staff commitment is required coupled with 'local champions' educating and promoting practical ideas.

5. Some low carbon technologies do not have a payback short enough to fit within most property investment horizons. Although grants and subsidies could help in the short term they should only be advocated if the property has been improved to minimise the load demand (sufficient levels of insulation coupled with adequate means of ventilation for example).

6. If the Government Estate commits to only take buildings of a certain standard and insists upon green leases, this is likely to result in a modal shift in the property market because they occupy such large tracts of property

7. There is no single answer to address the economic barriers. However, mechanisms that are already in place to facilitate the implementation of energy efficient measures and controls and the installation of energy efficient equipment are not widely utilised. For example ECAs, soft loans (as currently available through the Carbon Trust), and targeted grants for suitable low carbon technologies.

8. The Government should work toward realising the true value of carbon in order for a carbon market to develop. This is how the economy as a whole will work hardest toward addressing climate change issues.

• *Monitoring and enforcement*:

1. The planning system and accompanying policies are a good instrument to challenge traditional design and elicit creative solutions. However, unless there is a post-construction check before signing off the building, the final product may not be the same as the proposed design. In addition, there is lack of consistency across different regions in both the interpretation and enforcement of planning policies. Although there are reasons for specific clauses depending on regional development plans and local circumstances, it is important to avoid inconsistency. One of the areas that need improvement and investment is the training and education of planning officials.

2. A similar weakness applies to enforcement of building regulations in the case of refurbishment. Checks need to take place not just based on plans and proposals but also after completion.

Dr. Sandra Gómez, Technical Director
Energy & Sustainability Group, CB Richard Ellis

WRITTEN EVIDENCE SUBMITTED BY CIBSE (CHARTERED INSTITUTE OF BUILDING SERVICES ENGINEERS)

About CIBSE

This submission is from the Chartered Institution of Building Services Engineers (CIBSE), a professional institution incorporated by Royal Charter. CIBSE exists to promote the art, science and practice of building services engineering for the benefit of all, and the advancement of education and research in building services engineering. CIBSE is dedicated to the development of better buildings by the production of guidance on the design and maintenance of heating, cooling, ventilation, lighting, lifts and other energy using systems in buildings as well as installation and commissioning. The Institution maintains a close relationship with manufacturers to ensure high standards and an active role in contributing to governmental consultations and development of legislation. Building services expertise has been required to provide renewable energy in buildings and from this position building services engineers have emerged as the professionals that are consulted typically when expertise is sought on a planning and master planning basis.

This evidence has been prepared by Dr Hywel Davies, CIBSE Technical Director and Mr Brian Mark FCIBSE and Member of the BERR Renewables Advisory Board, of Fulcrum Consulting. CIBSE has nominated two members to attend the evidence session on 12th May to give further evidence: Mr Rob Manning of Faber Maunsell and Mr Brian Mark of Fulcrum Consulting.

Requirements for improved energy performance of buildings have brought building services to the forefront in recent years. CIBSE members are essential for designing and then managing the energy using systems in the built environment. We have to provide them as well now for zero carbon. Whilst new buildings are increasing energy efficient it is imperative that the energy performance of the existing non-domestic building stock be addressed if the UK is to meet EU and government targets for reduction of carbon emissions from the built environment.

The Institution is committed to tackling climate change and requires its members to 'have due regard to environmental issues in carrying out their professional duties' under its Code of Conduct. CIBSE has taken a leadership role in a project to reduce the carbon emissions from our own headquarters by 60% and seeks to improve the construction industry and the existing built environment through support of legislation and collaboration with relevant other bodies.

CIBSE has close dealings with CLG and BERR and is advising on the impact of legislation emanating from the EU. We have also addressed the corporate social responsibility agenda and responded to an increasing demand for energy efficiency from companies acting independently of regulation. Through our "100 Days of Carbon Clean-up Campaigns" we have been able to provide help for over 700 companies looking to improve energy efficiency and sustainability for their existing portfolios. CIBSE has developed guidance and, crucially, measurement methodologies for energy use in buildings that have been adopted nationally.

CIBSE has recently given both written and oral evidence to the CLG Inquiry and Call for Evidence on Existing Housing Stock and Climate Change Session 2006-07. As stated in CIBSE's evidence to the CLG Committee, we are keen to participate fully in any future inquiry into the energy performance of the existing non-domestic buildings. We therefore welcome this inquiry.

So much effort has been made to ensure that new build is as efficient as it can be but even once new build joins the ranks of the existing stock, the proportion of the existing stock that is old and poor in terms of energy performance will remain high. Older existing stock has potential for improvement but the use of this stock may have been changed many times and it will be a challenge to find cost-effective ways of retrofitting it.

Barriers to reducing emissions from urban buildings:

Lack of information

How good is the data that owners/occupiers have about their energy usage, efficiency and carbon footprint?
The new Energy Performance Certificates and Display Energy Certificates under the Energy Performance of Buildings Regulations (from the EU Directive) will provide recommendations for improvements to a building's performance that can then be used to make decisions. Building owners may choose to make these improvements or the demand will come from tenants. This is a potentially powerful tool for the market to facilitate improvement of existing building stock.

At present there are a number of measurement methodologies for energy usage. The introduction of energy performance certificates (EPCs) across the board for buildings for sale or rent will provide 'asset rating' data on how a building should perform according to how it has been designed. However data on energy usage – the operational rating - will only apply to public buildings. An operational rating gives data on how efficiently the energy is being used and this is why CIBSE is encouraging businesses to obtain voluntary operational ratings to complement their energy performance certificate and calling for wider rollout of Display Energy Certificates. Only an asset rating and an operational rating will provide the full picture of how a building is performing and allow feedback to inform and improve future designs and operational management. Techniques to provide sustainable zero carbon building to meet the CLG target of zero carbon only new homes by 2016, all buildings by 2019. Many recent low carbon buildings have not performed as well as intended when monitored. Feedback is essential to reverse this.

How far are they able to benchmark their performance against that of others?
The Display Energy Certificate (for public buildings) will have benchmarking information and CIBSE has been instrumental in developing this information and disseminating it. Whilst this does not exist for EPCs at the moment the CLG and certification scheme operators such as CIBSE will be able to access general data from national database on which all certificates are logged. This will enable benchmarking information from confidential sources to be built up and made available.

The CIBSE Low Carbon Consultants register requires its members to provide information on the carbon savings their designs achieve over and above regulation. This was a requirement of the grant funding from the Carbon Trust and it is beginning to build up a valuable picture. This picture would be even more valuable if applied to all buildings. CIBSE calls for a national database for energy bills to be logged so that actual performance can be tracked against intended performance.

If owners/occupiers lack data about their building's energy usage, what is preventing them from getting it?
Utility companies are now required to provide information on energy use. The abolition of estimated readings would be a major step forward in enabling building

owners/operators to understand their energy use. Smart meters provide regular readings at times suited to the building operator. The way older buildings have been designed may pose a problem to installing meaningful metering and this is an engineering issue that CIBSE can help to solve.

There have been significant developments in monitoring and controls for buildings – many large buildings now have building management systems with facilities managers able to access real time energy usage readings in building zones. This enables them to identify unexpectedly high usage of energy and make corrections to behaviour or improvements to plant or fabric. Part L of the Building Regulations will in the long term bring in the requirement for building log books (for existing building stock these unfortunately often do not exist). Part L will also require consequential improvements to the energy performance of a building when major refurbishment is planned.

CIBSE's own project to reduce carbon emissions from our own HQ by 60% has highlighted the importance of information and we have installed a system that allows online real-time remote monitoring of our energy use. This has enabled us to identify faults in our equipment and incorrect settings for heating as well as behavioural issues with occupant use. In effect this allows us to "drive" our building and our behavior in it towards ever increasing carbon reduction targets and to understand where we are failing and were we could improve. In this context, by "drive" we mean to use information to correct constantly – information that influences our behaviour.

Costs, benefits and barriers to owners/occupier

Even if a more comprehensive understanding of a building's energy usage could be achieved, what is preventing owners/occupiers from undertaking measures to use energy (heating and electricity) more efficiently or minimise energy wastage?

- Lack of knowledge on how to make cost effective improvements;
- Lack of support at Board level to make improvements that may have a longer payback period than the short or medium term business plan may allow for;
- Lack of skills to analyse the data and take the simple / no-cost measures for improvement or make decisions on what is best to do amidst conflicting advice
- Lack of available access to informed advisors, skills shortage of such advisors
- Proven performance failure of inappropriately early marketed low energy designs that have not worked.
- Lack of dynamic metering to allow users to make decisions on exactly when to take energy – this demand/supply interface could be valuable in promoting a national energy strategy for evening out demand, incentivised by price

What barriers (both economic and physical) do owners/occupiers face when considering the installation of low carbon technologies?

- Some low carbon technologies may require both planning permission and building regulations approval and this can be complicated. CIBSE experienced this recently when attempting to obtain planning permissions to install more energy efficient windows;
- There is currently a lack of experienced designers and installers, particularly those that appreciate the need to integrate one technology with another;
- There is still a lack of knowledge and therefore conflicting views on low and zero carbon technology. Whilst welcoming the boost that "The Merton Rule" gave to consideration of renewable technology, CIBSE has pointed out that more flexibility is needed to allow designers to suggest the most cost-effective solutions in a holistic way, otherwise developers just stick up a wind turbine and say they've satisfied the requirements or even worse, provide a part wood fired plant

to achieve planning permission with no real intention of ever using it because the is no need to prove operational compliance with such planning requirements;
- Owners need the confidence that they are getting a satisfactory service from design to completion as customers – this comes from good information that will empower them as customers;
- One of the key issues here is that you don't have owners/occupiers in non-domestic buildings – they are either one of the other. The exception to this is the iconic building commissioned specifically by the owner to be a business headquarters. Wessex Water's iconic building is an example of this – it was built with whole life costing as its basis and is a building that performs well.

Costs/Benefits to the wider economy

How important are the wider urban economic impacts of greening existing buildings?

Hugely important - for reduction of reliance on energy security, to establish new supply chains in the urban economy, to encourage stability. There is evidence that regional businesses are closing down because of rising energy costs. Cheese making for example which requires a lot of heat, and this leads to local job losses. This could be balanced by a city masterplan for energy. Cities delivering new sustainability policies that will affect the community will benefit the fuel poor.

For businesses maintenance of asset value is becoming more important and this includes ability to save and generate energy. Land values operate on lagging information (at least four years) which is a long time in sustainability terms. Valuers could be encouraged to value taking into account sustainable measures.

Any local energy measures must interface with EEC, CERT and supplier obligation.

District heating is ideal for urban areas and existing stock could be retrofitted. Now that almost all of the options for greening existing building stock have now been covered DH is almost the only option for reducing carbon emissions in urban areas. Because new buildings do not use much heat because they are all being built to LZC requirements district heating will have a high capital cost, making it potentially uneconomic. However this is a decision government may have to make – to pay for district heating in order to meet emissions targets.

Existing buildings have to be eager future customers of urban district heating fed by CHP. The EU Renewables Directive does not distinguish between heat and energy and CIBSE is concerned by this as energy efficiency is no longer a driver – the driver now being heat – which could be wasted as long as it is being supplied from renewable sources.

There are other wider urban economic impacts. 'Green buildings' are typically more comfortable to be in and provide a 'feel good' factor to users and visitors – in many cases this can be measured.

A green building often has the capacity to provide energy to adjoining buildings and many 'green projects' could be utilised in encouraging greening of existing stock. These projects will already be covering such elements as safety & security, access for all, improving the local economy and citizen empowerment. Organisations such as the Academy for Sustainable Communities as part of the Homes and Communities Agency could take a lead.

Existing stock can be 'greened' in imaginative ways and whilst some measures could be complicated and costly other measures are more straightforward - utilising passive design methods to save energy will have the effect of reducing the urban heat island effect.

Not only businesses but whole cities can be seen to be acting and those that act quickly can claim the brand – in the same way that Eco towns will – cities now have a responsibility to meet energy requirements and energy will increasingly inform decisions – not always in a beneficial way – for example in competing for a piece of brownfield development land a business complex would provide employment for many people but an application for a storage unit (which only employs a few people) might be granted permission over and above the other application because it is will be using less energy. This may not be good for the wider community.

The majority of commercial property is occupied. A full scale retrofit would require temporary relocation for the occupants, with potential profit losses for the landlords and disruption to tenants' businesses. What are the likely impacts on cities' economies (for example in terms of job creation and business opportunities/costs in the property industry and other business sectors)?
External insulation does not stop business and most retrofit is intervention to the outside skin of the building (eg p.v.) – not too disruptive and certainly less disruptive to business than sending everyone home in a heatwave or dealing with sewage in the water supply following a flood.

Building services plant has on average a 20 year lifecycle so building services engineers are skilled at renewing plant with the minimum of disruption – it can be done. CIBSE has undertaken some major work to reduce its carbon emissions by 60% without closing any offices or adversely affecting workplace activities.

There is also a natural cycle of refurbishment and retrofit for all buildings. Regulation and incentive should dovetail into this. Government could sponsor a useful exercise in analyzing whether integrating a programme of improving the energy efficiency of existing buildings into this natural cycle would achieve targets in time. This might provide some quantitative data as to how much reliance should be placed on this natural cycle.

Any improvements have to integrate with existing policies such as CERT to minimise duplication. Whether by incentive or regulation businesses need a level playing field – for example, in the forthcoming review of part L of the Building Regulations (Conservation of Fuel and power (in buildings). There is scope for the requirements for consequential improvements to buildings under part L to be enhanced. If all businesses are required by Building Regulations to improve their energy efficiency if they undertake major refurbishment then they will. It may be necessary to consider different types of businesses differently – eg public facing businesses such as retail, leisure and hotels as opposed to manufacturing or service providers. It may be possible to do something in conjunction with the Energy Performance of Buildings Regulations widening the requirement for Display Energy Certificates (DECs) and bringing in requirements for businesses to act on the improvement recommendations. Consideration is already being given at European level as to whether to roll out DECs to this type of building and this is something that CISBE supports.

Breaking down barriers to 'greening' urban buildings:

Addressing the lack of information

What actions are needed at the industry level to produce the measurement standards needed? How can the Government support the industry in achieving this?
Simple methodologies, smart meters, easily available import/export meters, accurate bills, Carbon Reduction Commitment, strengthening Part L to increase the requirements for consequential improvements, improving the likelihood of improvements resulting from EPCs and DECs, proper enforcement and compliance.

Are there any current tools that could be adopted to improve energy measurement?
The methodology for energy performance certificates seems the most obvious one – at present EPCs for existing buildings are triggered by sale or rent. If businesses wish to measure their energy performance outside these triggers, using the same methodology would enable them to produce 'voluntary EPCs' something the government is already keen to encourage. A few industry leaders using this methodology outside the official 'trigger events' would perhaps encourage other property owners/occupiers to follow suit.

CIBSE's work with the British Property Federation to develop the LES-TER project (Landlords Energy Statement – Tenants Energy Review) should address the issues of responsibility for energy information between commercial landlord and tenant.

As mentioned elsewhere, it is essential that we have operational ratings as well as asset ratings to give a true picture of what is happening with energy performance.

It is looking increasingly likely that the European Co-generation Directive will make it compulsory to use the most effective energy source and in many instances this could well turn out to be district heating from CHP plant utilising urban waste.

Addressing economic consequence
If owners/occupiers face barriers to more efficient use of current energy sources, what policy changes would allow them to overcome these barriers?
Insist that they do it and demonstrate that there is a level playing field and a benefit to the business. Extra help for small businesses whether it be advice, business support or grants would be helpful and would also demonstrate a key government social commitment. Feed-in tariffs could be used as an incentive to take up microgeneration.

What are the comparative merits of regulation, market mechanisms, fiscal incentives/penalties and educational awareness campaigns?
We must have a level playing field for all to engage. Regulation first and fiscal incentives second. We have had 30 years of market mechanism and educational awareness. Education is important however – the decision makers of the future are now in school.

Monitoring and enforcement
How should policies to ensure carbon reduction be enforced?
Through building regulations and possibly the planning system. Building Control now has a remit for post occupation audit but this rarely happens. Building Control Departments should be adequately funded and building control officers trained to undertake these audits so that developers come to expect it. Commercial engineers will then be able to tell clients with confidence that they must comply with regulations and must expect a post occupancy audit visit.

The next iteration of the energy Performance of Buildings Directive looks likely to bring in requirements for improvement of buildings. At present the Directive only requires information and improvement recommendations but no obligation to act on them.

The planning system could be used to introduce a requirement for energy performance improvement modelled on the requirements for heritage buildings. At present refurbishment of heritage buildings is strictly controlled to preserve historical significance and the 'look and feel' of a place. Improvement of energy performance is still open to arguments as to what is cost effective – if we can be draconian about heritage buildings can we afford not to be more draconian about energy efficiency?

What is the most effective level of intervention for different policy options?
National, regional and local – as appropriate – it should be the route of least resistance – nothing else will deliver fast enough. National guidelines would give local policy a steer.

Should it be addressed mostly through the planning system?
If this is the most straightforward way. Local planning can include requirements for greening existing buildings as a part of gaining planning consent – similar to the Section 106 Agreements for providing affordable housing. The reaction of developers to 'the Merton Rule' has demonstrated that what they need most is a level playing field. National guidance that allows local planners to find the best way forward would provide this.

Should they sit at national or city level? How can city leaders together with the private sector help deliver greener buildings?

Regulation to reduce demand side consumption should sit at national level as currently exemplified by the implementation of Part L, EPCs, DECs and taking the broader perspective of managing scarce energy resources, city leaders should work with the private sector to investigate local options to be more carbon effective in delivering primary energy to buildings.

A consistent message from all government departments would be very useful. Energy policy is fragmented and this needs to be addressed.

WRITTEN EVIDENCE SUBMITTED BY CONSTRUCTING EXCELLENCE IN THE BUILT ENVIRONMENT

It is essential that government takes the lead to address the reduction of carbon emissions from our existing stock. A recent survey of our membership identified client leadership as imperative to drive forward sustainable improvements in our built environment. Targets set out in the forthcoming Sustainable Construction Strategy will force Government departments to increase energy efficiency across their estate thus demonstrating to the industry how this can be done.

Barriers to Reducing Emissions from Urban Buildings

Lack of Information
There is little doubt that owner/occupiers of non-domestic buildings do not have access to enough information about the energy efficiency of the buildings that they use. Utility bills can be confusing and are often issued at a building level, rather than allowing individual offices or organisations within the organisation to monitor their performance. Information on energy efficient features is often limited and obtaining more detailed information can require a concerted and united effort from tenants. Efficiency measures implemented by tenants do not always reap savings for the individual tenant but are spread out across the building. Operation manuals are often not supplied by landlords so it can be difficult for tenants to operate their systems in the most efficient way possible.

Requirements for Energy Performance Certificates will go some way towards increasing the understanding of energy efficiency by the building users. However problems could still be posed by the separation of occupier and responsibility for building management. Equally landlords may be reluctant to institute measures which require initial capital spend but will reduce running costs for tenants.

Debate over terms and definitions clouds the issue of reducing a building's "carbon footprint". Some carbon footprints are based on information gathered at the design or construction phase, some on the level of energy used by the occupants. The lack of a standard definition leaves it very much open to interpretation. As such, Constructing Excellence would support the work currently underway within the UK Green Building Council to produce a definition of zero carbon. There is also a lack of information regarding the suitability of sustainable solutions. For instance, wind turbines are instantly recognisable and can have a positive influence on a company's corporate image however they are often not suitable for urban sites where the levels of wind are low. Another challenge can be posed by the lack of information on existing sustainable products used in refurbishments. This can make decision making difficult when adding to existing systems in terms of U values, air tightness etc.

Some benchmarking tools are available such as those provided by BRE and Action Energy. However the wide variety of non domestic buildings makes comparison difficult. Apart from size and location, non domestic buildings have a large variety of uses from hospitals to offices to train stations.

Costs, benefits and barriers to owners/occupiers
Cost is the major barrier to owner/occupiers increasing the energy efficiency and reducing the carbon emissions produced by their buildings. Efficient systems can be expensive to install and may involve large scale disruption to businesses and organisations. Sustainability officers and facilities managers can find it difficult to persuade board members and senior management to agree to often expensive

refurbishment especially as the pay back time for new technologies can be extensive and make such decisions difficult to stack up. Landlords can find the issue of maximum rental value for assets a significant barrier. Location and market can limit the potential return making extra expenditure on refurbishment uneconomic.

Barriers and constraints can be posed by the location of buildings. Those buildings located in dense, urban areas can be difficult to refurbish as the footprint of the building is small and access can be restricted.

Once the energy usage of a building has been established owner/occupiers can introduce measures that will help to reduce the running costs of the buildings. Smart metering can help provide easily accessible evidence of energy savings which can help build the business case.

Costs/benefits to wider economy
More widespread efficient, greener buildings will provide opportunities for new manufacturers and requirements for new skills in installation and maintenance. Energy efficient measures may cause disruption to occupiers and lead to loss of business days. Solutions such as green roofs can have energy efficient properties and also reduce the temperature of the surrounding area thus potentially reducing lost days in the future.

To minimize disruption sustainable components could be built into existing refurbishment schedules. If a building is due to be refurbished then using sustainable components need not add to the disruption to businesses that would already exist.

The economy will have to adapt to a rise in demand for energy efficient features. Prior to any new regulation coming into force analysis must be done to identify suppliers and ensure that an increase in demand can be delivered.

Breaking down barriers to Greening urban buildings

Addressing Lack of Information
The first step could be to encourage all facilities managers to monitor and report key performance indicators to encourage benchmarking. Independent standards and labelling schemes are necessary to break through the confusion surrounding “carbon footprinting” and the energy efficiency of products. Standards such as those issued by the BSI could be developed. Further research and development is needed to find cost effective ways of mass producing efficient products. Subsidies and funds may be required to enable the research to be carried out.

Government must act as exemplar clients. Stipulation for energy efficiency in retrofitting contracts and incentives for facilities managers to increase the efficiency of their buildings is imperative. The industry could then respond with clearer and more widespread labelling of products. Information regarding the carbon properties of a technology and the expected amount of energy saved will help clients make informed choices.

A series of exemplar projects or buildings should be identified and case study information on these produced to make the business case for change.

Addressing economic consequences
To bring down costs, fiscal incentives and/or tax breaks for the incorporation of sustainable technologies could be offered to landlords and owners. This would

encourage more energy efficient technologies to be installed where the financial savings are usually gained by the occupier. Once again research may need to be commissioned to find cost effective ways of mass producing efficient goods and products. We can not rely on the good will or moral conscience of owners/occupiers. They will respond to cost effective, environmentally friendly options as they will be seen as a double win.

Energy companies could be encouraged to increase their rates if energy use in a building exceeds a responsible level. The extra income could then be used to subsidise the development of renewable energy generation projects.

Once again, the government should use its power as client to drive through and provide leadership on these issues. Demonstration projects can be used to provide the business case for low carbon building operation.

Monitoring and enforcement
There are many different options for monitoring and enforcement. Provision of smart meters in non domestic dwellings would help improve the energy information supplied and thus encourage energy efficiency.

The planning system would be the most obvious mechanism for enforcing energy efficiency however it is vital that any planning policy is consistent across Local Authorities. Inconsistency leads to confusion and irritation which can lead to non compliance. Stipulations could be made for double or triple glazing and consideration of insulation for any refurbishment project. There are opportunities for city leaders to demonstrate good practice and highlight cost effective solutions.

Landlords could be obligated to provide energy efficiency reports when engaging new tenants. New tenants could also be provided with information packs on the opportunities available to reduce energy consumption and kinds of savings these could bring.

Legislation has been identified by our membership as the most effective driver in sustainable development and its sensible application combined with initiatives to drive down the costs of efficient alternatives and advice and support for new technology will be the most effective way to reduce the carbon impact of our existing stock.

WRITTEN EVIDENCE SUBMITTED BY CORE CITIES

Introduction

This written statement is a response from the Core Cities Group to an invitation to submit evidence to the All Party Urban Development Group inquiry on climate change and the urban built environment.

The Core Cities Group is a network of England's major regional cities: Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield. They form the economic and urban cores of wider surrounding territories, the city regions. The Core Cities work in partnership to enable each City to enhance their economic performance and make real advances within a highly competitive international market, increasing their comparative standing and - in different ways - securing positive identities as places to live, work, visit and do business.

The Core Cities, together with their city-region areas, are home to some 16.5 million people, including some of the communities most vulnerable to climate change in many of England's most deprived wards. Individual Core Cities-city regions are responsibly for up to 50% - and in some cases more - of their regions' entire economic output. They are big energy users, producing almost one third of England's carbon emissions and many are situated in coastal areas or adjacent to major rivers with serious flooding potential. This special combination of economic importance, large populations, carbon production and geographical situation means that the Core Cities sit at an important axis in addressing climate mitigation and adaptation for the future.

Recognising the key role, which they can play in terms of delivering the climate change agenda, and their populations' and economies' vulnerability to it, the Core Cities have signed a 'Shared Commitment to climate change, setting out a series of actions that both they and government will take. It is signed by all the Leaders of the 8 Core Cities and by the Government[2]. It is with this commitment in mind that the Core Cities make the following observations.

Key Issues

1. Barriers to reducing emissions from urban buildings

Lack of Information

The lack of information and more generally the way information is communicated is a crucial first step in addressing climate change and energy efficiency within the built environment. Whilst we concur that there is a major issue concerning a lack of information in certain areas, in particular that relating to energy supplier information we believe the major issue regarding information is the overwhelming volume of it and the fact that it is poorly tailored to suit particular needs. In a recent HM Treasury report[3], 70 national and 96 regional bodies were identified as delivering energy efficiency advice. In addition, the report identified that many of the services offered were not tailored to need. This is substantiated by work recently undertaken as part of the development of a Low Carbon Programme in Manchester. Here many

[2] Core Cities Shared Commitment on climate change
www.corecities.com/dev07/News/Climate%20change%20declaration.pdf

[3] Report of the task Group on business energy efficiency and advice, HM Treasury, 2006
www.hm-treasury.gov.uk/media/8/9/pu150_report_of_the_task_group_on_business_energy_efficiency.pdf

‘investors’ both public and private feel overwhelmed by the amount of generic information compounded by the fact that there are two separate agencies dealing with energy efficiency issues at the national level (Carbon Trust and Energy Savings Trust). We are working positively with both these agencies on the Low Carbon Cities Programme, but there is clearly room for further integration. This apparent lack of co-ordination is we believe a major barrier to the Core Cities as they strive to become drivers of economic growth and investment. Although a number of public and private sector organisations have benefited from the CT and EST sponsored energy management programmes focussed on developing action plans our view is that capacity within these organisation will take considerable development to take this work to the next level. So where initial enthusiasm and commitment has been generated further commitment towards investment can be stymied. In addition, the CTs energy surveys and eligibility criteria do not lend themselves readily to the commercially leased sector.

With regard the issue of obtaining baseline information on energy usage both the business and private sector have experienced significant problems in terms of accessing such data. Although utility data is received at the national level through the Department for Business, Enterprise and Regulatory Reform there is a real need to make this information relevant and specific to the city level. Currently, it is a highly labour intensive exercise for local authorities and businesses to collect energy usage data and it does not appear to be a priority for those organisations that actually supply the energy. The emphasis on metering is around cost as opposed to actual usage, this is a key barrier that needs to be overcome if organisations are to invest strategically and effectively in energy efficiency technologies.

Costs, Benefits and Barriers to owners/occupiers

One of the key barriers experienced in some core cities, such as Leeds is that around leaseholder rights. The owners of existing property are generally unwilling to make capital investments, which will improve the energy efficiency of their property. They see any accrued benefits belonging to the occupier rather than the owner. The occupiers themselves are unwilling to make these investments as they have little if no long–term stake in the property and hence feel that the owner would accrue any benefits. This has led to a level of paralysis in energy efficiency investments within the commercial leased sector. This view is echoed elsewhere where the emphasis in terms of grants and support is on operational costs rather than the building fabric itself. One common mechanism used by local authorities is the SALIX finance system used for upgrading boilers and plant machinery. However, this relies on obtaining match funding as well as ensuring that any work undertaken has a payback period of 5 years. Considerable resources are needed within organisations to identify both the financial match funding and priority areas for investment (e.g. Carbon Trust’s enhanced capital allowance scheme), this problem becomes more exacerbated with smaller organisations.

Costs/benefits to the wider economy

Core Cities recognise that any major retrofit will incur costs both in terms of the actual investments needed as well as the problems caused by temporary relocation, these costs will vary across the different sectors as they have different accommodation requirements and different sunk costs in terms of plant machinery etc. A clearer picture needs to be developed to understand costs within each sector as well as sector priorities in terms of the impacts they have on carbon emissions through their building fabric and the contribution they make to GVA – it is important that this analysis is undertaken at the local level so that such economies are not damaged irrevocably. Where practicable, this should take account of functional economic areas rather than purely administrative boundaries.

However, the Stern review highlighted the fact that it makes prudent economic sense to invest in energy saving technologies now. Manchester has commissioned its own 'Mini-Stern' due for completion in June this year. However, initial findings would support the broad conclusions of Stern. With regard to the work of the All Party Group this piece of work highlights the following;

- That unless there is significant investment in addressing climate change now the costs to the economy of Manchester alone will be billions of pounds
- Multiplying this across all 8 of the Core Cities – and beyond – results in a massive economic deficit
- These costs are lessened if investment is made immediately
- Tailored support services at specific sectors need to be developed to assist economic growth both through investment in efficiency and the step into new energy efficiency and renewable energy saving technologies.

2. Breaking down barriers to 'greening' urban buildings

Lack of Information
Core Cities firmly believe that a much more tailored approach to service requirements needs to be developed and delivered at the local city wide level rather than the national one, albeit within a wider national framework co-ordinated by one single agency. The work in Manchester indicates that tailored support needs to be prioritised on those sectors, which are key drivers of the economy (financial and professional services sector) as well as those, which are high-energy users (textiles and manufacturers). As an example Manchester has committed itself to establishing a Climate Change Agency by March 2009 and other Core Cities are considering similar arrangements; these would be ideal vehicles for acting as a 'one-stop shop' and conduit for information as well as developing specific tailored programmes on behalf of a single national body.

More pressure needs to be brought to bear upon suppliers of energy to release data more efficiently and effectively. We would support and press for a requirement by suppliers of energy to incorporate energy usage as a mandatory component of the billing system, where the priority is on actual energy usage rather than just simply the cost. Information needs to be made available at the postcode level, this will improve understanding of profiling so that particular demand clusters can be identified in particular areas at particular times. Such an approach would enable cities to plan their approaches to critical energy infrastructure much more effectively, possibly through local decentralised energy systems.

Although we recognise that the introduction of energy performance certificates will play a role in improving the market value of energy efficient premises, they alone cannot ever achieve the savings required. This system must be supported by a serious financial incentive package to property owners to improve the fabric and operation of their buildings. This package needs to be easy to access and light on bureaucracy. Finally, we would suggest that information on energy performance of a property form part of the contract with any tenant, indicating clearly the current energy efficiency of the building fabric and heating/power systems, this may help to introduce an element of market competitiveness for energy efficient buildings.

Addressing economic consequences
We believe that any programme of initiatives needs to distinguish clearly between the owners and occupiers of property. We would encourage the All Party Group to investigate the introduction of mandatory stretch targets within the new energy certification system so that owners of low performing (G rated) properties would have to show regular annual improvements to reach an acceptable level of efficiency. The new national indicator set (NI 186) may provide a possible mechanism for doing this in conjunction with the 'duty to co-operate' if targeted at property owners. We would also suggest that the new CAA regime might provide scope for undertaking some of this work. It may also be possible through the business rate to levy an additional charge on the owners of poor performing buildings. Use of these performance frameworks would require more thought in terms of the practicalities of collecting information, the resources required and any regulatory issues. The obvious candidate for undertaking such a regulatory function would be local authorities.

Finally, one mechanism that has often been proposed and should be addressed by the All Party Group is that of VAT exemption levels on energy efficient products. This would have two benefits to the economy, one in that it would lower the costs of retrofitting energy efficiency within existing buildings therefore making it more financially viable and secondly it would stimulate economic growth within the energy efficiency sector of the UK economy either through the manufacture or installation of particular products.

Monitoring and enforcement
The introduction of proposed stretch targets for energy performance of buildings would require financing and new regulatory powers; these would be best bestowed upon local authorities as part of their inspection services.

Thought needs to be given to joining up existing and proposed services to achieve better outcomes. The establishment of climate change agencies within Core Cities to co-ordinate and establish capacity for improving energy efficiency within non-domestic buildings should be part of a wider raging agency remit to help deliver climate change targets whilst achieving economic growth and prosperity. Such agencies would be ideally placed to implementing approaches on a scale that contribute towards national priorities that transcend those at the regional level.

Conclusion
In essence we believe a number of barriers exist to improving the energy efficiency within urban development within the confines of this inquiry

- That the amount of information and the number of organisations providing information is overwhelming for users and needs to be streamlined from the national to local level
- That more pressure needs to be brought to bear upon energy suppliers to make energy usage data available as an integral part of their billing systems.
- Costs to an individual property owner or business may in the short term be incurred, however in light of Stern these will be rewarded both for the individual and across the economy in the longer term through improved efficiency as well as stimulating expansive growth in the energy efficiency and renewable energy sector.

- More thought needs to be given to regulatory powers in supporting the energy performance certificates regime in terms of rewarding the high achievers and penalising the lower ones.
- The establishment of Core City climate change agencies to develop specific tailored approaches (including that on energy efficiency in non-domestic buildings) to achieving climate change targets whilst realising economic growth and prosperity.

Prepared on behalf of Core Cities by:

Mike Reardon and Steve Turner, Environment Commission Development Team, Association of Greater Manchester Authorities.
Chris Murray, Core Cities.

WRITTEN EVIDENCE SUBMITTED BY FACILITIES MANAGEMENT ASSOCIATION

From The Secretary of the Facilities Management Association

This enquiry is much needed. It has been a matter of concern for many ,that all current legislation regarding the reduction of carbon emissions from commercial buildings has been directed at new buildings when the 'Gas Guzzlers' are those that are already in use. The enquiry has been developed along the right lines with a remit to investigate what needs to be done to UK plc's existing urban buildings but it is in danger of compounding an assumption which is made by almost everyone concerned with reducing energy use—**starting in the middle of the process** .

Those offering to help building owners/operators reduce carbon emissions suggest a multiplicity of electronic packages which offer energy consumption analysis for whole or part of a building and /or an offer to find the lowest price package for fuel supply contracts etc.

This works for a year or so and then the emissions start rising again**. Why?**

We now have energy labelling but it will be some time before sufficient energy use data on existing buildings can be collated in order to compare like for like and highlight inconsistencies and investigate the reason.

Without paying better attention to the fitness for use of the building services plant [equipment] providing the heating and cooling which uses the energy causing the carbon emissions we will never get to the real reasons for the high power consumption in UK's existing urban buildings.

What is not being done is ensuring that every piece of plant in the asset register used to heat or cool a building is capable of operating at optimum efficiency **all the time.** Immediately this is mentioned those concerned with the operation of the building will say that it is maintained by reputable contractors so it must be OK.

Would it not be more constructive to ask for incontravertible proof ?

Why does this matter?

Efficient plant uses less energy. This is why it was been stated that we are trying to reduce emissions by starting in the middle of the process.

Current practice

Generally building services plant is maintained by three differing types of contract

1.Breakdown/Reactive ie Do nothing until it does not work .This is the cheapest but is liable to use the most fuel.

2 Fixed quarterly visits to adjust major plant items

3. Planned preventive maintenance [PPMon every piece of plant] which may alleviate breakdown but does not prevent inefficient running of plant causing extra energy use.

These methods are antideluvian in concept in today's electronic age. They rarely use modern analytical tools which are readily and cheaply available and are used extensively for the maintenance of Aircraft and Cars [remember when garages had an extremely bad name –the manufacturers switched to electronic engine management and diagnostic -systems which surprisingly helped to reduce fuel usage]. The process is called Condition Based Monitoring [CBM]

Why do we not use these modern methods to maintain our existing buildings whose building services are often unloved because they are hidden. We spend more on cleaning these same buildings than maintaining the plant that uses vast amounts of energy giving off high carbon emissions.

What are the reasons for this behaviour?

a. Property operators often view the building services as a 'black art' so will continue using the maintenance contractor they 'trust'
b. Maintenance contractors make contracts profitable by installing new equipment which they say is required, no one is interested in longevity of life of the plant. [install new, therefore it must be better]
c. Gatekeepers who cannot cope with change.

Whilst it is true that some in the maintenance industry are using CBM to keep a check on large expensive items and sometimes this is done with the energy usage in mind it is more often to prove they are looking after it properly.

One of the Members of the Facilities Management Association has been addressing these issues by developing for existing buildings, a totally integrated IT system of condition based monitoring every piece of plant which uses energy . Thus it can be proved at any time on a screen for all to see ,anywhere, that everything is working within the manufacturers design parameters ie at maximum efficiency.

Additionally it has been found that not only has a totally integrated system reduced maintenance and replacement costs but energy consumption is much reduced by comparison with that used when other maintenance methods have been used. But except for a few enlightened building operators and insurance companies it has not been accepted as the way forward.[see a,b and c above]

What should be done?

Before any major capital expenditure is considered

1. Concentrate on proving all the building services plant [ie do not leave the rotten apple] is operating at optimum efficiency –using non-invasive ,relatively cheap CBM techniques and make the neccessary adjustments .
2. Record the energy usage before and after.
3. Equipment that cannot be made to run efficiently within 5% of the manufacturers given parameters should be considered for renewal.
4. If a large percentage of the plant cannot reach the above target then consider the retrofit of all the building services [this of course will cause a large increase in its carbon footprint-if properly calculated]

How to achieve this?

Mandate that every existing urban commercial building over a certain floor area shall have to be able to prove all its plant is able to work at the manufacturers design

parametersfor efficiency, as there are proven CBM systems in existence by which this can be achieved

A further suggestion

Enforce Statutory Instrument SI Public /1013 1980 which states that employers may not use electricity or fuel to heat their premises above 19C [66.2F]

WRITTEN EVIDENCE SUBMITTED BY GEORGE STOWELL, ARCHITECTS URBAN DESIGN

BACKGROUND AND CONTEXT

The challenge of delivering policy to implement much better real energy efficiencies and significantly reduced carbon emissions from the non-domestic sector is achievable and realistic.

The strengths of the present regulatory system in the non-domestic sector include support for shared knowledge through networks, conferences and publications, better aligned incentives, diversity of opinion and expertise. These are all good building blocks upon which to move forward. In London, for example, there is a high degree of consensus between policy makers led by the Greater London Authority (GLA), users and developers that positive outcomes can be achieved by working co-operatively.

Energy consumption

There are only three possible changes to reduce energy consumption from fossil or non-fossil sources. These are input substitutes, efficiencies from technological change or information use and behavioural change.

Green policy making and Government Department team

Present delivery of cost effective zero carbon grid energy is well below what is needed as there is strong community loss aversion[4] when visual and biodiversity impacts have been tested in the planning system. Without energy storage, wind power supplies mainly base load. High cost supply is more efficiently delivered when marginal energy supply meets peak demands, for example recent hydro power investments in Scotland.

Other technologies that initially appeared to be "green" have become less economical and unfair. This has happened partly because of Government pressure to gain political capital in the absence of price based market signals, insufficient information or poor decision making skills. Bio-fuels are perhaps the main area of concern; policy has been supported by poor evidence and weak decision skills[5].

Consumption is partly driven by behaviour, but also by marginal perceptions of comfort, value and doing what other do. It also driven by market inefficiencies such as "Principal Agent problems" recently explored by the IEA[6] who identified landlord and tenant problems in Europe contributing to energy over consumption totalling 85% of Spain's annual energy use. These factors are "expected errors" and bias".

Policy that incorporates evidence, "expected error" and "bias'" is sound policy. To deliver policies in the area being inquired about there is evidence that Central Government staff need much more financial and academic support to delivery workable solutions.

Carbon dioxide emissions

Improvements in energy intensity and carbon efficiency in the UK in the past ten years have come mainly from substitute energy inputs, notably gas. Diminishing

[4] Loss Aversion is a human bias in decision making due to the tendency when giving up something to perceive negative impacts up to twice as much than being pleased if the very same thing is acquired. This can lead to inefficiencies in decision making as agents compensate by consuming more resources (including time or substitutes).

[5] The Times, Letter April 28th. Dr Richard Pike, Chief Executive, Royal Society of Chemistry.

[6] IEA, "Mind the Gap" Principal Agent problems in Energy Efficiency. 2007.

marginal returns, increased scarcity and the need for lower carbon intensities from substitutes[7] leave behavioural change and efficiency improvements from technology and information use as the two main areas left to explore.

Urban density

Urban densification or agglomeration, partly supported by public policy and private need, increases the value of public goods relative to private ones[8]. Living spaces become smaller, shared transport systems become more intense and communities demand higher levels of service from public or shared urban goods, including the historic building environment. "Status Quo"[9] bias further hinders renewal or positive adaptive change to the challenges faced in many areas and this is embodied in the present local planning system.

In recognition of these factors further support from Fiscal incentives and the Planning system is needed, even if this means buildings and urban space change in significant ways that public good users may not like the look of in the coming years.

Recommendations

The Inquiry's question: "What are the barriers to reducing emissions from existing commercial buildings and policy initiatives needed to address these effectively?" are answered by suggesting the following:

- simplify present Building Regulation Part L[10] compliance methods and documentation[11] and align them with the Planning System, for example, by following the GLA's approach of "marginal carbon mitigation investment" on suitable sites;

- research to better understand "in-use bias" that is, the differences between modelling for Energy Performance Certificates and Building Regulation compliance purposes and in-use consumption of energy and Co2 production. Data from Display Energy Certification could be useful in this process if information was complied with for this use.;

- following this work, update Part L Building Regulations and Planning policy to accommodate differences.

- reduce inconsistencies inherent in existing tools for Part L compliance and Energy Performance Certificates and ensure that tools are useable at different project and compliance stages without unnecessary time and expense;

- make definition of Zero, Zero Net or Carbon Neutral standards and explanations readily available in easy to understand language that clarifies the pros and cons of each option;

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[8] GLA "Valuing Greenness". June 2003. P.1.
[9] Decision makers share a tendency to stick with their current situation.
[10] Part L, Approved Documents. Conservation of Fuel and Power, 2006.
[11] Updates to Part L Building Regulations are now being proposed with three tiers of documents.

- add support to the Carbon Trust's work offering more advice to businesses and owners on how to achieve positive rates of return on investments in lower energy and carbon technologies. Build stronger ties with Energy Assessors;

- set up a long term marketing and advertising campaign as an extension of the Carbon Trust's work that supports businesses and consumers further. The advertising could be designed to overcome "status-quo and loss aversion bias" amongst many building owners as well as "principal agent problems" where they exist. Change would need to be supported by HM Treasury or Local Government backed fiscal incentives through the tax system.

- Identify skill weaknesses in Government and in Local Planning Departments (including Councillors), systematically increase funding to improve training.

- Add energy statements to all Planning Applications where a Design and Access Statement is needed.

In summary, the overall message is that incentives work better over the medium and long term than rules and regulations. Unfortunately, the present regulatory system directs technological change as the lowest Transaction Cost option for the regulator rather than encouraging behavioural change because of its "command and control" values.

Understanding a way Forward

Transaction Costs

The largest Transaction Costs[12] for owners delivering improved energy/carbon performance in built up areas with a large percentage of Conservation Areas, Historic Buildings, Parks and Metropolitan Open Land (including proximity to them) are the costs of engagement, negotiation and proof in the[13]:

- Building Control; and
- Town Planning systems.

The largest Transaction Costs for regulators enforcing improved energy/carbon performance are:

- consultation and internal co-ordination to create "joined up policy"; and
- information gathering to form effective policy.

If the Transaction Cost(s) and capital investment exceeds/exceed the benefits, owners do not invest in technological or organisational improvements that can deliver positive Internal Rates of Return; neither do Regulators, if their costs exceed the benefits. The first area of inquiry is therefore policy options to reduce transaction costs that also take into account "status- quo" and "loss aversion bias'". Such an approach would need further research using information not yet available on how people "actually consume energy in buildings" and the costs of compliance in time and other resources.

[12] Transaction Cost is the cost of making an exchange. In this case it is the cost of exchanging information and bargaining with the regulator in low frequency situations. The Regulator tests against norms and social policy in return for a permit to meet consumer needs measured by intangible benefit and/or profit.

[13] Both systems include professional advice and internal costs.

Information
The purpose of the Committee is to explore "barriers to change". One of the most significant barriers is up to date, relevant and useful information for use by owners and regulators to create policy in more collaborative ways. Government statistics have provided useful and quite accurate information on the type, age range and size of the existing housing stock, but not for the non-domestic sector.

To form the foundation of sound policy, resources need to be spent on research to understand changing patterns of use and energy consumption shifts over the past ten years, in addition to research indicated above. Data is needed, not only for new development, but most importantly for existing buildings as their use affects both energy consumption and carbon emissions. Data is presently inadequate for energy policy in the non-domestic sector[14]. Information would include:

- age of stock;
- sector breakdown;
- internal function;
- location;
- energy intensity;
- carbon intensity.

Energy Performance Certificates (EPCs) are perhaps one of the most useful steps along the path to deliver better building policy and performance in the medium to long term. By no means perfect, because they rely on notional performance of the observed fabric rather then in-use performance with real users, they have, nevertheless, started to break down the "asymmetric information problem" endemic in private markets between owner and regulator. Support to improving their value and usefulness should be given by the Inquiry.

The main weakness of EPCs is the next area your Inquiry could address. Anecdotal evidence from clients indicates that EPCs and Building Regulation standards are a poor indicator of actual energy performance and, therefore, Carbon Dioxide emissions.

In many instances, actual consumption is two or three times above what is designed and regulated. Although the Regulations are not the panacea for more efficient buildings, they help set the benchmarks and communicate social signals on what is acceptable.

Display Energy Certificate information also needs to be extended to all non-domestic buildings with information that can be fed into the design and regulatory process.

Understanding past energy performance
The evidence of performance improvements in fabric and services due to regulation over the past three decades, are evident; however, there have been no real increases in overall building energy performance in the last ten years[15]. The limited evidence

[14] UK Green Building Council Report "Carbon reductions in new, non-domestic buildings".
[15] ibid. p.127.

shows the electricity consumption per m2 has remained constant[16], based on information from fifteen years ago[17].

To meet targets of 50% or 60% improvements in carbon efficiency, lack of knowledge about past performance of regulations and in-use behaviour is a significant barrier to delivering effective policy, in the future.

Regulatory compliance

Clients and Designers including Engineers and Architects are required to design new and refurbished buildings to client briefs, Building Regulations and Planning Standards.

To meet a brief, regulatory engagement is only fair where market failures are evident[18]. Little evidence suggests there are real market failures in global energy markets, although there are consumer preferences where investments are not made and benefits can be gained. Perhaps compliance rates reflects that knowledge[19]; Part L compliance[20] is understood to be poor across the whole system[21].

Greater emphasis ought to be placed on incentives to mitigate carbon emissions and not punishing non-compliers because it is in this area market failures are evident.

As previously noted, policy fails to account for in-use bias[22]. Research could be undertaken to assess if standards could be significantly improved by taking into account this fact. If this happens, compliance may not increase, but performance (holding all other factors constant) would.

It is perhaps worth asking, “why such low levels of compliance?”. It would be a weak reply to suggest that “there’s not enough trained Building Control Officers”. Further, this hides the salient issue, namely that of incentives, in the knowledge that non-domestic building owners behave principally in self interested ways.

Feedback from clients and colleagues suggests that it is also the complexity and associated cost of compliance now mainly understood through an algorithmic process[23] in the absence of economic incentives, that is a significant barrier to efficiency improvements.

Useful and effective standards give sophisticated clients who can afford measurement and modelling advice from professionals, the tools to deliver and, at the same time, give straightforward information for the smaller property owner who pays the higher Transaction Cost[24] relative to their total investment.

[16] ibid. p.37.
[17] IN some sectors there has been significant changes in floor space efficiencies and technology use in that time.
[18] GLA, The Rationale for public sector intervention in the economy II. GLA Economics. March 2008. P10+.
[19] Non-compliance in inner city areas is unknown, although the higher risk of enforcement would suggest improvements to that figure.
[20] Compliance rates are being assessed by DCLG at the present time.
[21] Down to 40% in the domestic sector, data unknown for non-domestic sector.
[22] Differences on average between design standards for compliance and how users consumer energy
[23] SBEM and other Building Regulation Part L compliance software.
[24] Noted that compliance fees are related to development value, these costs are small when compared to professional fees.

In low value building alterations, sensible policy would support different consumers in different ways as it related to their unique circumstances. For example, few go into a supermarket and are presented with one choice to meet a "need for biscuits", and no-one would expect that choice.

Indeed it is the weakness in structuring choices for consumers (building owners and investors) through low Transaction Cost, higher value investment in energy/carbon efficiency that needs improving. More choice in methods to comply could be communicated by the use of sector specific typical details and site-specific design approaches that worked with planning policy and briefs.

Regulatory clarity

In refurbishing old building stock, Building Regulations Part L2A exempts energy and carbon emission compliance where change would "unacceptably alter their character or appearance". In other words changes would need to have been tested in the Planning system before Building Control would accept an applicants proposal.

Because of the density of Conservation Areas, Historic Buildings, Parks and Metropolitan Open Land (including proximity to them), the Planning System has become the default test for compliance and therefore fabric/services performance improvements.

By having two regulatory systems that work in different ways and the planning compliance system orientated toward local decision making, it is likely that rent seeking outcomes, heuristic bias' of overconfidence, anchoring[25], rules of thumb and loss aversion in the absence of sound information hinder efficient outcomes if played out in the Planning system first.

The challenge therefore is for Government to improve decision making so that it is based on sound evidence and good training, structured responsibilities and clear duties for Civil Servants, Planners and Planning Committee members. Anecdotal evidence suggests further improvement in training and resources need to be given to support this outcome.

Fiscal support

In assessing fiscal support for energy and carbon efficiency, it is worth looking back at The Stern Review[26]. Their findings could be brought up to date for use by Planners and fed into Regulatory Impact Assessments proposed by DCLG, in 2009, when the next round of Building Regulations updates are assessed.

Clearly, fiscal and professional support needs to be made available where evidence shows that private or Government owners are not investing in energy reducing choices with positive internal rates of return. Further research is needed to identify who is not making these decisions and why.

Until Government negotiates a framework to support more realistic carbon values, fiscal cost/benefits will be uncertain for owners and Government alike. Clearly the biggest hurdle for fair and efficient technology choices to mitigate carbon dioxide emissions (and global warming potential equivalents) is an international agreement on setting carbon price signals. When such an agreement is created on a global

[25] From colleagues, press and media sources.
[26] The Stern Review, H M Treasury, 2006. P.249.

scale, all policies need to ensure they are co-ordinated. Pre planning for this eventuality is a real priority.

George Stowell BA(Hons), Dip Arch MA (Arch TP) RIBA

George Stowell is an Architect and RIBA accredited Independent Client Design Advisor (CDA). The CDA position is chosen from Architects who have delivered excellence in the built environment across the full range of project stages and sectors with a wide variety of clients. He is presently a CDA for the London Borough of Ealing, The Lawn Tennis Association and is selected with Cyril Sweett for an Office of Government Commerce Framework Agreement (H M Treasury) to deliver client development services in the public sector.

At Ealing he is contributing to the redevelopment of a Grade 1 listed building and 25 Ha Walpole Park. In the heritage sector he has contributed to the redevelopment of HM Treasury in Whitehall and projects in sensitive Conservation Areas across London.

At Sheffield University he studied Architecture and Town Planning with an MA specialising in the socio-economic impact of capital investment in regional economies. More recently, he has been reading Microeconomics at the London School of Economics and Financial Appraisal in property development at Reading University.

After graduating in 1989 he worked for Nicholas Grimshaw and Partners on Waterloo International Terminal. The project was extremely well received, winning among others, the RIBA Building of the Year Award in 1994. In 1999 he began work at Foster and Partners on the regeneration of Tyne Riverside at The Sage, Gateshead, a major new international music venue and educational facility.

Between 2001 and 2005 he also led the HM Treasury refurbishment team to Planning Approval stage and the low energy strategy for an innovative housing scheme in Santa Giula, Milan.

After considerable experience delivering world class design with clients and project teams at Foster and Partners he started practice in 2005 with the goal of supporting clients creating better built environment futures in designed, collaborative and evidence based ways. Design projects are undertaken alongside CDA services. To date, projects include multi-million pound house conversions in London, more modest extensions for private clients and commercial sector refurbishment.

George works closely with the RIBA in their London Region branch and is a member of the RIBA Sustainability Committee. He contributes to Central Government policy, including a consultation submission to The Stern Review in 2006 and the Zero Carbon Homes Policy by DCLG. He is a member of Cambridge Energy Forum and a Member of the British Standards Institute Construction Standards Committee advising on the future of British Standards.

WRITTEN EVIDENCE SUBMITTED BY THE INVESTMENT PROPERTY FORUM

The Investment Property Forum (IPF) welcomes the opportunity to submit written evidence to the All Party Urban Development Group's enquiry into Climate change and the urban built environment.

The IPF
IPF is a membership organisation of senior professionals all active in the property investment market. The organisation has a diverse membership of over 1,900, which includes investment agents, fund managers, bankers, lawyers, researchers, academics, actuaries and other related property professionals. It operates in London, Scotland, the Midlands and the North of England.

The IPF's mission is to improve the awareness, understanding and efficiency of property as an investment for its members and other interested parties, including government, by: undertaking research and special projects; providing education, and encouraging discussion and debate. IPF is not a lobby organisation.

IPF has commissioned six research reports looking at commercial property sustainability, two of which have been published, four are on-going. These are:

- The sustainable property appraisal project – a report looking at how a property's sustainability might be incorporated into investment appraisals.

- The energy performance of buildings directive and commercial property investment: a situation review.

- Occupier demand for sustainable buildings – a project examining how sustainability has been reflected in completed acquisitions of office space by occupiers.

- Landlord and tenant relationships as a driver for more sustainable property occupation, management and ownership.

- The cost of low carbon upgrades to existing commercial buildings.

- The IPD/IPF 4 Good – A Sustainable Property Investment Index.

All the research focuses on the existing commercial stock. We also have a Sustainability Special Interest Group which is linked with the Institutional Investors Group on Climate Change ('IIGCC') which meets to share and disseminate best practice in sustainable property investment.

General Market Comments
The property investment sector is a key player in the commercial property markets. Research carried out for IPF in 2005 estimated that 61% of retail property, 63% of office property and 23% of industrial property by value, is held by investors. The sector is also significant to society and the economy more widely. The institutional investors who hold the majority of the commercial property stock do so for the purpose of generating returns to investment funds.

These funds in turn are largely ultimately held by the insurance, savings and pensions policies of the general public. Many investment fund managers have been working for some years to better understand the risks energy efficiency and other

sustainability related issues pose for their property assets, as part of their fiduciary duty.

A characteristic that sets commercial property apart from most other investment forms is the presence of two interests in each asset – the landlord (owner) and the tenant (occupier). Both have different legal obligations and jurisdictions within a building and different reasons for holding a legal interest in it. Recognising the differences between these two stakeholder groups is essential to good progress being made in working with the market to make the stock more energy efficient. Key issues to consider are:

i. According to IPD data more than 60% of property in each sector (retail, office, industrial), bar distribution warehousing, is multi-let, increasing the number of interest in each asset and the complexity of management issues.

ii. Landlords are responsible for the common parts of a let property and hence will only have immediate access to data on energy use in the common parts. They do not have responsibility for energy in the floor-space let to the occupier(s) and have no right of access to data on energy use within that floor-space. Landlords starting to collect this data from tenants may not be welcomed (or permitted) by the tenants. It may impact on tenant relations, and requires significant investment of resource by the landlord.

    There are industry-led initiatives looking at developing practical, mutually agreed ways to resolve this problem. These include a number of 'green-lease' type arrangements and projects such as the British Property Federation ('BPF') /Carbon Trust led 'LESTER' initiative. However, the problem should not be underestimated and a solution developed by both groups of stakeholders, ie landlords and tenants working together, may well be the most effective way forward.

iii. The landlord pays the bill for energy used within the common parts and then recharges this through the service charge. There is an indirect incentive for the landlord to ensure energy use in the common parts is efficient so that service charges are kept low which promotes good tenant relations. But the landlord will not a) bear the cost of inefficiency or b) benefit directly from any reduction in energy costs. This means there is no direct incentive for the landlord to invest in more energy efficient plant and machinery. There may well also be a requirement from the tenant for the landlord to maintain levels of light/ heat/ cooling/ lift availability in the common parts, particularly reception areas, which restricts the options available in implementing energy efficient measures even in these areas.

iv. Tenants are responsible for paying for the energy they consume within the tenanted areas. There is a direct incentive for the tenant to control their energy consumption through practical measures such as switching lights off and shutting down electrical equipment at night. However, as they have only a short term interest in the property there is little or no incentive for them to make large investment in plant and machinery to improve the overall energy performance of the building. This would be in the domain of the landlord. But as the landlord does not pay the energy bill there would be no direct return on their investment in such machinery, making it difficult to establish a business case for the investment.

    Whilst this may suggest that the landlord should take responsibility for paying for the energy, this has been largely disregarded and discredited as a solution

as it removes any incentive for the party using the energy to do so efficiently. It is felt this could easily increase rather than reduce energy use.

Requested Response Matters
The call for evidence asks questions in six specific areas and we will address each of these in turn.

1. Barriers to reducing emissions from urban buildings

a. Lack of information

Information on energy use in buildings is undoubtedly limited and difficult to collate comprehensively. There has traditionally been no incentive for the landlord to collect data on energy performance. Furthermore, where commercial property is multi-let it is often sub-divided and re-configured for different tenants over a number of years, adding layers of complexity to metering systems.

Collecting data for common-parts is relatively straightforward and a number of industry based initiatives have sought to measure and monitor performance in this area, including Upstream through their Property Environment Group ('PEG') Report on shopping centres. However, there is no single comprehensive system for gathering data on energy use for the whole building.

Data collection is an extremely resource intensive and expensive process, particularly where systems have not been in place previously. Landlords are investing substantially to ensure they have systems in place to comply with the requirement for EPC's, and data collection has been a major expenditure.

The industry has identified the need for a single standard system for energy data collection, appropriate to both landlords and tenants, and supported the LESTER project as a positive initiative in moving towards this. The initiative has been taken up by the British Council for
Shopping Centres ('BCSC'), which is planning to adapt it for the retail sector.

In considering issues of data it is important to remember the variety of different uses to which commercial buildings are put. Variations in the length of time they are operational (i.e. 24/7 or 8-8 Monday to Friday and many other combinations), the range of uses within them (ie data rooms, canteens, call centres) and the density with which they are occupied; all have a significant impact on energy use. An air-conditioned office with a canteen being used 24/7 at an average density of 12m2/person will have a much higher energy load than a similar office operating 8am – 8 pm Monday to Friday and containing open plan office space. But which is the more energy efficient building?

b. Costs, benefits and barriers to owners/ occupiers

The separation of responsibilities for common parts and tenanted space, and the overall responsibility of the tenant(s) to pay for energy consumed creates an automatic barrier to the landlord making extra capital expenditure on energy efficient plant and machinery. The landlord will receive no direct payback from any investment as they do not pay for the energy used and there is not yet any evidence to suggest that tenants will pay more for energy efficient buildings.

The key driver for landlords is the rental income. It is anticipated that occupiers may begin to pay less for less efficient stock as EPC's deliver more information into the

market. However this would not generate additional revenue to create payback for capital expenditure on upgrade.

Consequently landlords are looking for cost effective ways to improve energy performance before embarking on potentially expensive capital expenditure programmes. Major investor landlords such as PRUPIM have been investigating potential low-cost and no-cost improvements to standing portfolios as a means of upgrading the existing stock without compromising investment return for policy holders.

The shorter leases that are now a feature of the commercial property market in the UK mitigate against any tenant investment in the stock. Where tenants may get a payback through reduced bills, the length of lease may be insufficient to break even on the investment.
Shorter leases may, however, provide landlords with more frequent opportunities to upgrade the stock during periods of vacancy if tenants do not renew leases.

Upgrading a commercial property to more carbon efficient standards at refurbishment is often a more expensive option than a standard refit. This is particularly the case where improvements to the fabric are required i.e. to roof, windows and walls. Yet these are often the elements of a building that can generate the greatest improvements in energy efficiency.

Enhanced capital allowances (ECA's) are available in some instances for low carbon plant and machinery, but not on fabric. This seems counter-intuitive. An ECA system that rewards the overall carbon savings made rather than the use of particular technologies might be more effective. Furthermore the enhanced capital allowances system is generally seen as overly complex, a barrier in itself to the take-up of potential incentives.

c. Costs/benefits to the wider community

Temporary relocation of existing commercial property occupiers to enable retro-fitting would be enormously expensive. It would also prove extremely disruptive to tenants. Most investor landlords have planned programmes of maintenance and refurbishment for their portfolios. A more viable solution might be to work with the landlords to identify potential opportunities to carry out retrofitting works within those programmes and at points of naturally occurring vacancies. Whilst not all properties will have easily identifiable opportunities, many will, and to work with the landlords to achieve cost effective improvements to stock where possible with minimum disruption to tenant business might be an attractive option.

An important consideration in terms of the viability of an environmental upgrade of commercial stock is its value. Where land values are low, upgrades to stock are more difficult to justify financially. The cost of the upgrade will be the same as for a more valuable property but the rental return less.

One consequence of this may well be that the life expectancy of commercial property stock in areas with low land values is shortened; it may be more commercially viable to demolish and redevelop than to upgrade and retro-fit to more stringent energy efficiency standards. This could increase carbon emissions through the less efficient use of resources and materials embedded in existing buildings, along with the earlier instigation of the (very resources intensive) development process. The trade-off would then be between the energy used by maintaining a relatively inefficient building and the energy used by demolishing and rebuilding to produce a more efficient one.

Shortening building life in general is not helpful in terms of reducing carbon emissions.

2. Breaking down barriers to 'greening' urban buildings

a. Addressing the lack of information

Action is being taken at industry level, particularly through the Property Industry Alliance ('PIA' an alliance comprising the IPF, BPF, BCO and the RICS), to identify industry wide reporting and benchmarking systems for energy data. Efforts are being made to provide advice for the sector on the collection of energy performance data as a means of creating commonly understood standards without being prescriptive. This in turn would enable more effective benchmarking. It would perhaps be helpful if government were to engage with the PIA in this programme to ensure policy development and recommendations are cognisant of industry based actions.

The introduction of EPC's, and later DEC's will generate wide scale data on energy efficiency of buildings. However this data will not be publicly available, reducing its effectiveness in supporting benchmarking and comparisons between buildings. Government might consider ways of making this data more accessible.

b. Addressing economic consequences

The economic barriers differ for landlords and tenants as do the elements of energy usage they can control. For example landlords can strive to supply the most efficient building in terms of fabric and plant and machinery but have no control over the efficient use of the building and, importantly, over the small electrical equipment used within it such as pc's, printers etc. These are within the domain of the tenant. Policies to address these two areas therefore need to reflect these different spheres of influence for each party. Tenants can have a major impact on energy by using the building efficiently, in particular in terms of light and small equipment. Facilities management teams can be very effective in changing occupier behaviour by placing stickers on items left on overnight for example. Programmes such as the Better Buildings Partnership (led by the Greater London Authority) have championed this issue, amongst others.

Landlords are incentivised by maintaining or improving investment return. This means maintaining predicted rental growth and depreciation levels and minimising void periods.
Landlords will therefore be incentivised to refurbish to more energy efficient standards if less efficient property takes longer to let, or commands lower rents. This is a potential consequence of the introduction of Energy Performance Certificates ('EPCs'), particularly into a market of falling demand and rising supply.

As outlined above, fiscal incentives through ECA's could direct refurbishments and retro-fits to the most efficient energy saving measures for a particular building if they reward the overall reduction in carbon as opposed to the use of a particular technology, which might not be the optimum solution for the building. It is important again to re-iterate the complexity and heterogeneity of the commercial property stock. There is no 'one-size-fits all' fiscal incentive that will work for the sector.

The use of incentives through the Uniform Business Rate ('UBR') where more efficient buildings are rewarded with a lower charge could provide a workable fiscal incentive that would reward tenants by reducing their business overheads and

landlords by increasing the marketability of their building (and hence reducing void periods). However, consideration should be given to two issues here:

i) as the landlord is likely to have to make the initial investment, a means of more directly rewarding that investment might be appropriate. Any additional, unrecoverable costs affecting a property will have an impact on the performance of a fund and the returns to policy holders.

ii) If the UBR is used to introduce a penalty for poor performers by increasing the rate payable, as opposed to a reward for good performers through a reduced charge, in areas of low land value this could blight areas where land values are too low to make upgrade unviable yet the increased UBR makes the local market unattractive to tenants. The economic impact locally could be extremely negative. The introduction of empty rates will also make landlords increasingly sensitive to prolonged void periods.

The introduction of EPC's will present the market with a major opportunity to understand more about the energy efficiency of the stock and to respond. This could present one of the most powerful incentives for upgrade of stock with little further intervention in the market. In combination with educational and awareness raising campaigns and the support of pro-active facilities management, both sides of the commercial market could be tackled: the provision of more efficient stock and more efficient use of the stock.

Building Regulations are also having a significant impact on stock. It is true to say that property developed post the 2002 and 2006 updates to the Building Regulations are more energy efficient than those developed prior. Significantly, these regulations are national, affecting all market operators, and robust systems are in place to monitor compliance. Interventions that take place at city or regional level have the potential to distort local markets with unpredictable consequences. Equally, the planning system is perhaps not the most effective means of tackling energy efficiency within the existing stock.

Louise Ellison
Research Director

WRITTEN EVIDENCE SUBMITTED BY ISIS WATERSIDE REGENERATION

Introduction

ISIS is a waterside regeneration company formed in October 2002 by British Waterways with igloo (the regeneration fund of Morley Fund Management) and AMEC Developments (now MUSE Developments).

Named after the Egyptian goddess of rebirth and rejuvenation, ISIS was created on a sound commercial business model, however, crucially, one that is based on ethical principles. Indeed, ISIS adopt the same policies as igloo, who have been described by the United Nations as the world's first socially responsible property fund and the only substantial socially responsible real estate investment vehicle in the UK.

In addition ISIS is one of the very few companies to submit to independent audit. This is carried out by URBED under the guidance of a Socially Responsible Investment Committee chaired by Sir Jonathan Porritt and including Professor Anne Power (LSE), George Ferguson and Paul King (Chief Executive of the UK Green Building Council), ensuring that we continue to push ourselves and our partners towards more effective sustainability policy and implementation.

ISIS is playing an important role in the delivery of the Government's vision of an urban renaissance, building on the charm of our inland waterways. ISIS was created to deliver mixed, balanced and diverse genuinely sustainable communities.

ISIS offers a real choice of housing, business and leisure amenities around land and water, within high quality innovative developments.

ISIS is supporting regeneration in towns and cities across the UK with total scheme values of circa £10billion.

50% of ISIS profits are invested in Britain's waterways.

In our business model we do not consider existing non domestic buildings in isolation and so our experience and input may not be as relevant as some. However we offer the following points for consideration.

Barriers to reducing emissions to urban buildings

- Capital cost availability vs. the longer term savings proves a major obstacle for general public and small to medium sized businesses. Access to grants is not transparent, and funds are not available without some delay. Easiest option is to do nothing and put up with the energy bills.

- Vicious circle between Tenants and Landlords – the disconnection between the party who must invest and the party who will reap the return is a major hindrance to investment, even when grants are available, as the upgrade work is disruptive. This is also a problem in speculative new-build.

- The size of the backlog, and therefore the affordability over the short term, given the urgency of a push for improvement. If 98% of “existing stock” exists while the 2% of new stock is being constructed, and if we accept that

the building regulations have only become adequate over the last decade, it follows that approximately 80% of all stock is inadequate to a greater or lesser extent. This is a huge problem to overcome and makes the investment disproportionate to conventional “marginal cost” metrics in introducing legislation for improving building standards.

- The growth in material consumption to offset the cost of labour, pre-assembled non-repairable components in petrochemical materials, vs their metallic predecessors with easily refurbished internals.
- The ease of installation or lack of, for energy conservation measures proves to be an inhibitor for many.
- Heating controls, draft proofing, roof insulation are relatively inexpensive and not disruptive to fit. Replacement of central heating equipment, upgrading of windows to double glazing are more expensive and disruptive but not unrealistically so. However, the insulation of the huge proportion of existing stock with single leaf wall construction, which would have significant benefit, proves very challenging without introducing risk or likelihood of interstitial condensation, or dramatically changing the external appearance of buildings.
- Dealing with the retail sector who traditionally operate with heating or air-conditioning running, but doors wide open to attract footfall will require more imaginative approach.
- A programme of opportunistic fabric upgrade, at the time of other repairs to facades or roofs could be undertaken with some building types, as is done in parts of Germany.
- However for the large proportion of character or listed buildings, this is not an option without destroying the character of large swathes of Britain’s buildings and streetscapes.
- Perception: The acceptance that central heating and uniform conditions are the norm, rather luxurious, promoted by energy companies advertising hard in the last twenty years while rich with offshore fossil fuel reserves. Three adult generations of “energy on demand” convenience needs to be reversed.
- In educating the public, the additive impact of small changes to one property needs to be understood, as well as the cumulative effect of large numbers of properties doing the same.
- The actual consumption of a typical business needs to be understood, as well as the numerical impact of the various improvements.
- A programme addressing the effects of climate change on buildings, and the reciprocal effects of buildings on climate change, needs to address the unsuitability of much of the existing stock for use during extended periods of warmer temperatures.

- The quantum of lightweight construction which is prone to overheating without cool air temperatures. Will we be facing a bigger problem in future with the large scale uptake of air conditioning equipment, either as a luxury accessory, or as a need for providing comfortable working conditions?

Conclusions

At least the topic is high on most agendas and there are some good examples of public sector leadership (Yorkshire Forward leading on the Holbeck Urban Village CHP scheme). Indeed it is clear that getting the necessary scale for new infrastructure often needs public sector intervention at a strategic and practical level.

We would of course welcome the chance of giving further evidence and thank you for the opportunity to comment

Kind regards.

MARK RYDER
Chief Executive with support from Mike Finkill Regeneration Director and Tim Thornton of Halcrow

WRITTEN EVIDENCE SUBMITTED BY JOHNSON CONTROLS

Barriers to reducing emissions from urban buildings:

These include:

- ***Lack of information:*** **How good is the data that owners/occupiers have about their energy usage, efficiency and carbon footprint? How far are they able to benchmark their performance against that of others? If owners/occupiers lack data about their building's energy usage, what is preventing them from getting it?**

The availability of data both in terms of a baseline and ongoing measurement is an issue for many non-domestic consumers. This is largely due to limited metering, often only the supply company provision, and no resource to record and analyse energy usage. More enlightened organisations might request detailed consumption information (eg half hour data) from the energy suppliers, but this is still likely to be limited to a single point measurement at the intake position. Further benefit can be obtained by installing additional metering within the building/demise to enable a more granular picture of energy usage. This may be a challenge depending on the complexity of the installation and being able to identify relevant areas that still support flexibility in use of the space. However, new technologies can simplify this intent.

On the demand side, many building users do not give thought to how energy is used and what their impact is on that usage. Heating, cooling and lighting are base requirements to employees and the energy impact should be obvious, but little may be understood as to how it is provided (and some may argue why should it be). Other factors such as leaving technology switched on un-necessarily or the use of printing/copying. The current idea of having real-time energy meters displayed in the workplace is thought to provide staff with feedback so that they might see the effect of personal and collective actions (eg turning lights off) but this is likely to be of limited effect unless the measurements are sufficiently local for differences to be visible.

Whilst having data is beneficial in managing usage – what gets measured gets managed – is does not give any indication of whether the level of usage is good or bad (although it could be argued that any usage is bad). Benchmarks have been developed across a range of scenarios including: per square metre; per unit of heat; per unit of cooling; per unit of lighting. This will enable benchmarking of actual usage and the opportunity to identify areas for possible improvement. The requirement for commercial buildings to have an energy rating is a step forward that will enable prospective buyers or tenants to compare new premises and provide them with additional information on which to base their decision. However, it will only ever be one of the factors. This is likely to be a greater issue for landlords rather than owner/occupiers in that landlords arguably have to be able to market their building competitively more often than the owner/occupiers and therefore have more cost pressure to invest against a competitive market. The trend in the UK and Europe is that lease periods are reducing to reflect business uncertainty and a greater need to be flexible.

Carbon Foot printing is a much publicised activity that is creating an industry of its own in consultancy, technology and confusion. The response to Carbon Foot printing has in some respects received a stilted response. This may be due to a number of reasons including a lack of understanding on what it means, the scope that is applies to, and what you do with the information when you have it. Is there an

acceptable level of emissions? What is a 'good' footprint. Carbon emissions are the underlying issue of climate change and the contribution that buildings make to this are significant both in terms of embedded carbon and operational carbon. It is therefore important to be able to quantify this but in a standard way. Today, there are many carbon calculators available but the outputs of these tend to be inconsistent. Green House Gas (GHG) emission tools are perhaps becoming more accepted as the way forward, but present a more complex approach as it does embrace the wider range of gases that are the issue (referred to as CO_2 equivalents).

In order to promote the capture of data and the ability to analyse and improve, there needs to be a competent resource to manage this process. Organisations vary in terms of investing in resource to meet these requirements, and the 'energy industry' has a gap in competent and qualified people who can fulfil these roles. The supply industry is still built around selling as many units of energy as possible. It could be argued that building owners are caught in a trap. The Carbon Trust is making some progress, but more focus, possibly at government level, needs to be given to provide the trust with more leverage and impact.

· ***Costs, benefits and barriers to owners/occupiers*: Even if a more comprehensive understanding of a building's energy usage could be achieved, what is preventing owners/occupiers from undertaking measures to use energy (heating and electricity) more efficiently or minimise energy wastage? What barriers (both economic and physical) do owners/occupiers face when considering the installation of low carbon technologies?**

Reduction in the use of energy can be achieved through both technical and behavioural approaches.
Technical approaches would include replacement of plant and equipment such as boilers, chillers, air-conditioning, lighting systems and building management systems that would be more efficient in operation. Appropriate maintenance regimes should be applied to ensure that plant and equipment run at their optimal level. The building structures can also be improved by the addition of insulation, sealed double glazing, reflective glass (or film) and reduction of infiltration or leakage. Where data centre or production activities are present, improvements may be possible by consideration of the operation. Where new plant and equipment are installed, the opportunity should be taken to balance the size of load to equipment to reduce potential inefficiencies (ie do we still need as much space/services).

Behavioural changes apply to the chief executive of a company, through the management structure to the staff. Energy improvement, in particular as part of a Sustainability Policy, requires sponsorship at the highest level in an organisation to agree strategy and investment. This approach must be supported through the management structure. The staff also need to apply themselves in support of the intent to reduce energy usage. This may be simple acts such as turning lights off, not increasing the settings of local heat/cooling controls and double side printing.

An organisation can also review its building portfolio to optimise its needs. Rationalisation of portfolio would bring an immediate reduction in energy needs.

Increasingly, organisations rely on outsourced services and its supply chain to deliver their product or service to a demanding customer. This has at least two impacts:

- Energy usage in its direct sense is reduced for the organisation
- Energy usage in its indirect sense is moved on to others (off shored). In this case, there is an apparent reduction, but in absolute terms it has only been moved. However, by using specialists to support an organisations operation,

it might be argued that 'they' are more efficient and therefore a reduction may be achieved.

In this area, a company must have a clear strategy for their supply chain, and manage its process (both for initial procurement and also for ongoing relationship with suppliers).

The changes described above will in most instances require some level of investment. An organisation, developer or landlord will need to recover its costs typically by seeking a payback period acceptable to the business. Many organisations expect a return within 1 and 3 years. Other models, commonly termed performance contracting, funds replacement of plant or equipment through energy and maintenance reductions of the new installation. These types of deals commonly require a contract agreement of 7 to 11 years. Even with these options, many organisations do not choose to undertake improvements due to a short term business outlook on their portfolio where owned, and contract parameters where leased or a dislike to external funding.

The physical attributes of a building may themselves present barriers to change. Age, condition, access, adaptability of structure or façade and potentially planning or building requirements. Overcoming the challenges may add cost that overturns the viability of the initial improvement project.

· ***Costs/Benefits to the wider economy:*** **How important are the wider urban economic impacts of greening existing buildings? The majority of commercial property is occupied. A full scale retrofit would require temporary relocation for the occupants, with potential profit losses for the landlords and disruption to tenants' businesses. What are the likely impacts on cities' economies (for example in terms of job creation and business opportunities/costs in the property industry and other business sectors)?**

In the situation where the work requires the temporary relocation of staff to a facility outside of the existing community, there may be some economic impact to the community. For an owner/occupier, there is additional cost in finding alternative accommodation whilst still be liable for many of the costs for the building under retrofit. For a landlord, the costs would depend on whether the work was being funded by the tenant or was 'in between lets'. Where the work was funded by the tenant, the landlord may contribute towards the project costs but still be receiving rent. Where the work was being carried out in between lets, the landlord would potentially be facing the cost of the works in addition to a loss of revenue. The project work may provide income fro local suppliers and contractors, and the workforce might use local facilities. Where the work is of a significant nature both in content and programme, the local authority should be involved in discussions to minimise impact and to seek possible solutions to minimise impact on the community. From a construction perspective, the contractor selected to undertake the work should be registered with Considerate Constructor Scheme. The code established by this scheme is intended to improve the operation, safety, use of local materials and impact on neighbours and operatives to construction activity.

In this area, there needs to be a partnership between stakeholders. For significant projects, this may include local authorities, local communities and relevant NGO's to ensure that the short, medium and long term impacts/opportunities are identified and considered for the optimum outcome.

Breaking down barriers to 'greening' urban buildings:

· ***Addressing the lack of information*: What actions are needed at the industry level to produce the measurement standards needed? How can the Government support the industry in achieving this? Are there any current tools that could be adopted to improve energy measurement?**

The immediate thought is to introduce a common standard for energy measurement so that adequate monitoring and analysis can be achieved. The adequacy of metering should be an activity that is supported by the supply industry. Currently, the supply industry has no incentive to reduce its energy supply – its revenue and profit is based on selling the maximum number of units. This situation needs to change to enable an approach from the supply industry that encourages less energy to be sold and incentivises better monitoring and reduction.
Carbon foot printing has become more prevalent and a number of 'calculators' can be found on the internet. There is an issue of scope, consistency and accuracy of the calculators available. The Carbon Trust has established a register of consultants who will undertake an analysis of energy usage and carbon footprint to an approved format. The reduction of energy and the reduction of a carbon footprint are related but can have independent influence. A reduction of energy will automatically lead to a reduction of a carbon footprint. A change of energy supply from a hydrocarbon source to renewables will not reduce the quantity of energy used, but does reduce the carbon content.

One of the key facts about carbon emissions is that they 'act globally'. It is difficult to establish policy in one country unless there is global acceptance. Commercial organisation, and in particular the larger entities, are international organisations who have to compete in an international market. Whilst each organisation must act with consideration to the global population, they require a level playing field in which to operate. There is already evidence that shows companies acting voluntarily can disadvantage themselves where the outcome has a cost implication on its product or service. Voluntary action must therefore be supported by government action. The government action also needs to be globally agreed, or at least accepted, to avoid organisations looking for regions in which it can operate with a lesser set of regulations or laws to comply with.

· ***Addressing economic consequences:* If owners/occupiers face barriers to more efficient use of current energy sources, what policy changes would allow them to overcome these barriers? What are the comparative merits of regulation, market mechanisms, fiscal incentives/penalties and educational awareness campaigns?**

"The one thing we need to do to solve our energy problem is to stop thinking that there is one thing that we can do to solve our energy problem (based on a quote from Robert Liberts). The reality is that government, suppliers, owners/occupiers, staff and community all have a role to play to reach a viable solution. The barriers to owner/occupiers are divided into internal and external:

- Internal
    - Understanding of the issue and its impact on their business
    - Short term outlook of business cycle
    - Uncertainty in market place
    - No clear ownership of issue and hence no clear leadership
    - Green hype without green action
    - Focus on energy cost per unit as opposed to energy usage
    - Buying themselves out of problems (eg offsets)

- External
    - No clear leadership from governments – hype not action
    - Energy supply market interested in selling units and not reducing units sold
    - Lack of investment in renewable energy – needs more government incentives
    - Hydrocarbon producers protecting their industry and implying no problem
    - Others are using much more energy than us – we will not make any difference

Comparative merits:

- Regulation – On its own, regulation will not solve the problem. Regulation should provide a level playing field where one organisation cannot gain unfair advantage over another for taking steps to reduce energy usage/carbon footprint. However, to be really effective, the measures put in to place need to go beyond individual country borders in line with organisations. Government also needs to ensure that its own house in on order and able to demonstrate best practice and what can be achieved through both regulatory and voluntary actions. Is there a world trade issue – would regulation be seen as unfair practice? Regulation must underpin other activities.

- Market Mechanisms – The market will respond if it has either a compliance issue, a cost issue or a competitive advantage through taking a particular course of action. Compliance is generally taken to mean compliance with regulation or statute. As part of a supply chain, compliance can relate to being acceptable to a customer (normally business to business but potentially to the consumer) – this may be part of pre-qualification to taking part in a bid activity.

- Fiscal incentives/penalties – This is an area that has to be used carefully and in conjunction with other methods. Using this approach can impact an organisations operation if they are competing with other companies outside of the country within which the incentives/penalties apply. In line with 'regulation', there needs to be harmonisation with other countries so that it is fair and equitable within their market sector. The basis on how the incentives/penalties are applied can also be critical in the success of such measures for example, how would this approach be applied across different industries (eg commercial versus industrial), different estates (eg recent construction versus listed buildings).

- Educational Awareness Campaigns – The need to educate governments, commerce and the public is as important now as it ever has been. What we will not achieve is an overnight change in attitudes or behaviours Governments compete in rhetoric to gain the best sound bite, commerce makes pronouncements as to their morale standing but do match this with actions, and individuals hold high expectations of others but with a lesser position on actually doing something. Part of the reason for these reactions to climate change and energy usage is a lack of understanding as to the actual issues as they relate to each of the areas, and the understanding of what actions need to be taken. Misinformation (not always deliberate) creates confusion for example, the current debate on bio fuels. Bio fuels have been advertised as a potential solution for the need to use greener fuels. However, the impact of using crops (whether diverting existing food

crops or growing specific crops) has led to a distortion of the food market leading to increased costs and less availability, to rain forests being torn up to grow the bio fuel crops. This is perhaps straying into issues of ethics, but does serve to create confusion and bring complexity to the arguments. The educational awareness also has to be at all levels (from early education to life long learning goals).

What is required is an integrated solution where all of the above factors are used to maximise the impact of resolving the issues surrounding climate change. Regulation coupled with incentives/penalties can provide an environment within which market mechanisms can function to bring about positive change underpinned with education to ensure a common understanding of the issues and how they can be addressed.

· ***Monitoring and enforcement*: How should policies to ensure carbon reduction be enforced? What is the most effective level of intervention for different policy options? Should it be addressed mostly through the planning system? Should they sit at national or city level? How can city leaders together with the private sector help deliver greener buildings?**

The areas of policy change that would assist in more efficient production of energy would relate to the following:

- Consideration of 'heat' and 'cool' generation for both domestic and non-domestic. This is the consideration of district heating schemes using rejected heat from a electrical generation and district cooling schemes (potentially linked through appropriate technologies). Even where hydrocarbon fuels are used (although biomass is a possible alternative) the carbon emissions for the original combined heating/cooling and electrical load would reduce.
- Enforce the Merton Rule in all local authorities for new developments.
- Enforce any new incinerator construction to be built as a generating facility. This will reduce the need for landfill, make use of the fuel capacity of the refuse and if linked to district heating achieve an overall reduction in waste carbon emitted to the atmosphere.
- Extending planning requirements to existing buildings. It is not possible to insist that existing building stock is retrospectively improved to 'new' standards, but maybe we should consider having 'improvement plans' as a requirement linked to the energy certificates for buildings. Owners/occupiers could be required to have an improvement plan in place with agreed timescales – this should be linked to incentives and funding from energy suppliers. In the longer term, a listing of buildings should be compiled and benchmarked to understand their efficiency. This could be used to assist in promoting replacement/refurbishment of the building stock and over time bring the overall portfolios nearer to the best practice. Some allowance would have to be built in to address conservation/listed building needs.

The policies should be established at National level – in fact the intent should be to establish these at regional global level in time – but with responsibility for enactment at local/city level. If left to local/city level only, the option for too much leeway could be potentially introduced in either a positive or negative way. Policies must create level playing fields.

The Clinton Climate Initiative (CCI) and the London 'Green 500' are examples of city leaders and commerce being brought together for the common good. They will generate improvement whilst looking to private money to fund the improvements.

What we see at the moment is a ‘system’ where expectations are being set by governments with little supporting legislation or incentives/penalties in place to drive change. There is an perceived requirement for commerce to take the lead in an increasingly difficult financial environment in which investment is difficult to obtain and where certain activities may become defunct leading to job loss and hardship. With the climate change clock ticking we are running out of time to change.

WRITTEN EVIDENCE SUBMITTED BY MICROPOWER COUNCIL

Key Points

1. The Micropower Council welcomes the current inquiry being conducted by the All Party Urban Development Group into climate change and the built environment. There is an urgent need to improve the energy performance of existing non-residential stock.

2. Low and zero carbon technologies are vital for helping the non-residential sector meet its energy demand. Different energy solutions will be suitable in different situations. Microgeneration installations and community schemes (see Appendices A - D) are beneficial because they reduce a business' carbon footprint, lower energy bills and protect commercial owners from energy price fluctuations. A range of microgeneration technologies exist that are suitable for installation in non-residential properties including solar panels, heat pumps and micro-wind turbines.

Policy Recommendations
3. A number of regulatory changes would increase the deployment of microgeneration in non-residential commercial properties:

- **Incentivising Landlords**: Landlords are in a unique and strategic position to install microgeneration technologies in their properties. However, they need incentives to act to provide microgeneration as an energy solution for their tenants. When replacing a heating system in a property, the extra costs of microgeneration technologies are not significantly over and above the expected cost of installing more traditional technologies. The vast majority of businesses that can benefit from microgeneration are currently hindered by the fact that they rent their business premises.
- **Tax Breaks for Businesses:** The Government has ensured that the installation of microgeneration technologies do not trigger a re-evaluation of business rates. However, when business rates are reviewed at the end of each five year cycle, rates should not be increased because microgeneration installations exist. In the 2008 Budget, the Government stated that it would consider the merits of the further use of fiscal instruments to promote energy efficiency in non-domestic buildings. The treasury must continue to recognise that these technologies are a positive step in reducing carbon emissions and businesses must not be penalised for installing them. The current system will also act as a break on microgeneration installation as businesses are discouraged from carrying out such installations in the months/years preceding a review.
- **Increasing Awareness of Microgeneration for SMEs:** Small to medium enterprise companies need to be educated on their energy usage and how microgeneration can help them reduce energy costs and their carbon emissions. The microgeneration industry has an accreditation scheme and a consumer code, and these need to be tied in with a Government led awareness campaign. Companies often have some of the facts about microgeneration, but need independent advice that they can trust.

Appendix A – Why Microgeneration?

Microgeneration is the production of heat or electricity on a very small scale by technologies that are typically installed within the fabric of a building – generating energy for use onsite or within a community. Microgeneration technologies are environmentally friendly, typically using renewable energy sources such as wind or solar or using existing fuel sources more efficiently.

Microgeneration comes in various forms:

- There are two categories of solar powered technologies; photovoltaic (PV) systems, that produce electricity, and solar thermal systems to provide hot-water and sometimes space heating.
- Ground Source and Air Source Heat Pumps use energy stored in the ground or the air for space heating.
- Micro-Combined Heat and Power (micro-CHP) look and operate similar to gas boilers whilst providing electricity as well as heat.
- Micro turbines provide electricity, either powered by the wind or naturally flowing water and the latest development is the roof or wall mounted wind turbine.
- Hydrogen powered fuel cells to provide heat and electricity at the commercial level are currently being developed and are expected to emerge in coming years.

Microgeneration of renewable electricity and heat will, given the right policy framework, play an important role in addressing the key goals of energy policy in the UK. The five principal benefits of microgeneration are:

1. **Reducing carbon emissions**, thanks to the direct impact of the technology in producing heat and electricity from low or zero carbon sources. Indirect emissions reductions are also achieved by the effect that microgeneration has on encouraging businesses and homeowners to be more energy efficient.

2. **Tackling fuel poverty,** by providing cost effective power to off-grid properties and in the potential to reduce fuel bills for vulnerable groups.

3. **Improving energy security,** by reducing reliance on centralised electricity generation and gas supply networks, which are becoming increasingly reliant on imported fossil fuels.

4. **Economic benefits** brought about by use of microgeneration, at the cutting edge of new ‘green’ technologies. Continued progress in the sector will help to increase high skilled manufacturing capability and employment throughout the United Kingdom, especially in those areas which best accommodate and promote these technologies.

5. **Engaging consumers** as active participants in the “green agenda”. There are wider benefits than just cost and carbon reductions. Businesses and households that install microgeneration technologies tend to reduce their energy consumption significantly, whilst consumers whose interest might have been raised by the idea of microgeneration often decide to take other energy efficiency measures such as insulating their lofts.

Appendix B – Examples of commercial projects using microgeneration in the UK

Wearside

Two extra wind turbines will be added to Wearside's Nissan factory to help boost the plant's energy efficiency and cut costs. The turbines are expected to be in place by January.
Sunderland Echo, 8th November 2007

Sefton

The £6m South Sefton Investment Centre which began construction in October 2007 is being developed using a range of innovative green technologies – including ground source heating and a natural ventilation system.
Liverpool Daily Post, October 3rd 2007

York Eco-business Centre

The York Eco-business centre will use ground source heat pumps providing occupiers with 'free heat' using energy from the Earth to cool the building. A wind turbine will be installed to produce electricity and water saving devices, a green roof, lighting saving controls linked to daylight levels and rainwater harvesting are also utilised.
York Press 10th October 2007

Blackburn

A new business centre in Blackburn features solar panels on the roof and toilets are flushed by collected rainwater. Bosses are also planning to erect a wind turbine to make the building even more energy efficient.
This is Lancashire, 8th October 2007

Appendix C - Types of microgeneration technologies

Solar Thermal Hot Water Heating

Solar thermal is the most commonly installed form of solar energy currently in use today. Solar water heating can typically provide almost all hot water requirements during the summer months and about 50% year round. At the end of 2005, around 80,000 solar thermal installations existed in the UK.

There are three main components for domestic hot water systems: Solar panels, a heat transfer system, and a hot water cylinder. The solar panels, or collectors, are usually fitted to the roof and collect heat from the sun's radiation. This heat is used to raise the temperature of the household water and is delivered by the heat transfer system which takes the heated water to the hot water cylinder for storage until use. A single solar installation would typically save approximately 400kg of CO^2 per year, depending on the fuel replaced.

Solar Photovoltaic (PV) Electricity Generation

Photovoltaic or PV generates electricity from sunlight. Small-scale PV modules are available as roof mounted panels, roof tiles and conservatory or atrium roof systems. 1-3 kW is a typical power output for a domestic installation although this is very flexible and depends on the number of PV modules installed.

A typical PV cell consists of two or more thin layers of semi-conducting material, which is most commonly silicon. The electrical charge is generated when the silicon is exposed to light and is conducted away by metal contacts as direct current (DC). Although the electrical output from a single cell is small, when multiplied together a desired electrical output can be achieved. Therefore, PV cells are connected together and encapsulated, usually behind glass, to form a module or panel and any number of modules can be connected together.

The average domestic system is usually between 1.5 and 2 kWp (kilowatt peak) in size and costs are around £4,000 - £9,000 per kWp. Solar tiles, which can be integrated into a roof, are maybe worth considering if major roof repairs are intended to be carried out. The PV system generates no greenhouse gases and saves approximately 325kg of CO2 per year or about 8 tonnes over the system's lifetime – for each kWp.

Micro-Wind Turbines

Wind Turbines harness the wind to produce electrical power. The efficiency of a domestic system will depend on factors such as location and surrounding environment and the electricity output is usually between 2.5 and 6 KWs, but can be as low as 1KW. Larger systems would be suitable for commercial properties.

Calculating electricity generation from a wind turbine requires consideration of the characteristics of wind. Wind power is proportional to the cube of the wind's speed which means that large changes in potential output can result from relatively minor increases in wind speed. Because wind speed increases with height, a typical wind turbine is mounted on a mast or tower

The latest development in domestic wind turbine technology is roof-mounted turbines for installation on domestic dwellings. These mini-wind turbines give a nominal output of 1kW and are designed to generate energy from low wind speeds. They are typically mounted on the gable end of buildings although in some cases can be attached to the building side-walls.

Small-scale wind power is particularly suitable for remote off-grid locations where conventional methods of supply are expensive or impractical. A roof mounted 1kw system can cost around £1,500 saving approximately 500kg or half a tonne of CO2 per year.

Micro Combined Heat and Power Units

These systems are usually fuelled on gas, although some can burn a range of other fuels, and produce electrical power and thermal energy from the single fuel source. The two major types of engines used in micro-CHP systems are:

Reciprocating engines

The electrical output of this type of micro-combined heat and power (micro-CHP) units typically start at about 5 kW offering around 10-12kW of thermal output. Significant development work has been underway and currently continues, particularly in the USA, but here in the UK Baxi-Innotech are leading the market.

Stirling engines

These are external combustion engines with a sealed system using an inert working fluid, usually helium or hydrogen. They range in size from ½ kW upwards and are currently undertaking extensive field trials with a view to having production units in 2008/9. Leading brands such as Baxi and WhisperGen are working on units that will generate 1kWe for domestic dwellings. In addition, fuel cells are an emerging technology for micro-CHP applications (see below).

Heat Pumps

A heat pump moves heat energy from one place to another and causes an increase in temperature. An example of a commonly known heat pump is a domestic refrigerator. Where heat pumps are used for heating applications, heat is removed from the source (ambient air, water, soil or bedrock) and then

discharged where the heat is needed. Where cooling is required, the reverse happens and heat is removed and discharged into air, water, soil or rock.

The most common form of heat pumps are ground source heat pumps. In the UK, the earth that lies a few metres below our feet, keeps a constant temperature of about 11-12C throughout the year. The ground has a high thermal mass which allows it to store heat from the sun during the summer.

Ground Source heat pumps tap the heat within the ground and convert it into energy. The heat is captured from within the ground by either pipes laid into trenches or down a borehole and is eventually distributed within the building through radiators or under-floor heating. Air source heat pumps can be directly retrofitted to the exterior of a building.

Biomass

Biomass heating usually involves the use of commercial energy crops in the form of fast-growing trees such as willow or poplar for woodchips or waste wood products such as sawdust, pallets or untreated recycled wood for pellets. These fuels are

burned in either pellet stoves or larger scale boilers to provide heating and/or water heating.

Biomass is often called 'bioenergy' or 'biofuel'. These biofuels are produced from organic materials, either directly from plants or indirectly from industrial, commercial, domestic or agricultural products.

Fuel Cells

A fuel cell uses hydrogen and oxygen (from air) in an electrochemical reaction. Unlike technologies which "burn" fuel, with fuel cells the conversion takes place electrochemically without combustion. Fuel cells are used in portable applications (mobile phone and laptop battery replacements), mobile applications (cars, buses, planes, etc) and stationary applications (as UPS, standby power, distributed micro-CHP or as large MW electrical generators).

Fuel cells can be run on a wide variety of fuels, and importantly, fuel cells make fuels last longer. When run on pure hydrogen fuel generated by renewable energy sources, fuel cells produce no carbon or other toxic emissions at all, and can therefore help tackle environmental and energy security challenges. Fuel cells are quiet, have low maintenance requirements, high energy densities and high efficiencies. In addition, they can help to provide a buffer for fluctuating renewable power.

As micro-CHP devices in the home and business, fuel cells can use existing gas supplies and replace conventional boilers to provide heat and power as needed, with an overall energy efficiency of 80-90% and a carbon saving estimated to be around 1 to 2.6 tonnes CO_2 per year.

Appendix D - Estimated microgeneration installations in the UK – end 2004[27]

Technology	Number of Units	Notes and applicability
Solar Thermal	- 80,000 installed	Fully commercial, but technology improving.
Wind	- 700 installed	Typically roof/wall mounted, mass market domestic sector (<3kW)
Micro-CHP	- 200 installed	Mass market for gas boiler replacements
Photovoltaics	- 1100 installed	Technology becoming more established
Fuel Cells	- 10 installed	High electrical efficiency & therefore carbon offset
Ground Source Heat	- 400 installed	Particularly attractive for buildings with a good space provision

[27] Source: 'Our energy challenge: Microgeneration Strategy: Power from the people' Department of Trade and Industry, March 2006. http://www.berr.gov.uk/files/file27575.pdf

Biomass heating	- 150 installed	Wood pellet boilers
Micro-hydro	- 100 installed	Water Mill conversions

WRITTEN EVIDENCE SUBMITTED BY THE NATIONAL INSULATION ASSOCIATION

This submission is from the insulation industry and has been produced by the National Insulation Association (NIA). The NIA represents the manufacturers and installers of insulation products including cavity wall insulation, loft insulation and other innovative products.

We agree that less attention has been paid to efficiency initiatives within the non-domestic sector and believe this has been particularly acute in relation to smaller businesses. Therefore, the remainder of this response will focus upon one particular area which has been almost completely ignored by Government – smaller businesses, where we would welcome some focus added by the Group.

Improving energy efficiency of existing urban buildings

Smaller businesses premises share many of the physical attributes of the residential sector and therefore proven cost effective insulation measures exist which would improve their extremely poor levels of insulation. A policy lever to raise such standards in a systematic way should be investigated as a matter of urgency.

However, many of these properties, particularly in the inner cities have solid walls and are therefore not suitable for standard insulation measures such as cavity wall insulation. Therefore additional policy drivers are also needed to encourage investment in the solid wall insulation market. Our industry needs clear signals from Government that the vast carbon savings available via the use of this measure will be realised.

The potential for energy and carbon savings in the small business market are huge as is highlighted from the following information published by the Federation of Small Businesses:

- *there are 4.3 million small businesses in the UK (up from 4 million in 2003)*
- *97% of firms employ less than 20 people*
- *95% employ less than 5 people*
- *12 million people work in small firms*
- *small firms contribute more than 50 per cent of the UK turnover - about £1,200 billion.*

According to information published by Defra around 8MtC or 15% of total CO2 used by the business and public sectors are used by micro or small firms. Around 70% of this energy consumption is associated with building services such as space heating which demonstrates that there is enormous potential for carbon savings which must be explored.

Barriers to reducing emissions from urban buildings in the small business market

Since the Climate Change Levy was introduced to increase energy efficiency through the Climate Change Agreements it has had little impact on smaller users who view it as an energy tax. This is due to the fact that the financial penalty is not high enough to affect change in smaller businesses as this is such a small percentage of their overall costs. This is particularly acute where a company subleases the property as there is not a driver for action from either the tenant or the landlord.

However, there are similar barriers to the uptake of energy saving measures in this sector as in the residential sector such as a lack of understanding as to the benefits of insulation, payback periods and the like. Compared to the many pressing problems facing smaller businesses, climate change is not the top priority for management action. We believe this area has been ignored to date by the present Government and this is clearly untenable moving forward and in direct opposition to European edicts. The Energy End-Use Efficiency and Energy Services Directive applies to all energy users including this market and therefore Government has a responsibility to ensure that policy measures are initiated to cover this sector which will drive action.

The policy initiatives needed – including regulation, fiscal incentives, penalties and educational campaigns – to address these barriers effectively.

The Government recently consulted on the Carbon Reduction Commitment which will capture emissions from energy use of any organisation whose energy use has a mandatory half hour metered electricity consumption of more than 6,000 MWh/year. This will generally capture those organisations with an annual energy bill of over £500,000.

But this omits smaller businesses where there is a need to encourage action to reduce carbon emissions. Therefore we believe that a proportion of the monies raised through the levy must be focussed on programmes which will directly incentivise this sector to carry out appropriate measures.

This should be in the form of specific advice and grants which will overcome the barriers directly experienced by this sector and encourage the uptake of cost effective energy efficiency measures such as wall and loft insulation. Whilst the Carbon Trust has demonstrated great expertise in incentivising and encouraging action amongst larger business energy users they have not demonstrated the same expertise or focus in relation to smaller businesses. This is due to the fact that such businesses have far more in common with the domestic retrofit market which is currently engaged in energy efficiency matters by the Energy Saving Trust. Therefore, if such an initiative were implemented then it is recommended that the expertise of the Energy Saving Trust be utilised in implementation including utilising their advice centres to provide advice and information to small businesses.

Trade Associations such as the National Insulation Association can also play an important role in this area by providing small businesses with direct access to professional insulation companies, information and advice.

In technological terms the uptake of proven technologies such as insulation measures where the life time carbon savings are the greatest and the payback periods the shortest should be encouraged.

At the present smaller businesses are paying towards the Levy but not receiving the benefits which would lead to a reduction in their carbon emissions. It is vital that if energy use is to be reduced then this market is incentivised and the current arrangements do not do so and represent a real policy gap in the Government's carbon agenda.

The most robust option to ensure that carbon emissions are reduced within the smaller business sector would be to draw on the vast success and very cost effective carbon savings which have been achieved in retrofit domestic properties via the Energy Efficiency Commitment (now called the Carbon Emissions Reduction Target).

A similarly structured scheme, ring-fenced for the smaller business sector, would prove to be very cost-effective - as was demonstrated under the Energy Efficiency Standards of Performance scheme when this not only covered the domestic market but also small businesses.

If this were not possible then we would welcome the opportunity to discuss other options with the Group. If any further information or oral evidence is required please do not hesitate to contact us.

John C Mason
Head of Policy and Communications
National Insulation Association

WRITTEN EVIDENCE SUBMITTED BY OVE ARUP AND PARTNERS

Humanise the Street

- Quiet, pollution free streets allow opening windows both for non-domestic buildings and residential buildings. Most commercial buildings have sealed facades simply because of external noise and pollution. These sealed facades and the resulting air-conditioning effectively double building energy use and associated carbon emissions (ref ECON19).

- The introduction of Low Emission Zones (ref GLA) with their ultimate aim of allowing only zero emission low-noise vehicles (electric, hydrogen fuel cell or plug-in hybrid running in electric mode) should be anticipated in the urban form and its buildings.

- Main transport corridors such as rail should have their own noise shielding to protect adjacent buildings (ref HK transit or large screens on motorways as Europe)

- Walkability with appropriate build density and local amenities for the local community helps avoid the need for local vehicular trips as well as reinforcing the streets are for pedestrians.

- Vegetation is a key aspect of streets and buildings. Trees provide cool shade to promote pedestrians in summer while allowing daylight penetration in winter. Extensive surface covering of vegetation at roof and ground level absorb heat and reduce Urban Heat Island effects. Larger vegetation helps protect against wind gusting and wind canyon effects reaching ground level.

- There is also a role of pollutant absorption with the appropriate choice of vegetation

Community Energy

- Cost of delivering zero carbon initially for new-build and eventually for the existing stock is very dependant on the scale of their energy systems. The costs can vary from less than £5k per dwelling attached to community sized system serving 500 homes, up to up to some £50k for a standalone house.

- The remotely located power-stations generate almost as much waste heat as is needed to heat the whole of the UK's buildings. The aim of Decentralised power generation is to bring clean modern electrical power generation sufficiently close for the waste heat can be piped directly to the buildings. This is CHP (combined heat and power) serving a district heating as part of a community energy system.

- Ideally new developments should be designed to minimise their electrical demands and instead make use of as much of this waste heat as possible. The same district heating should also connect into the existing building so that the surplus heat is available to the existing stock with its higher heat demands.

- One of the advantages of community based CHP is that it offers flexibility of fuel sources without having to retrofit in future the buildings it serves. Fuel examples include clean wood biomass, waste timber, municipal solid waste, commercial waste, sewage/food waste anaerobic digestion, specialist waste streams like old tyres, etc.

- Community energy centre locations should be planned to have good access to transport routes, including canals, rail, etc.

- Delivery of community energy systems can only be led from a wider town planning and master plan level. The numerous northern European examples (Hammerby, Malmo, Copenhagen, Hanover…..) are all initiated and led by the local planning authorities. Individual plot developments are normally too small to make these systems financially viable. As a general rule minimum housing densities of 50 homes/ha average are recommended to limit the cost of pipework installation.

The following role and responsibilities would be typically needed:

- **Local government:** Provide the outline design of community heating systems. Locate community energy centres (with upgrade space and fuel transport access), and put policies in place to oblige all new developments to connect. Define limits on the new development energy demand profiles for compatibility with community heating systems. Administer rolling fund established from planning tariffs (this funds the laying of pipework) and potential future zero carbon buy-out funding. Provide land for energy centre. Oversee process of clustering individual new developments with connecting pipework with temporary energy centres prior to full community networks. Oversee connections of existing properties using CERT funding (CERT replaces and EEC from 2011).

- **Energy companies:** Enter long term obligation to provide and operate district heating systems. Fund and build energy centre. Comply with obligation to upgrade to zero carbon where initially set up using natural gas fired CHP. Install pipework system drawing on rolling fund for top-up funding. Operate district heating system to meet quantify service standards. Agree terms for supply of energy to consumers. Split profits to nationally agreed formula with rolling fund. Implement connections of existing properties using CERT funding (CERT replaces and EEC from 2011).

- **Developers:** Obligation for building systems compatibility with, and to connect to, district heating (even if not yet installed). This would include absorption chilling to make use of spare summer heat capacity (& 100% winter free-cooling systems when heat demand is otherwise at its highest). Meet zero carbon targets set by planning/building regulations and contribute to rolling fund using buy-out mechanism where full zero carbon not met on site. Certain on-site renewables would not be permitted because they reduce the financial viability of district heating.

- **Central government:** Prepare scenarios illustrating formulation and evolution of district heating system to serve new and existing buildings. Set obligations and guidance for local authorities to implement systems. Draw up standard contracts. Relax energy supply monopoly rules where energy companies commit to longer term investment in local community energy systems. Establish basis for locally administered district heating support rolling funds. Stimulate demonstration projects.

- **Owners and occupiers:** change behaviours by running their buildings efficiently: switching off equipment that is not needed; adjusting set points upwards in summer and downwards in winter; maintaining equipment properly; monitoring energy consumption daily. There is ample evidence that energy consumption can be reduced by at least 20% across the board at little or no cost.

- Beware of implementing 'low hanging fruit' measures in absence of longer term community based strategy. For example, initially implementing extensive heat refurbishment may mean subsequent district heating pipework installation would need more subsidies because of reduced income for the energy company, which in turn makes the next step of upgrade to fully renewable energy sourcing more difficult.

- Community energy systems would also include large scale wind turbines located in local parks paid for by public subscription with dividend return – part of community engagement

Future Proofing

The built environment should be designed for change. Future energy costs, legislation, building and appliance labelling, together with carbon trading being applied to progressively smaller organisations, will be driving the desire for lower carbon buildings. Current benchmarks for energy performance are likely to rapidly become obsolete. The challenge is to ensure our built environment does not become likewise obsolete.

Laptop computer technology is halving the cooling needs of the work place. Task lighting has the potential to do the same for office lighting. Proscribed maximum cooling capacity for solar are also likely to dramatically reduce the commercial building future cooling requirements. These bring the cooling needs well within the capacity of natural cooling using room exposed thermal mass surfaces (coupled with night ventilation). Even if initially an air-conditioned fit out is perceived necessary for current commercial expectations, buildings should be designed so that at the first fit out the air-conditioning can be stripped out and the building operated with natural ventilation.

The European trend of workspaces all being within some 7.5m from windows is also likely to become a significant factor as attracting and retaining quality staff with higher perceived space quality becomes more important. The emphasis is likely to change towards quality of daylighting instead of the current obsession for oversized windows with their inherent poor light distribution and glare across the room depth.

Master planning should anticipate these trends. Depth and massing of buildings in master planning block terms should be tested for depth allowing natural ventilation, with particular care across corners of doughnut blocks.

A different approach to façade solar access will be needed with future high levels of thermal insulation reducing the heating season to little more than a month or so. Under these circumstances south façade horizontal brise soleils are no longer suitable for protecting against low sun angle over-heating.

Future proofing strategies are needed to ensure that new buildings and regeneration efforts do not quickly join the ranks of the difficult to upgrade existing building stock.

Compared with individual building energy generation, community energy systems normally allow relatively easy switching to alternative renewable fuels at central plant renewal stages without having to upgrade each building connected to the system.

It is clear that planning policy will need to become far more proscriptive on what are the appropriate local energy systems, their future trajectory to low and zero carbon for the community, how systems are to be implemented, and to describe the default measures needed of development proposals to connect and support these systems.

Code for Sustainable Homes and Code for Sustainable Buildings

- The importance of achieving zero carbon in the new-build section is highlighted by the fact that for 2050 some 30% of our buildings have yet to be built and much of this new-build is simply adding to the existing building stock and hence adds to UK carbon emissions and does not contribute to the UK's downward carbon trajectory. It is also the case that much of the techniques required for improving the existing stock are initially developed in the new-build sector before filtering into refurbishment.

- A non-domestic version of the Code for Sustainable Homes is currently in preparation. It is likely to have a similar format, together with a timescale to zero carbon new-build over the next decade or so.

- The economics of delivering the zero carbon aspect of these Codes is very dependant on the scale of their energy systems. Particularly for smaller urban developments it becomes too costly to deliver zero carbon within the confined of densely built sites.

- Given that non-domestic use buildings typically have almost double the electrical demands of residential buildings there is likely to be more acute limits on the proportion of renewable energy that can be generated on site. This will tend to add momentum to the need for near-site renewables in the form of decentralised community energy systems. The option of remote off-site renewable electricity from wind farms is not expected to be readily available due to future high demand from other sectors such as transport and the existing building stock.

- Both the CSH and a future Code for Sustainable Buildings (CSB) provide a framework for progressive improving environmental performance of new-build with a default programme for carbon emissions aspects of the Code implemented via the Building Regulations updates on a 3 yearly cycle. Various agencies intend to use the CSH/CSB but to accelerated implementation programmes. The Housing Corporation policy is for all aspects of the CSH to be implemented on funded affordable homes one year ahead of the Building Regulations timescale. English Partnerships is expecting three year acceleration, with more so for the Ecotowns and Carbon Challenge sites to act as trailblazers and build experience where government land is involved. Various LPAs like the GLA are also considering accelerated implementation of aspects of these Codes.

- For major developments a key issue is how subsequent phases trigger higher requirements under the CSH/CSB. The latter phases may be insufficient size in themselves to be able to cost effectively deliver CSH/CSB Level 6. It is important for the master planning to include an energy strategy illustrating how appropriate investment in site-wide infrastructure allows later phases to meet their enhanced commitments. As an example, future proofing early phases with district heating

based on gas-fired boilers can then be upgrades to gas-fired CHP for later phases, and then perhaps biomass CHP for the final zero carbon phases. This also allows relatively easy upgrade of earlier phases to zero carbon at a later date. Care is needed with technologies like ground-source heat-pumps which although appropriate for delivering lower levels of the CSH, become problematic at higher CSH levels because of the extra electricity they add to residential energy demands.

- Issues very similar to those encountered on phased major new developments are applicable to progressive installation of community low carbon energy systems into existing building stock.

Climate Change Adaptation

- Planning for climate change involves two largely separate aspects:
    - Mitigation; which is reducing the causes of global warming, e.g. carbon emissions.
    - Adaptation; which is lifestyles and built environment changes needed to accommodate the extent of changing climate that is going to happen
- In general terms the extent of climate change over the next 25, 50 and 75 years has been predicted. There is on going research to improve these predictions, but the first order aspects sufficient for urban planning are already in place.
- The expectation is that the usable life of our existing and new buildings will need to be extended as materials and energy become scarcer. Consequently, plans for the future built environment should be tested against future climate change scenarios to minimise the risk that they become prematurely obsolete.
- Different components of the built environment will need testing against different time horizon scenarios. The buildings themselves are tested against the most distant time scenarios, with initially installed components on shorter timescales. Hence, the building structure and any needs for room exposed thermal mass would use the longest timescales because they are most difficult to change retrospectively. On the other hand, windows with a useable life of say 20-25 years would be tested against this shorter timescale, knowing that enhanced windows and shading can be installed when they are renewed. At the townscape level, long term scenario testing may suggest trees for pedestrian solar shading, but this may need a timescale of many decades to mature to appropriate size and so need implementation now. Similarly, attenuation of storm-water runoff may require areas of soft landscaping and building green-roofing that would be difficult to retrofit.
- Building massing is of critical importance for future proofing and future use of natural ventilation. The question of how this natural cooling can cope with increasing temperatures is important. In this context there is considerable research into solar powered cooling in Mediterranean countries. Whether powered by solar hot water or solar electric PV, both show promise, with the potential of perhaps meeting between 10-20% of the capacity of conventional cooling. Thus, a naturally ventilated building designed for comfort conditions with the current climate has the potential for future retrofit of solar powered cooling to cool ventilation air by the few extra degrees anticipated by climate change.

- Urban heat island (UHI) effects will add to the climate change temperature rises. It is very important that comprehensive strategies are implemented to reduce this effect; otherwise it acts as a trigger for multiple heat emission effects escalating the ambient temperatures. If UHI gets too high such that natural ventilation is insufficient, then air-conditioning effectively doubles the heat emission for a building into the local atmosphere. In addition, this same heat rejection equipment works less efficiently as ambient temperatures rise, so adding further heat emissions. As these outdoor conditions get hotter more people tend to opt for air-conditioned private transport to get around town which in turn add further heat emissions.

Measures for reducing UHI that should be prompted by town planning and master planning include:

    - Reducing and eliminating vehicles, because of their high heat output (more than two thirds of their energy ends up as heat)

    - Air-conditioning avoidance, because it rejects all the extracted heat plus its operating energy, as heat into the local outdoors (building depth, massing, materials, proximity to noise & pollution, etc)

    - Increased vegetation, in the form of ground cover, pedestrian cover & roof cover. Plants convert heat into energy for transpiration and growth, as well as providing direct shielding of solar radiation.

    - Retention of storm water in green roofs and vegetation. This acts as a flywheel extending the evaporative cooling effects for days and weeks after the rain have gone.

    - Solar reflective surfaces, for example, 'Cool-paving' and 'cool roofs' to reduce surface heat absorption.

    - Sufficient night security (& perception) to allow cool night ventilation using openable windows

- There is a need to start quantifying the extent of the above measures expected of any development in a particular area as a default in the local planning policy guidance. For example, the percentage of site vegetation coverage (ie the proportion fully shaded).

What are the obstacles to improved energy efficiency?

A number of commentators point to market imperfections. These may be listed as:

- A lack of awareness among consumers, compounded by a lack of reliable information

- A lack of options, which discourages consumers from making energy-efficient choices

- Landlord-tenant relationships – who should pay for improving the energy efficiency of a building?

- Cost – financing the up-front investment can be a barrier

- Taxation - VAT on refurbishment actively discourages making serious improvements to a home or commercial premises.

The main political parties can help by removing climate change and energy policy from party politics, and agreeing a national framework that will guide and assist the transition to a low carbon economy.

Central government can then act decisively to remove the barriers to saving energy: public information campaigns that demonstrate what can be achieved at no cost, by behavioural change alone; making available grants and low cost loans for improving the energy efficiency of buildings; regulating to allow energy-saving schemes to be fast-tracked through the planning process; removing VAT from refurbishment; encouraging community energy schemes by regulatory and fiscal means; copy the German renewable energy policy; and finally, make it cost-neutral for power generators to install CCS.

As stated above, building owners and tenants can help by simply running their buildings efficiently: switching off equipment that is not needed; adjusting set points upwards in summer and downwards in winter; maintaining equipment properly; monitoring energy consumption daily. There is ample evidence that energy consumption can be reduced by at least 20% across the board at little or no cost. To this end the role of central government will be to campaign effectively to get this message across, and to provide the clear and objective data that will enable consumers and businesses to make appropriate choices.

WRITTEN EVIDENCE SUBMITED BY OXFORD INSTITUTE FOR SUSTAINABLE DEVELOPMENT, OXFORD BROOKES UNIVERSITY

1.0 Overview of OISD

The Oxford Institute for Sustainable Development (OISD), which is based within the School of the Built Environment at Oxford Brookes University, was established in July 2004. OISD, which has six main research groups, is the largest academic research institute in the UK dedicated to research on sustainable development in the built environment. The website is at: http://www.brookes.ac.uk/schools/be/oisd/

A recent HEFCE report into sustainable development in higher education in England suggests that the Oxford Institute for Sustainable Development (OISD) is one of the key players in sustainable development research. OISD is also a member of the UK Green Building Council.

The mission of OISD, which has a multidisciplinary focus, is to help create a sustainable future by undertaking research on sustainability in the built and natural environments. OISD is currently carrying out a range of funded research for the research councils, industry and the public sector.

2.0 Response of OISD

In the response which follows, we have focused primarily on commercial property.

2.1 Barriers to reducing emissions from urban buildings

***Lack of Information:* How good is the data that owners/occupiers have about their energy usage, efficiency and carbon footprint? How far are they able to benchmark their performance against that of others? If owners/occupiers lack data about their building's energy usage, what is preventing them from getting it?**

Research by the Carbon Trust (HM Treasury, 2005)[28] suggests that there are a number of barriers to energy efficiency measures by both the public and business sectors. These fall into four main groups which include:

- Investment costs of new technology set against energy savings.
- Hidden costs from adopting more efficient energy equipment.
- Market failures from 'split incentives'[29] (i.e. the landlord – tenant split where tenants pay energy bills but landlords control the properties).
- Organisational inconsistencies, where there is a misalignment of return within an organisation when differing parts of an organisation may place different values on different rates of return. This may derive from managerial inertia or key decision-makers lacking interest or motivation to improve energy efficiency.

Another important barrier is the relatively small proportion of total costs that energy represents for a commercial organisation (about 1-6%) (Mayor of London, 2007[30]);

[28] HM Treasury (2005) *Energy Efficiency Innovation Review: Summary Report*

[29] Or what Urge-Vorsatz et al (2008) (see footnote 11) refer to as the 'principal-agent' barrier.

[30] Mayor of London (2007) *Climate Change Action Plan*

nonetheless, with increasing energy costs, this figure is rising. This therefore creates a reduced incentive for change, and is often exacerbated by the use of energy use estimates rather than meter readings or 'bundling' of costs. Also, key information on fuel bills such as carbon emissions associated with actual gas and electricity consumption, are frequently missing. The only benchmarks available on energy consumption are those from CIBSE Guide F, and they are out of date as they are based on studies undertaken in 1990s. Over the years, research on post-occupancy evaluation of buildings by OISD and others have shown that there is a wide credibility gap between designed energy use versus actual energy consumption, due to:

- Little monitored information and feedback on building performance in use to those who procure and regulate buildings.
- Problems with design, specification, build quality, commissioning, handover, operation, controls, usability, management and communication.
- More equipment, using more electricity in particular and often requiring yet more equipment to cope with the consequences.
- Unmanageable complication as we throw more and more technologies into buildings, when what we really need is to keep it simple and do it well.
- Consequently, many systems don't work properly, aren't understood by users and management, and default to ON, even when they are not needed. This also happens for health & safety reasons.
- And finally a more legitimate reason. Often new non-residential buildings are used more intensively (higher occupation densities, longer operating hours) than their predecessors. Therefore to judge them solely on consumption per unit area may not be fair.

Other barriers may be related to cultural and behavioural issues or, indeed, the fact that a number of costs or risks may not be captured directly in financial flows.

At the heart of many these barriers lies a lack of information. It is clear from our continuing research that many organisations either do not measure environmental performance in their buildings or the systems they are using may be questionable. This is a more severe problem when global companies are trying to cope with varying standards internationally. In addition, for many property professionals providing advice, their training and education may limit their ability to provide such advice, and pursuing

It is for these reasons that the Investment Property Databank (IPD) has recently launched its environment code for corporate occupiers, which is designed to provide a simple way of collecting data and benchmarking performance for corporate occupiers of commercial property.

It is also clear that a lack of relevant information has also constrained investor interest in 'green' or 'sustainable' buildings in the USA and UK (Nelson, 2007)[31]. As investors wait for better performance data so there are further delays in committing to more sustainable new build or refurbishment. The development of a FTSE4 Good Index for property investors could therefore help tackle this problem.

Ultimately, the 'circle of blame' seems still all too pervasive. By tackling both the investor and occupier sector with better information on energy consumption, water, waste and related factors, these continuing deficiencies and misalignment between owner costs and benefits could be addressed.

[31] Nelson A. (2007) *The Greening of U.S. Investment Real Estate-Market Fundamentals, Prospects and Opportunities*. RREEF Research No. 57, November 2007

***Costs, benefits and barriers to owners/occupiers:* Even if a more comprehensive understanding of a building's energy usage could be achieved, what is preventing owners/occupiers from undertaking measures to use energy (heating and electricity) more efficiently or minimise energy wastage? What barriers (both economic and physical) do owners/occupiers face when considering the installation of low carbon technologies?**

As described above, a key barrier is the lack of data sources and information allied with the 'split incentive' issue. A further barrier is the lack of experience with green or sustainable buildings in the sector, or indeed the lack of awareness of the importance of these issues. Recent research by OISD (Dixon et al , 2007a; Dixon et al, 2008)[32] on energy performance certificates for the Investment property Forum (IPF) (and published by the Investment Property Forum Research Programme) showed the market remains unprepared for the implementation of energy performance certificates and unconvinced of a business case for upgrading stock. Businesses that were gearing up for implementation were being hampered by the lack of key information regarding the energy performance certificates, including the setting of the A-G rating bands. Uncertainty also remained regarding the availability of sufficient numbers of assessors. Evidence was also found of a continuing market perception that the capital-expenditure required to upgrade existing buildings remains too high for it to be economically feasible in most cases. Government estimates suggest the introduction of EPCs for commercial buildings will initially cost approximately £102m in 2008 in England and Wales. This represents the equivalent of about 2.5% of annual property development and improvement investment expenditure for the whole of the UK. Other issues raised by OISD report included the considerable variation in implementation and timing across Europe: for example, many countries are adopting only EPCs and not operational energy certification, which the UK has committed to introducing. This could lead to variation in obligations and, potentially, management costs across European property portfolios.

When it comes to installing low carbon technologies owners and occupiers often face technical difficulties and conflicting evidence. Clients are not aware about the longer term cost-benefits of deploying low carbon technologies versus their capital costs. Seminal reports on commissioning sustainable construction and saving energy in the FE sector by Gupta and Chandiwala (2007)[33] use evidence-based information to advise senior management teams in FE colleges about what low carbon systems work, and the importance of reducing the demand for energy first, before adding any low carbon technologies.

***Costs/Benefits to the wider economy:* How important are the wider urban economic impacts of greening existing buildings? The majority of commercial property is occupied. A full scale retrofit would require temporary relocation for the occupants, with potential profit losses for the landlords and disruption to tenants' businesses. What are the likely impacts on cities' economies (for example in terms of job creation and business opportunities/costs in the property industry and other business sectors)?**

[32] Dixon, T., Keeping, M., and Roberts, C. (2008) 'Facing the Future: Energy Performance Certificates and Commercial Property' (Practice Paper), JPIF, Vol 26. No. 1, 96-100 and Dixon, T., Roberts, C. and Keeping, M. (2007a) The Energy Performance of Buildings Directive and Commercial Property Investment: A Situation Review, Investment Property Forum

[33] Gupta, R and Chandiwala, S. (2007). *How to commission sustainable construction in further education colleges*. Seacourt Publishers, Oxford. ISBN 978-1-873640-58-6
Gupta, R and Chandiwala, S. (2007). How to *conserve energy in further education colleges*. Seacourt Publishers, Oxford. ISBN 978-1-873640-59-3

Research from RICS by Cyrill Sweet (2007)[34] has shown that there are often substantial disparities in environmental performance between existing and new buildings, with a strong perception that retrofitting is expensive and disruptive. Related problems include:

- Resistance to change by the building's occupiers;
- Suitability of the fabric of the building for retrofitting;
- Noise levels and disturbance;
- Ongoing maintenance costs;
- Installation costs; and
- Planning approval processes.

Nonetheless the same research points to the fact that relatively small innovations can create substantive benefits. For example:

- Up to 60% reduction in energy use through the installation of energy efficient lighting;
- A 50% or more reduction in heat loss through walls by installing cavity wall insulation; and,
- The provision of thermal insulation, rainwater attenuation and habitat for a range of species by retrofitting a 'green roof.'

The EU has estimated that a 20% reduction in EU energy consumption by 2020 can potentially create up to 1m new jobs (EC, 2005), especially in the semi-skilled labour trades. The growth in professional property services and allied construction trades needed to deal with the increased demand for cost effective solutions could be a potential benefit to city economies. Research for RICS by OISD (Dixon et al, 2007b)[35] has highlighted how there is a substantial demand for property services related to sustainability issues. However, over the next few years, given uncertainty in the property market as the credit crunch starts to bite, will investors and occupiers still see energy efficiency and green issues in the same light?

2.2 Breaking down barriers to 'greening' urban buildings

<u>Addressing the lack of information:</u> What actions are needed at the industry level to produce the measurement standards needed? How can the Government support the industry in achieving this? Are there any current tools that could be adopted to improve energy measurement?

There needs to be greater consensus between occupiers and investor/landlords as to the type of information that is needed. The UK Green Building Council and the various property industry bodies (eg Property Industry Alliance) need to ensure a consensus view. Key to this will be further research which should identify the full range of tools which can be used to improve energy measurement. These include:

- Regular post-occupancy evaluation of buildings to look at both the hard and soft issues of building performance (Gupta 2007)[36]

[34] RICS (2007) *Transforming Existing Buildings: The Green Challenge*
[35] Dixon, T et al (2007) *A Green Profession? RICS Members and the Sustainability Agenda*
[36] Gupta, R. (2007). Leading by example: post-occupancy evaluation studies of city council-owned non-domestic buildings in Oxford to assess the potential for reducing CO_2 emissions. Peer-reviewed paper. *Proceedings of the 24th International Conference on Passive and Low Energy Architecture (PLEA)*. 22-24 November 2007, Singapore.

- Landlord energy statements to provide operational energy use and related carbon emissions to both tenants and landlords.
- Carbon modelling of the non-domestic building stock by local authorities using principles of GIS-based neighbourhood level modelling developed by well-respected DECoRuM model (www.decorum-model.org.uk).

In addition, further research is needed to examine the behavioural aspects of energy consumption and how key stakeholders in the commercial property sector are engaging with the sustainability agenda.

Addressing economic consequences: If owners/occupiers face barriers to more efficient use of current energy sources, what policy changes would allow them to overcome these barriers? What are the comparative merits of regulation, market mechanisms, fiscal incentives/penalties and educational awareness campaigns?

A recent UK Green Building Council seminar identified a range of fiscal incentives which could drive forward a green agenda. Part of this is to with influencing those who develop and invest in commercial property but part is to do with influencing lifestyle. For example, BDGworkfutures commissioned BMRB to conduct 1600 face-to-face interviews for its green initiatives survey (BDGworkfutures, 2007)[37]. The research discovered that of those people who have environmentally-friendly initiatives happening in their company, 70% felt it was not up to individuals themselves to be responsible—instead the responsibility lay with company directors (35%); facilities managers (15%) or office managers (10%). The same survey found that energy saving measures were easier for office workers to carry out at home—the conclusion from the research was that as consumers we are able to make our own ethical and socially responsible choices, but as employees, power has to be relinquished to property and procurement experts.

As reported by Urge-Vorsatz et al (2008)[38] there are a range of global policy tools and instruments designed to reduce CO2 emissions in the building sector. Their research showed that building codes and appliance standards could achieve the highest CO2 emissions reductions, while appliance standards and energy-efficient obligations and quotas were found to be amongst the most cost-effective policy tools, with negative net costs a key outcome. Lack of progress in the sector is often due to lack of regular updating of building codes and insufficient enforcement.

From our research and the findings of other we believe that the following instruments will need further analysis at a UK level:

- Mandatory code for existing buildings based on operational energy use.

- The current polarisation on VAT for refurbishment and newbuild continues to mitigate against sustainable retrofitting. There is now a large body of evidence to suggest there should be a reduced 5% rate for refurbishment and an increased rate to the same percentage for newbuild.

- Tax breaks, including enhanced capital allowances for energy-efficient capital expenditure and tax relief for retrofitting involving energy efficient measures.

[37] BDGworkfutures (2007) *Green Initiatives*
[38] Urge-Vorsatz, D., et al (2008) 'Mitigating CO2 emissions from energy use in the world's buildings', *Building Research and Information*, 35(4), 379-398

***Monitoring and enforcement*: How should policies to ensure carbon reduction be enforced? What is the most effective level of intervention for different policy options? Should it be addressed mostly through the planning system? Should they sit at national or city level? How can city leaders together with the private sector help deliver greener buildings?**

The policies for ensuring carbon reduction need to address a number of different levels:

- Individuals;
- Organisations; and
- Buildings.

In this context the planning approval process is also key, and it will be important for both the public and private sector to work together to ensure the best and most appropriate outcomes.

At a city level there is already the Clinton Climate Change Initiative (in alliance with the C40 Large Cities Climate Leadership Group) which has brought together cities, energy companies and financial institutions through its joint 'Energy Efficiency Building Retrofit Program'. This initiative focuses on a small part of what is a global issue. In one sense the property cycle of refurbishment and maintenance provides the opportunity for retrofitting—despite the uncertainty surrounding EPCs, key to this will be the emergence of a market for commercial property driven by the energy rating of buildings.

Further research is needed to examine the best ways of partnering and joint venture for retrofit schemes at a city and national level.

Prof. Tim Dixon, Director of OISD (E: tdixon@brookes.ac.uk)
and Dr Rajat Gupta (OISD: Architecture Unit)
Oxford Institute for Sustainable Development
Oxford Brookes University
May 2008

WRITTEN EVIDENCE SUBMITTED BY PRICEWATERHOUSECOOPERS LLP

9 May 2008

Our ref: Tax/RW/CT03/HG2

Dear Sirs

All Party Urban Development Group
Spring Inquiry: Climate Change and the Urban Built Environment

Introduction

PricewaterhouseCoopers (PwC) is pleased to submit evidence to the All Party Group's inquiry. We are committed to contributing to all the inquiries and consultations that may be undertaken to explore how Britain's cities can use innovative measures to deliver sustainable communities and tackle climate change.

In this case we have restricted our comments to the fiscal policy changes that may allow owners/occupiers of existing commercial buildings to overcome the barriers to reducing carbon (and similar) emissions.

We note that the All Party Group is interested in new initiatives that may help achieve the aim of reducing environmental impact. We make two general comments in this regard:

- Firstly, there is, rightly, an increasing focus from HM Treasury on simplifying the tax system, to reduce the compliance burden on business. The introduction of any new fiscal measures to specifically deal with the energy performance of business premises will need to have the possible administrative burdens created firmly in mind.

- Secondly, we believe that the required fiscal measures are broadly already in existence and the introduction of further measures may be unnecessary.

Existing measures

We note that the most recent Budget Economic and Fiscal Strategy Reports refer to the Climate Change Levy (CCL) and the Enhanced Capital Allowances (ECA) system as the major policy measures upon which the Government is relying on to deliver their policy objectives in the area of this inquiry.

Designing an effective tax on actual carbon emissions is proving difficult, with the closest approximation by the UK Government being CCL - a tax on the use of energy generated by fossil fuels. Such energy causes environmental impacts all along the chain, from extraction and production to transportation and end-use[39]. CCL does broadly address the European Commission's recently-set targets for reducing carbon emissions[40], as energy efficiency is one of the key ways in which emission savings can be realised.

[39] Europa, Press Releases, Memo on the renewable Energy and Climate Change Package
[40] 20 20 by 2020, Europe's Climate Change Opportunity, (http://ec.europa.eu/commission_barroso/president/pdf/COM2008_030_en.pdf)

Some of the other existing fiscal measures might also be employed to assist with the environmental objective, albeit with certain revisions to their current operation. This could create a 'basket' of measures that would help shape how business recognises and subsequently mitigates the cost of the pollution generated through their use of property.

The current market situation

Our experience is that property developers have, or have access to, the knowledge and resources required to undertake appropriate retrofitting of existing commercial buildings. However, they do not commit to such work due to a perceived lack of demand from occupiers[41] or property agents.

Even significant improvements in the energy efficiency of an existing property would have little impact on the scale of an existing tenant's occupancy costs, given the small proportion that energy bills represent to the rent/rates/service charge equation. Also, developers tend to view it as equitable that any measurable energy efficiency improvements they introduce ought to be rewarded by an increase in the rental value of their property. Accordingly, there is no real business case for work in this area.

If there is no simple business case for change to reduce business' environmental impact, moral obligation and a commitment to acting and being seen as a socially responsible organisation may prompt action. That is inevitably influenced by financial considerations. However, with the prospect of a price being more deliberately placed on carbon in the medium term, either through the introduction of the UK's Carbon Reduction Commitment (CRC) or other specific regulation[42], business will have to address the cost of their environmental impact in order to protect shareholder value and the inherent value of their image or brand.

Possible fiscal measures that might be considered

We now comment on some of the fiscal policy measures that might be used to encourage businesses to address the issue of pollution from the existing urban built environment.

1. It would be possible to introduce differential rates of business rate (property tax) to reward those operating from energy efficient properties whilst, in effect, penalising those who choose less efficient accommodation. Given the scale of property tax within the UK, relative to the rental value of properties, any significant increase or reduction is likely to have a marked impact on a tenant's occupancy costs. Therefore, where a tenant is able to make a choice between two prospective properties of differing energy efficiency, a rational business decision would be to choose to occupy the more efficient property. Over time, inefficient properties may be subject to greater void periods or may not be able to command such high rental values. That would put the capital value of those properties at risk. Accordingly, rational landlords and owners/developers of inefficient buildings would heed the market signals and undertake to improve their stock and protect their investment returns. The measure of what constitutes an efficient or inefficient property must be clear and unambiguous. Fortunately, the UK will have a ready made system of determining that measure following the introduction of Energy Performance Certificates during 2008.

[41] Emerging Trends in Real Estate © Europe, 2008
[42] Green paper on market based measures for environment and related policy purposes, (http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0140en01.pdf)

2. The existing stamp duty regime could be adapted to stimulate innovation in how developers redesign and renovate existing buildings to overcome concerns over their environmental impact, through a mix of differential rates and rebates[43]. For example, where a developer acquires an existing inefficient building, whose inefficiency will be appropriately recognised following the introduction of EPC labelling, and undertakes to improve the energy performance of that building within a reasonable predetermined timeframe, then a rebate of the stamp duty land tax (SDLT) payable on the purchase should be made. The level of the rebate could be made dependent on the measurable improvements made. Again, the data generated through EPC labelling (pre acquisition and post renovation) could be used as an easily measurable and transparent way of determining the level of improvement and, therefore, the appropriate level of rebate. Whilst it is recognised that many existing buildings simply do not possess the potential for achieving the highest energy performance ratings, as all buildings constructed to 1995 Part L standards, which includes everything built up until 2002, would currently have an energy performance rating of E[44], there is still huge potential for developers to be rewarded for being innovative and pushing the boundaries of what is thought possible with current materials and techniques. A policy of differential rates of SDLT, where the most energy efficient buildings would be subject to lower rates of SDLT, would continue to reward those who choose to purchase or lease existing buildings whose energy efficiency has been improved with the assistance of the rebate.

3. Once the appropriate signals are in place to stimulate occupiers and developers to commit to changing their behaviour and to demand and undertake to deliver retrofitting of existing buildings, the enhanced capital allowance (ECA) system can be used to help steer appropriate design. Unfortunately, whilst giving ECAs on only the most energy and water efficient building components is a major policy tool, we are not yet at a position where ECAs in isolation are sufficient to stimulate the changes required. In fact, in many respects, until recently the capital allowances system rewarded bad behaviour, by giving tax relief for mechanical installations that demand high energy and water resources for their operation, whilst denying relief for more mundane yet effective air treatment solutions – such as thermal insulation and solar shading. However, with the introduction of the integral features category of allowances and the increasing differential between the rate of relief for ECAs and other less energy efficient systems and components, the conditions are now set to reward good green design and penalise (in relative terms) wasteful design.

4. We believe that changes are still required to the capital allowances system to ensure that they work effectively in this regard. For example, whilst the ECA system is appropriately targeted at predominantly (in the context of much of the existing urban environment) lighting and air conditioning[45], it is too pedantic and narrowly focussed in its qualifying criteria to generate sufficiently high yields of ECAs within overall project analyses and this has made the ECA system somewhat ineffectual. There is a good case for relaxing and widening the

[43] A similar suggestion was tabled at the Think Tank event hosted jointly between the UK Green Building Council and Think on 1 May 2008 to promote improvements to the UK's existing domestic building stock.

[44] Energy Performance Certificates: Don't Kid Yourself, (http://www.building.co.uk/story.asp?storycode=3112437)

[45] Stain Soewarta, member of the cabinet of EU Energy Commissioner Andris Piebalgs, stated at the ICSC Europe conference in Amsterdam, in April 2008 that the bulk of energy savings in the property sector could be achieved through improvements to air conditioning systems, more efficient lighting and improved insulation.

qualifying criteria to, for example, entire air conditioning systems that attain certain efficiency targets, rather than specific components within a system. (A precedent already exists for this approach where ECAs are given on combined heat and power (CHP) facilities which attain a predetermined level of 'good quality', as assessed by the CHPQA programme on behalf of DEFRA, without the need to resort to purchasing specifically listed CHP components from approved manufacturers.)

5. There is scope to make more use of the new integral features category, particularly where items would not otherwise rank as plant and machinery. HM Treasury can widen the scope of this 'plant' category, via Statutory Instrument rather than primary legislation, to include other innovative building fabric solutions which help control the human environment within buildings by passive means, as has been the case with active facades. One downside of the integral features regime is that they are pooled, for capital allowances purposes, within a special rate pool along with long-life assets. As a consequence, HM Treasury's ability to increase the rate of annual writing down allowances to help promote such integral feature items is constrained. But a higher rate than the current 10% might well be desirable.

In summary, we believe that the fiscal measures required to help promote behavioural change in regard to the existing urban built environment are already broadly in place. With suitable revision, these measures could be used to help generate the signals the market requires to commit to change and to reward those with the vision to innovate.

PricewaterhouseCoopers LLP

May 2008

WRITTEN EVIDENCE SUBMITTED BY THE ROYAL INSTITUTE OF BRITISH ARCHITECTS (RIBA)

Introduction

The Royal Institute of British Architects is the UK body for architecture and the architectural profession. The Royal Institute of British Architects has 40,000 members and represents 85% of registered architects in the UK.

The problems: barriers to reducing emissions from existing commercial buildings

The RIBA is in strong agreement with the All Party Group's assertion that there is currently a lack of information when it comes to emission reduction. We believe that the government must endeavour to carry out more research into the, age, use, type and size of our non-domestic existing building stock. We believe more hard data is needed on the energy consumption of non-domestic buildings.

Despite what we see as a fundamental lack of data, architects do have specific knowledge on the nature of all buildings including the non-domestic existing stock. There are various factors that make can make reducing emissions from this group of buildings a challenge. Firstly non-domestic buildings accommodate a huge range of activities, many of which involve relatively high densities of occupation, high lighting levels and high equipment densities, all of which give rise to internal heat gains.

In **deep-plan offices**, much of the energy demand is in the form of lighting and equipment. Other key demands are from ventilation (often with cooling) to remove the internal heat gains from people, lights and office equipment.

Similar points may be made about **large retail building**s – department stores, supermarkets and out-of-town retail 'sheds'. These buildings often combine deep plans (making daylighting and natural ventilation difficult to achieve) with very high lighting levels (for display purposes). Supermarkets contain large numbers of refrigerated cabinets and freezers that use electricity and reject heat (often into the space), and retailers of appliances such as computers and televisions often have many such devices operating in shop displays, again using electricity and giving off heat.

These features, common to much of the non-domestic existing building stock, are not necessarily 'barriers' in themselves. As important are the corporate behavioural policies of these building's owners and users. It is becoming clear that the behaviour that promotes emission reduction is beginning to change on a domestic level. The way in which we use our shops and offices is witnessing no such sea-change. The everyday behaviour of office workers and shoppers as well as all users of non-domestic buildings needs to be informed towards marked change.

Policy initiatives needed to address these barriers effectively

- The RIBA believes that the owners and users of the existing non-domestic building stock need not only to be incentivised to improve the energy efficiency but need leadership from government.
- The RIBA welcomed conclusions of Communities and Local Government's Report on climate change in non-domestic new buildings. Dealing with the existing stock of all types obviously throws up more complex challenges; we do believe however, that more needs to be done.

- Anecdotal evidence points to the fact that the rate of compliance to building regulation when refurbishing a building is low. This indicates that there is little incentive for compliance and also that the assessment mechanisms that exists are often ineffective.
- Many of our members are also of the opinion that the highly complex nature of Building Regulations is acting as a barrier to full compliance. One member pointed out the confusion and ultimate non-compliance that results from Building Regulations Part L2A which dissuades the refurbishment of the existing building stock where it significantly alters its appearance or character, meaning applications must go through the planning system.
- There is also much need for clarity when it comes to the renovation of buildings in conservation areas. The RIBA believes that owners and designers must be incentivised to take part in a regulatory system that is clearer and broader when attempting to improve or invest in commercial buildings.
- We feel that the Government must re-assess the way in which building regulations that ensure the reduction the of energy consumption of the existing building stock are both enforced and assessed.
- The RIBA supports the recommendations made by Lynne Sullivan in "A Low Carbon Building Standards Strategy for Scotland", and we would advise the APUDG takes these into consideration in this inquiry. The report recommends the introduction of legislation that requires all owners of nondomestic buildings to conduct a carbon and energy assessment and produce a programme for upgrading.[46]
- The Sullivan report also points to the administrative mechanisms of owner assessment used in the implementation of improved fire safety in existing buildings as a potential model for carbon reduction measures. The RIBA would be keen to see such legislation considered in England.
- Finally, the RIBA would like to stress it would like to a holistic approach adopted in attempting to address the reduction of emissions from the nondomestic building stock. The APUDG inquiry sets out to tackle the urban built environment; city centres (increasingly) are sites for residential development new and old, they also have many buildings that have very mixed usage. We believe that this strengthens the argument for greening the energy supply of or existing urban buildings.

The RIBA's own Climate Change Policy

The RIBA is encouraging architects to engage with the issue of climate change to deliver both low-carbon new buildings and the low-carbon refurbishment of existing buildings. Over the last year the institute has been producing guidance to enable architects to address the demands of increasingly environment-conscious clients and tougher regulation.

The RIBA is endorsing "contraction and convergence" as the primary approach in tackling greenhouse gas emission. This involves emissions from industrialised countries reducing (ore contacting) and emissions from all countries converging to an overall target. The target would be set to stabilise emissions at a sustainable level and the convergence process would promote equitable distribution of the benefits associated with the energy use giving rise to emissions. To achieve equitable distribution, each of us in the UK would have to reduce our average carbon dioxide

[46] Scottish Building Standards Agency, A Low Carbon Building Standards Strategy For Scotland, Edinburgh, 2007.

emissions from ten tonnes to two tons. Cutting the emissions from the existing buildings which we use would be one of the most important parts of that reduction.

We also commissioned a full environmental audit to identify the main activities that contribute towards our carbon footprint and how these can be changed. The first steps are taking places in an action plan that will see marked reductions the carbon emissions of our Grade II listed main building, built in 1930.

Appendix

The following information is taken from the RIBA's recently published Climate Change Tool Kits. The first section, A Climate Change Briefing defines the nature of the climate change challenge. The information sets out the range of energy uses and CO_2 emissions associated with new and existing UK buildings. This document and the following Guide to the Principles of Low Carbon Design and Refurbishment and A Carbon Literacy Briefing which the RIBA published in May 2008, emphasise the critical role of the existing building stock, and includes links to sources of energy and environmental benchmarking data.

Existing non-domestic buildings; an analysis

The number of non-domestic buildings in the UK is difficult to estimate[47]. However, best estimates suggest that in 1994 there were approximately two million nondomestic premises in the UK. Some premises embraced several buildings (e.g.: college campuses), some formed only part of a building (e.g. office suites in a multi-tenanted offices block)[48].

Rates of growth and replacement vary from sector to sector, but the replacement rate is thought to average 1% per year and thought to be fastest in the retail and offices sectors (e.g. conversion of dockside warehouses into dwellings into dwellings).

Energy use and carbon dioxide emissions in the non-domestic stock are less well understood than in dwellings, but similar considerations apply:

- New buildings contribute a small proportion of the total emissions
- Most existing buildings will still be in use in 2050
- Emissions reductions targets are unattainable without significantimprovement of existing buildings and/or an increase in the replacement rate.

Energy use in non-domestic buildings and the associated carbon dioxide emissions are dependent on five key factors:

- Building form
- Building fabric
- Building services
- Activity accommodated
- Management of the building

[47] 'An introduction to the national non-domestic building stock database', Environment and Planning B: Planning and Design, Steadman, JP et al, 2000.
[48] 'Types, numbers and floor areas of non-domestic premises in England and Wales, classified by activity', Environment and Planning B: Planning and Design, Bhruhns, HR et al, 2000.

Even amongst buildings of a common type such as 'offices' there are many different combinations of these factors: some offices are in purpose-built blocks, but many are in converted terraced houses or attached to industrial buildings; some offices have central plant HVAC systems, but many have domestic-scale heating systems and rely on natural ventilation. Similar observations may be made about retail buildings, industrial buildings, educational buildings and healthcare buildings.

Because of this diversity, it is very difficult to establish benchmarks for building performance. A widely-used UK source of this information is CIBSE Guide F Energy efficiency in buildings[49], Part C of which presents energy benchmarks for many different types of non-domestic buildings. These benchmarks have been derived from a wide variety of sources with a focus on measured (not predicted) energy use in existing buildings.

The CIBSE benchmarks relate to buildings without renewable energy systems, and are not particularly challenging. Other benchmarks and best practice standards may be found in some of the Carbon Trust's publications[50], and a new set of benchmarks is currently being developed for Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs). The Passive House standard (which may be applied to non-domestic buildings) sets a more challenging performance target of 15kWh/m_2/yr for space heating demand and 120kWh/m_2/yr for primary energy use. See the guide to Low-Carbon Standards and Assessment Methods that forms part of the RIBA Climate Change Tools for further information.

The graphs and table below illustrate CIBSE benchmarks for energy use and the associated carbon dioxide emissions for four types of existing buildings: offices, retail buildings, industrial buildings and schools. In each case, 'typical' and 'good practice' benchmarks are given[51]. For the reasons explained above the spread of performance of existing buildings is very much wider than indicated by the benchmarks – the performance of many buildings is worse than 'typical', and in some cases performance is better than 'good practice'.

Where existing buildings are to be refurbished, it is appropriate to adopt energy standards equivalent to the appropriate good practice benchmark, or better.
When new buildings are being designed it is appropriate to adopt energy standards at least equivalent to 'good practice', and moving towards low- or zero-carbon standards.

[49] CIBSE Energy efficiency in buildings Guide F, Chartered Institute of Building Services Engineers, London, 2004.
[50] See www.carbontrust.co.uk/publications.
[51] In 2007, a review for CIBSE and CLG concluded that these benchmarks are inconsistent, out of date and overdue for review. A new set of stringent statutory benchmarks for use on Display Energy Certificates for public buildings is now being finalised. The development of voluntary benchmarks for different building sectors is also being encouraged. All of these new benchmarks are intended to have consistent technical underpinnings related to agreed allowances for buildings' needs, rather than historical statistics.

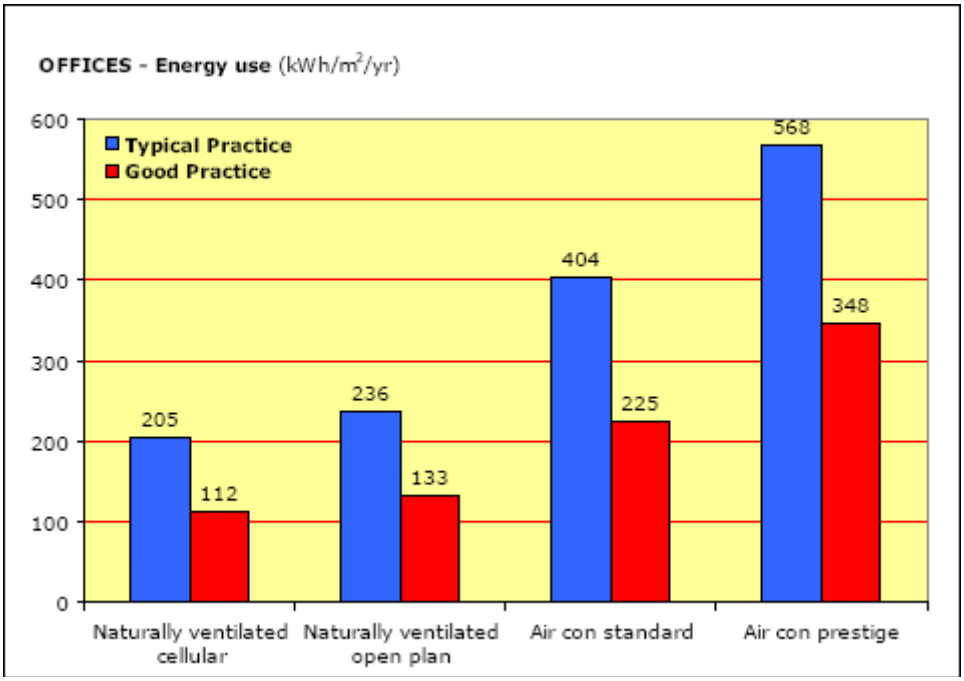


Figure 1: Energy benchmarks for office buildings (Source: CIBSE Guide F)

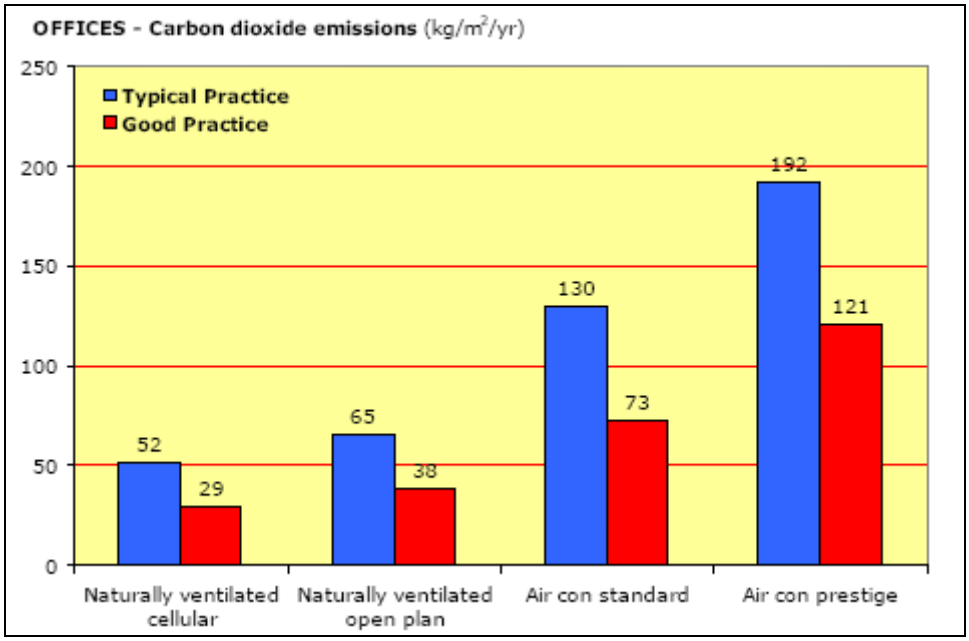


Figure 2: Carbon dioxide emissions benchmarks for office buildings
(Source: CIBSE Guide F)

The charts illustrate the significant energy-use and emissions penalty associated with air-conditioning and increased services, where there is much more intensive use of electricity than in naturally ventilated buildings. This is why low-carbon designs should avoid air conditioning wherever possible, or limit air conditioning to small areas (e.g. computer suites) where it may be unavoidable.
Table 1, which is reproduced from CIBSE Guide F, presents system and building energy benchmarks for office buildings – typical and good practice, broken down by end use and fuel type. This demonstrates the significance of cooling, lighting and office equipment/ICT suites in the electricity profile of typical office buildings.

System	Delivered energy (KWh/m²/yr)							
	Natural ventilation cellular		Natural ventilation open plan		Air conditioned standard		Air conditioned prestige	
	Good practice	Typical	Good practice	Typical	Good practice	Typical	Good practice	Typical
Gas/oil heating and hot water	79	151	79	151	97	178	107	201
Catering gas	0	0	0	0	0	0	7	9
Cooling	0	0	1	2	14	31	21	41
Fans, pumps and controls	2	6	4	8	30	60	36	67
Humidification	0	0	0	0	8	18	12	23
Lighting	14	23	22	38	27	54	29	60
Office equipment	12	18	20	27	23	31	23	32
Catering electricity	2	3	3	5	5	6	13	15
Other electricity	3	4	4	5	7	8	13	15
Computer room	0	0	0	0	14	18	87	105
Total gas or oil	**79**	**151**	**79**	**151**	**97**	**178**	**114**	**210**
Total electricity	**33**	**54**	**54**	**85**	**128**	**226**	**234**	**358**

Table 1: Detailed energy performance benchmarks for four types of typical and good practice office buildings, broken down by end-use and fuel type
(Source: CIBSE Guide F, Table 20.9)

Retail buildings

Figures 3 and 4 illustrate the CIBSE benchmarks for retail buildings, the stock of which is very diverse. The figures demonstrate the significant increase in energy use and the associated emissions with depth of plan (e.g. in department stores), because of the increased use of artificial lighting and mechanical ventilation, and with refrigeration (e.g. in food stores). Supermarkets are typically deep-plan buildings that combine high levels of artificial lighting with mechanical ventilation and refrigeration.

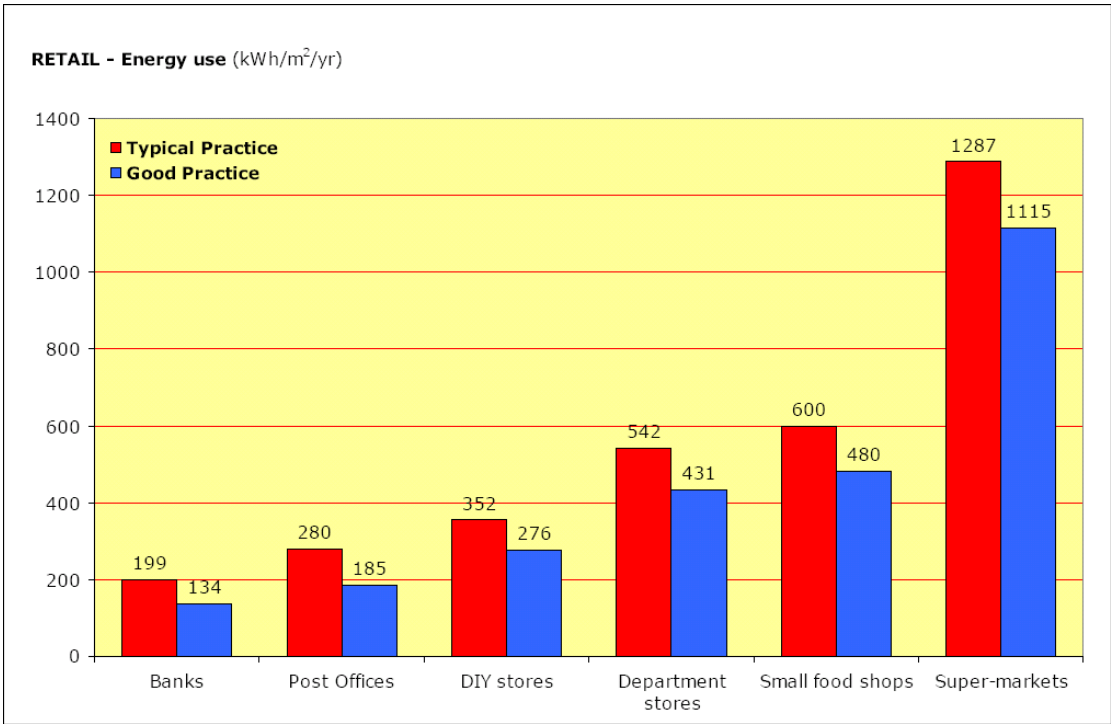


Figure 3: Energy use benchmarks for retail buildings (Source: CIBSE Guide F)

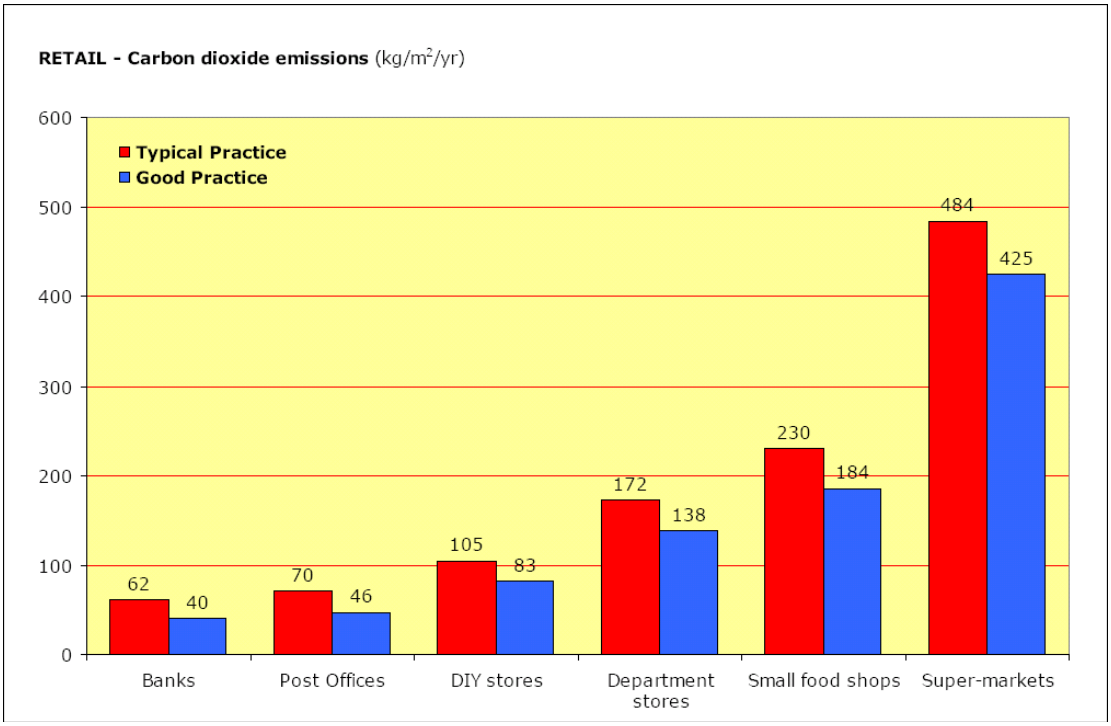


Figure 4: Carbon dioxide emissions benchmarks for retail buildings
(Source: CIBSE Guide F)

WRITTEN EVIDENCE SUBMITTED BY SOUTH WEST REGIONAL DEVELOPMENT AGENCY

1. **SOUTH WEST RDA – CURRENT ACTIVITIES IN REDUCING THE ENVIRONMENTAL FOOTPRINT OF EXISTING NON DOMESTIC BUILDINGS**

In the South West approximately 38% of our carbon dioxide emissions are from the non-domestic sector, of which 20% is attributable to non residential buildings therefore resource efficiency and the reduction of carbon emissions from the business sector is a priority for us.

Within the South West Regional Economic Strategy (RES) (2006-15), the environment is recognised as an economic driver and Environmental Technologies is identified as one of the eight priority sectors selected for specific intervention. The region is committed to reducing its environmental 'footprint' by adopting a low carbon approach to economic development; by improving resource efficiency; by promoting renewable energy and by encouraging better environmental performance in the private and public sectors.

Within our Corporate Plan (2008–11) we have committed to reduce the carbon footprint of our investments, with the ultimate aim of having a zero-carbon investment portfolio by 2013. Further more we will work towards enabling the development of a low carbon, resource efficient economy. We have recently consulted with stakeholders in the Region on our draft Plan and aim to issue the final version later this year.

Key areas of work from the Corporate Plan are:

- Offer leadership so that, for example, there are shared definitions and common language about carbon-reduction objectives and aspirations
- Develop an enhanced business support package for resource efficiency, through the Business Link portal in line with the requirements of BSSP
- Accelerate development of low-carbon, resource-efficient technologies in the energy, environment, transport, waste and construction sectors, ensuring faster commercialisation and supply chain development
- Continue to promote the wider take-up of sustainable construction methods and techniques in order to stimulate early learning in the region's construction and energy sectors in advance of the 2016 zero carbon building regulations
- Promote sustainable transport solutions
- Further our engagement in planning and development policy with partners to influence the reduction of their carbon footprint
- Work with partners to increase understanding of and develop better skills support for businesses engaged in low carbon technology sectors
- Strengthen the Sustainability Appraisal Toolkit that we use to help us develop projects and make investment decisions.

At a development and project level we condition our funding on meeting the targets specified in the Governments Common Minimum Standard, which includes standards for environmental performance of buildings. For existing buildings we require a BREEAM assessment to be undertaken and a target grade of "very good" achieved and for new build we seek a BREEAM/CEEQUAL target of 'excellent' subject, in both cases, to attaining value for money.

At a policy development and embedding level we have funded and contributed to the development of a range of regional strategies, policies and tool kits including: The Regional Spatial Strategy, The Regional Renewable Energy Strategy, The Way Ahead, the SW Sustainability Checklist and The Future Foundations Charter.

2: FEEDBACK ON SPECIFIC QUESTIONS IN THE CALL FOR EVIDENCE

We have prepared the following statements in response to the queries raised:

Barriers to reducing emissions from urban buildings:
These include:

• *Lack of information:* How good is the data that owners/occupiers have about their energy usage, efficiency and carbon footprint? How far are they able to benchmark their performance against that of others? If owners/occupiers lack data about their building's energy usage, what is preventing them from getting it?

SWRDA - there is undoubtedly a lack of information available. The reasons for this include that there is no requirement, in general, for building owners or occupiers to gather and publish this information. Also, energy management and energy efficiency is often not seen as a business priority due to the relatively low cost associated with the energy costs of running a building compared to other organisational overheads. Recent increases in energy prices have raised awareness of this issue although this appears to have had little direct impact on energy usage. Meters which monitor use are often sited away from general view and the impact of an individuals or organisations actions often pass unnoticed. The majority of meters in place don't provide user-friendly data in any case; there is scope to address this through the introduction of smart meters, although there is a low level of consumer understanding of these new technologies.

Buildings are also often under multiple occupancy, with no sub-metering facilities and energy use charged on a floor area basis, which provides little incentive for a business to understand or reduce its energy use.

There is a limited evidence base of energy usage in comparable buildings with similar business activities therefore it is difficult for owners/occupiers to benchmark their performance. If benchmarking is to become common place then a standard method of measuring energy use needs to be developed and accepted across the property sector. The use of Energy Performance Certificates could possibly provide the basis for such an approach.

However, the question is worded very widely and whilst it might be possible to capture data in some areas such as energy usage it would be very difficult given the lack of any standard to apply this more widely in the short to medium term.

• *Costs, benefits and barriers to owners/occupiers*: Even if a more comprehensive understanding of a building's energy usage could be achieved, what is preventing owners/occupiers from undertaking measures to use energy (heating and electricity) more efficiently or minimise energy wastage? What barriers (both economic and physical) do owners/occupiers face when considering the installation of low carbon technologies?

SWRDA – in our opinion the key driver for building owners and investors is the generation of return on their investment and meeting statutory requirements to allow them to market their product. If either the occupiers / market suggested there was a

need or market advantage to provide more energy efficient buildings i.e. a market imperative or when statutory legislation is introduced via development control (Planning or Building Control) then the uptake would be increased.

Building owners will seek fiscal incentives for installing and monitoring the effect of low carbon technologies. We expect they will want to pass on the costs to tenants and recover through rentals with a short payback period. However, the choice of solutions in urban locations is currently a limiting factor as cost effective technologies have yet to be developed for such sites and there may also be a challenge in getting occupiers to accept alternative means of generating heat and/or electricity.

Other barriers relate to the age of a building and its material compatibility to being upgraded. Also development control measures, such as listing or planning status, may prevent certain measures being adopted. Challenges of upgrading buildings in multi occupancy would also have to be addressed as it is unlikely that tenants can affect much benefit individually in the performance of their own areas of occupancy.

There is a lack of confidence in some low carbon technologies and increased availability of grant support and simplification of the grant process could increase installation rates.

• *Costs/Benefits to the wider economy:* How important are the wider urban economic impacts of greening existing buildings? The majority of commercial property is occupied. A full scale retrofit would require temporary relocation for the occupants, with potential profit losses for the landlords and disruption to tenants' businesses. What are the likely impacts on cities' economies (for example in terms of job creation and business opportunities/costs in the property industry and other business sectors)?

SWRDA – Given that there is such a large property portfolio it will be difficult to make any sort of impact upon energy use and carbon emissions without tackling the existing building stock. Indeed one could argue that this is the biggest opportunity to make a difference.

The issue of tenant relocation is a major issue to address although many buildings go through a refurbishment programme as part of the building life cycle and if sufficient fiscal incentives in terms of grants, higher rents or property yields existed then it is likely that many landlords would seek to maximise the investment potential. Redevelopment takes place across major urban areas on a regular basis and occupiers move to accommodate this change. It could be argued that this would have an impact on the local economy although there is also the potential for the refurbishment to attract occupiers to a higher quality environment than they are currently experiencing.

There is also an economic opportunity associated with the installation of energy efficiency measures and the installation and maintenance of renewable energy technologies. With rising fuel prices improved energy efficiency and increased fuel security will also be of interest to business.

Breaking down barriers to 'greening' urban buildings:

• *Addressing the lack of information*: What actions are needed at the industry level to produce the measurement standards needed? How can the Government support

the industry in achieving this? Are there any current tools that could be adopted to improve energy measurement?

SWRDA – a common methodology and assessment tool needs to be developed and agreed to ensure that assessments are transparent and comparable. A suitable route could be through adoption of a methodology through development control and the Building Regulations. Consideration would have to be given as to whether this related solely to energy use or more widely to carbon footprinting.

The Government could undertake a study to demonstrate the costs and values of making these improvements to the existing building stock. There is an amount of background information, this could be collated and disseminated to the public / private sector. There is a clear need to demonstrate a business case for the change and prove that the investment has a beneficial effect on the whole life value equation for buildings and that fiscal returns are possible on the investment.

There are a number of carbon calculators available on the market from the private and public sector including the Environment Agency's which could be adapted for buildings. Other options could be adaption of the SAP / SBEM models or an extension of the EPC's methodology.

• *Addressing economic consequences:* If owners/occupiers face barriers to more efficient use of current energy sources, what policy changes would allow them to overcome these barriers? What are the comparative merits of regulation, market mechanisms, fiscal incentives/penalties and educational awareness campaigns?

SWRDA – there is an increasing awareness of Corporate Social Responsibility amongst organisations which is starting to impact upon how they are run and operated with a consequent impact upon reduction in carbon footprint. However this is still some way from being mainstreamed and more therefore needs to be done. The government should not under estimate the impact it can have through its programmes and policies in influencing change. Ultimately the natural resources we have available to us need to be carefully managed and preserved and augmented through energy efficiency measures and the use of renewable technologies. City centre offices generally have a high energy demand due to the extent of electrical equipment contained within them along with air conditioning units which are needed to dispel the heat created by the electrical equipment.

In terms of energy efficiency there is already a high degree of awareness raising activity underway, however there is still a lack of understanding in relation to renewable energy technologies; which technology to use, effectiveness and integration with building services. Dealing with general enquiries can also overwhelm SME's therefore at this early stage a publicly funded independent brokering service that can assess a businesses needs, identify suitable renewable energy technologies and broker to accredited suppliers may overcome these barriers. The grant support available through the current Low Carbon Buildings Programme should also be increased and the application process simplified.

Fiscal incentives would clearly be attractive and promote change and a reduction in business rates for businesses which have reduced the carbon footprint of their buildings and operations may act as a driver for improved energy efficiency.

The introduction of the Energy Services Directive, which becomes law in the UK in May 2008, provides opportunities for energy suppliers to provide 'energy services' (ie products and services that encourage and facilitate demand reduction) to SMEs

through Voluntary Agreements with DEFRA. There is scope through the implementation of this directive to use the relationships energy companies have with their customers to reduce energy demand. Participation by energy companies will be voluntary and thus its impact may be limited. We believe that one option might be to monitor the impact of these agreements, and consider making them mandatory if they are seen to be effective.

It is possible that drastic measures could be introduced. For example the phased removal of air conditioning units would encourage all sectors of the market to consider alternative means of reducing heat build up and improving natural ventilation.

• *Monitoring and enforcement*: How should policies to ensure carbon reduction be enforced? What is the most effective level of intervention for different policy options? Should it be addressed mostly through the planning system? Should they sit at national or city level? How can city leaders together with the private sector help deliver greener buildings?

SWRDA – similar consultations have elicited clear responses from the development sector on this question. This has been that there should be one standard applied across the whole sector to create a level playing field. The adoption of different standards at regional or local level merely causes confusion and frustration.

This is not to say that this national standard could not be supplemented at a regional level through Spatial Strategies and Multi / Local Area Agreements but this must be underpinned by one clear national standard.

WRITTEN EVIDENCE SUBMITTED BY THE SUSTAINABLE DEVELOPMENT COMMISSION

Summary
The APUDG inquiry focuses on reducing the environmental 'footprint' of existing non-domestic buildings that are concentrated in our city centres and business districts. It examines:

- improving energy efficiency of existing urban buildings;
- barriers to reducing emissions from urban buildings; and
- the policy initiatives needed – including regulation, fiscal incentives, penalties and educational campaigns – to address these barriers effectively.

This inquiry's ultimate objective is to explore how Britain's cities can use innovative tools to deliver sustainable communities and move to the forefront of the fight against climate change.

The SDC recognises that significant political energy has recently been focused towards improving the environmental performance of homes, and that the non-domestic building stock has received relatively little attention. The SDC applauds the APUDG in tackling this subject and looks forward to the inquiry's findings and recommendations.
Research undertaken by the SDC that is relevant to this inquiry relates to the carbon footprint of elements of the public sector, and recommendations for how this can be reduced. We have found that although the public sector is committed to leading by example in reducing carbon emissions, current trends suggest that emissions will not reduce sufficiently within the necessary timeframe without significant new policy activity. We need urgent and bold leadership by government and within government, to ensure that both mitigation against and adaptation to climate change, become a practical as well as a policy reality.

The Sustainable Development Commission (SDC)

The SDC is the Government's advisor on sustainable development, reporting to the Prime Minister, the First Ministers of Scotland and Wales and the First Minister and Deputy First Minister of Northern Ireland. Through advocacy, advice, capability building and appraisal we help to put sustainable development at the heart of Government policy. Further information about our work can be found at: http://www.sd-commission.org.uk.

Responses to the inquiry questions

Improving energy efficiency of existing urban buildings: what are the emissions from existing non-domestic urban buildings? How can carbon emissions be reduced?
Schools: The SDC has worked with the Department for Children Schools and Families to estimate the carbon footprint of the English schools estate and how this can be reduced. Our studies[52,53, 54] found that the carbon footprint is 8.5Mt carbon dioxide per year, which represents approximately 15% of public sector emissions. This footprint can be broken down into four key sub-sectors:

[52] SDC, 2008, Towards a Carbon Management Strategy for the English School System: Scenarios and policy options (Unpublished)
[53] See: http://www.sd-commission.org.uk/publications.php?id=388
[54] SDC, 2008, Towards a Carbon Management Strategy for the English School System: Scenarios and policy options (Unpublished)

- 41% the use of heat and power in buildings
- 42% from procurement of goods and services including food, construction, products, ICT, cleaning
- 17% from travel and transport
- <1% from waste.

Our analysis found that on the basis of current trends and policy commitments, emissions from schools are unlikely to reduce beyond 20% by 2050. It is possible to reduce emissions from the schools estate by up to 80% by 2050, but a holistic framework of policies and actions is required. Emissions reductions from buildings was a key component of the emissions reductions to be required from the schools sector as these are within the control of the DCSF and could be achieved through current capital investment programmes.

Significant carbon emissions reductions from school buildings relies on:
- carbon standards for new schools reducing towards zero carbon in 2016
- carbon standards for refurbished schools towards a low carbon standard in 2016
- expanding the capital programme to encompass all primary schools (currently only tackling 50% of primary estate)
- energy efficiency and renewable energy retrofit programmes
- developing the capacity of the schools capital supply chain: designers, builders, suppliers, clients
- post occupancy evaluation of building performance in use
- energy efficiency standards for ICT systems
- occupant behaviour change awareness programmes to ensure buildings are being operated efficiently.

Schools are visible aspects of the public sector estate and as such have a role in communities of showcasing sustainable development in many aspects including low carbon energy use. Sustainable behaviours taught at school can be transferred to the wider community.

The barriers to reducing carbon emissions from school buildings include:
- poor information on actual school building performance
- lack of standards and research on low carbon refurbishment
- lack of skills and capacity within schools and local authorities to demand low carbon refurbishment
- lack of skills and capacity within the supply chain to deliver low carbon refurbishment.

Health: The SDC is currently working with the National Health Service to estimate the carbon footprint of the NHS and will be extending this work to find ways that this can be reduced. Our research[55] found that the NHS is responsible for 18.6Mt carbon dioxide per year, which represents around 30% of England's public sector emissions. This footprint can be broken down into four key sub-sectors:
- 22% from the use of heat and power in buildings,
- 18% from patient, visitor and staff travel
- 59% from procurement of pharmaceuticals, medical equipment, paper, food, construction, business services.

[55] SDC, 2008, NHS England Carbon Emissions: Carbon Footprinting Report (Unpublished)

Central Government: The SDC recently reported its assessment of the performance of central government operations against the targets of the Framework for Sustainable Operations on the Government Estate (SOGE)[56]. This 'watchdog' reporting aims to inform and inspire continuous improvements across government. This is the sixth annual Sustainable Development in Government assessment, based on the analysis of data given to us for the period of 2006/07.

It shows that individual departments are still not on track to meet all their SOGE targets – particularly on carbon emissions from offices and road vehicles – although government as a whole is generally performing better this year than last year. SDC is very pleased to note that there has been considerable activity and encouraging signs that the gvernment is preparing to up its game with regard to the performance of its estate.

Data suggests that carbon emissions from offices fell by 4% compared to the 1999/00 baseline year. However, the 4% reduction in carbon emissions from offices is largely due to the improved performance of the MOD estate. If we exclude MOD, carbon emissions from the rest of government actually increased by 22%. Nearly two-thirds of departments are not on track to meet their own 12.5% reduction target by 2010/11.

Energy efficiency per square metre improved by 21.7% against the 1999/00 baseline – higher than the target of 15% by 2010. However, without the improvements made by MOD, energy efficiency across the rest of the government estate has worsened by 3.3%. Current performance on the reduction of carbon emissions will make government's target to be carbon neutral by 2012 extremely difficult to achieve without resorting to major carbon offsetting. In our view, offsetting should only be implemented once all possible emission reductions have been achieved.

28.3% of electricity was obtained from renewable sources – far higher than the target of 10% by 2008.

Just 46 of the 351 new build/refurbishment projects completed in 2006/07 were assessed against the Building Research Establishment Environmental Assessment Methodology (BREEAM). Of these, only 28 projects (i.e. 8% of all completed projects) met the required standard.

Major problems persist on data collection and accurate reporting, particularly on travel, waste and water. This undermines the government's ability to assess and manage its own progress accurately

Embodied carbon: The SDC's work on housing has identified the sustainability issues regarding replacement of inefficient old buildings[57]. There is currently a strong debate running regarding whether a lower whole life carbon and better sustainable solution would be to demolish and replace inefficient old homes, or to retrofit them with energy efficiency.

Community Heating: Although much of the current focus of low carbon energy supply is on providing electricity, the existing non-domestic building stock has a high heat demand, which could be met in low carbon ways. The SDC commissioned a study

[56] SDC, 2007, Sustainable Development in Government. See: http://www.sd-commission.org.uk/publications/downloads/sdig_report_2007.pdf

[57] SDC, 2007, Paper for the Foresight Programme on energy and the built environment: does demolition or refurbishment of old and inefficient homes help to increase our environmental, social and economic viability? (Unpublished)

during 2007 to identify the role that community heating could play in providing low carbon, affordable heat to urban buildings.

We found that community (or district) heating has a potentially large role to play in providing low carbon or zero carbon heat to buildings from renewable sources (e.g. biomass, waste) which cannot be used in individual homes. Community systems can provide heat only or heat and power through a combined heat and power (CHP) system. Community heating can also bring other sustainable development benefits including tackling fuel poverty.

In terms of households, the UK has an estimated 4.5 million existing flats and 6.6 million terraced existing homes, which are likely to be at a suitable density for retrofitted district heating to bring carbon emissions reductions. Terraced homes built before 1919 are England's most prevalent housing type, and are typically expensive to retrofit with insulation, therefore district heating could provide a cost effective carbon reduction option in this context.

Importantly, supplying heat to a mix of loads (residential, commercial, public sector) can bring cost and carbon efficiencies. A range of building types will diversify the load profile for a CH/CHP system. The viability of a new community heating (CH) CHP scheme can be improved by connecting a network of anchor loads as the foundation for the scheme before extending out to private housing. Anchor loads are likely to be large public buildings within existing settlements such as schools, hospitals and council buildings, or can be a new build housing development. This can reduce risk to the financing of the scheme. Capital investment programmes already underway to create new and refurbished public buildings such as schools and health buildings should be reviewed to understand their potential to contribute to wider carbon emissions reduction. The SDC is not aware of any policy that encourages new public sector buildings to be systematically considered as 'anchor loads' for community heating systems.

Retrofitting CH/CHP incurs high costs in burying hot water mains under existing streets and pavements. Retrofitting CH/CHP in high density neighbourhoods increases the heat sales per unit length of pipe buried, and therefore the investment viability. Urban areas are likely to be the most viable locations for retrofitting CH/CHP.

The Department for Communities and Local Government (CLG) has announced that new homes built from 2016 should meet zero carbon standards. Analysis of this policy suggests that the standard can be met most cost effectively where district energy solutions are applied. Where new housing is proposed to be built on sites adjacent to existing communities, district energy systems such as CH/CHP should be extended to existing homes in the area. The construction of the new homes would be the catalyst for the CH/CHP system, and the demand profile for a mix of buildings will improve the viability of the system. New homes built to stretching carbon standards are likely to have 'spare' heat in the summer months if they use CHP. These schemes could be connected to neighbouring markets for heat including cooling.

The recent local government white paper stated that 'all local authorities can and should be taking action to combat climate change'. The white paper recognises the unique role of local government and gives it new opportunities to drive local action on climate change through community leadership and strategic influence, and to coordinate local partners and partnerships to affect change. CH/CHP installation could be aided by local authorities mandating connection to the system within the planning regime. In particular, the new local government performance indicator

covering emissions from the wider community (not just the council activities) will be vital to motivate local authorities to raise their sights beyond their own estate, and to catalyse and coordinate action by other actors who have an impact on an area's carbon footprint.

Barriers to the implementation of low carbon CH/CHP within existing urban areas include:

- Local authorities currently have few incentives to take action, and there is a significant need for a new incentive structure to drive forward action at a local level. Local authorities do not yet have the full powers to plan and mobilise CH/CHP, nor to mandate connection to existing networks, although there is evidence that the power of well-being can be used by local authorities to develop CHP and district heating.
- The Office of Gas and Electricity Markets (Ofgem) currently has no remit for looking at heating supply beyond gas and electricity. There is no framework for supporting the supply of heat from alternative sources, and regulation may favour gas over 'alternative' heat sources. There is no regulation of heat networks, and therefore little certainty for investors in this area. A regulatory regime focussed on heat provision instead of gas would see the characteristics of other more sustainable heating fuels better able to compete in the market and give greater commercial certainty to companies constructing heat networks.
- Further research is needed to understand the potential for retrofitting district heating to specific existing communities, consumer acceptability, business models, and policy options to support implementation.

What are the policy initiatives needed – including regulation, fiscal incentives, penalties and educational campaigns – to address these barriers effectively?

The UK Sustainable Development Strategy[58] structured policies into a holistic framework to catalyse action. This framework proposed that policies are needed to: Enable, Encourage, Exemplify and Engage in order to bring change. This framework is useful in considering the policies needed to address the barriers to reducing carbon in non-domestic

Enable
Information – Government to review how to provide energy efficiency and performance information for owners of non-domestic buildings similar to the advice services being set up for households. Government to ensure that information from Energy Performance Certificates and Display Energy Certificates is collated centrally and triggers proactive energy efficiency advice and support.

Planning – Government to ensure that the planning system facilitates retrofitting of energy efficiency and provides clarity regarding the policy for undertaking these works.

Skills – Government to work with the built environment professions to ensure sustainability and retrofitting existing buildings becomes part of the core skill set for all those working in the built environment.
Encourage

[58] HM Government, 2005, Securing the Future: delivering UK sustainable development strategy

Carbon standards – ensure that public sector buildings are refurbished to and operated within stretching carbon standards
Introduce tax incentives to reward energy efficient buildings – Government to review the costs of undertaking energy efficiency improvements and identify whether incentives may be required to catalyse change.

Local government action – responsibility lies far beyond the council-owned stock. Local authorities should work with property owners and tenants to encourage retrofitting of energy efficiency measures, microgeneration and district heating.

Exemplify
Provide clear political leadership – Government to make the priority of reducing carbon emissions from the built environment, and to set out a clear policy framework.
Make immediate changes to government buildings – The government should set an example by ensuring that all public sector buildings meet the best environmental standards as soon as possible.

Engage
Demonstrations of best practice – Government and local authorities to identify examples of best practice low carbon refurbishment and use these to raise awareness and to raise aspiration.

Encourage corporate responsibility – Government to encourage private sector to report on building energy performance and publish plans for improvement, engaging with building occupants and raising public awareness.

Use innovative communication methods – Government and local authorities to find new ways to communicate the importance of and solutions to climate change. For example, Cabe's work with cities through the Climate Change Festival.

Sustainable Development Commission
May 2008

WRITTEN EVIDENCE SUBMITTED BY THE TOWN AND COUNTRY PLANNING ASSOCIATION (TCPA)

About the TCPA

The Town and Country Planning Association (TCPA) is an independent charity working to improve the art and science of town and country planning. The TCPA puts social justice and the environment at the heart of policy debate and inspires government, industry and campaigners to take a fresh perspective on major issues, including planning policy, housing, regeneration and climate change.

Our objectives are to:

- Secure a decent, well designed home for everyone, in a human-scale environment combining the best features of town and country
- Empower people and communities to influence decisions that affect them
- Improve the planning system in accordance with the principles of sustainable development

The TCPA's field of expertise lies mainly in the planning, housing and development fields, rather than engineering, construction or in the science of energy production. However we consider the provision of technical measures to be largely dependent upon an effective and responsive planning system. We work closely with industry experts to inform the Association's policy justifications and feasibility of proposals. Our comprehensive publication database, including our climate change and sustainable energy policy documents and research and practice documents are available for your reference on our website at www.tcpa.org.uk.

Summary of TCPA's Views

The TCPA welcomes this inquiry into the environmental impact of the current stock of non-domestic buildings. Much policy and practice emphasis has been placed on new developments, rightly so given the greater opportunities to reduce their environmental impact, the relative ease of implementation compared to existing stock and with which to start from scratch. However achieving sustainable development in the UK also requires radical culture change to the status quo. Where better to begin than transforming existing buildings in towns, cities and the populations which occupy them.

Summary of Call for Evidence

The All Party Urban Development Group has launched a spring inquiry into the environmental impacts of existing non-domestic buildings. This inquiry will be structured around two main topics: the barriers to reducing emissions from existing commercial buildings and the policy initiatives needed to address these effectively. As stated in Budget 2008 [4], the Government is now considering policy options to address carbon emissions from non-domestic buildings, with the overall objective of

- making new buildings carbon neutral by 2019, and
- *improving the energy efficiency of and reducing carbon emissions from the existing stock.*

The inquiry will focus on the second objective. While reducing carbon emissions from new stock is necessary, only 1 to 2% of commercial building stock is replaced each

year. For policy to have a real impact, actions to reduce the ecological footprint of existing stock must be considered.

1.0 Summary of Key Issues

1.1 In the UK, non-domestic buildings constructed pre-1980s account for 70% of the total building stock. Existing non-domestic buildings (commercial, public sector and industrial) account for 17% of energy consumption and 19% of carbon emissions in 2000. Given their significant presence in our towns and cities and their contribution to climate change, it is disappointing that existing non-domestic buildings seem to be placed outside the radar of current policy propositions and research into reductions. The TCPA calls for the following:

a. ***Improve UK Research and Policy Evidence Base –*** A comprehensive evidence base is currently lacking in the UK with respect to the degree of ecological impact from existing non domestic buildings at the appropriate spatial scales. While a policy appreciation and understanding exists, there is a need to support and enhance the capacity of key stakeholders to take forward practical and viable proposals within the planning system.

b. ***Account for diverse needs of different types of existing buildings in different spatial contexts –*** Existing non-domestic buildings account for a large proportion of existing stock in our urban centres as well as other outer-lying areas, including business parks in the urban fringes. Creating and sustaining economies of scale and scope would be key to providing financial incentives for key decision-makers towards greening the existing stock and achieving real reductions in emissions. In some circumstances it may be more appropriate to refer to area-wide emissions than individual buildings by promoting opportunities for an integrated approach to combining new developments and refurbishments.

c. ***Promote green value and benefits over costs –*** Unlike homes, people place less sentimental value and responsibility on office buildings. In addition retrofitting existing buildings will have significant additional costs and disruptions to daily activities. Therefore key decision-makers need to understand and exploit the true benefits and value of a greener building, where generally technologies are reliable and fit for purpose. Action to improve energy efficiency and thermal performance can help employees to be more satisfied with the quality of the work spaces thereby increasing productivity.

d. ***Key organisations to 'walk the talk' and act as champions –*** Instil real cultural change within key organisations, such as local authorities to 'walk the talk' to act as champions. Planning and delivery would require long term commitment to a programme of actions including introducing a capacity for change through sustainable building strategies and plans for individual premises or buildings overseen by a dedicated sustainability manager. Regulatory controls could also be introduced but a last resort as part of compliance to Building Regulations for refurbishments, and part requirement for building warrant of fitness renewals. In addition the behavioural patterns of people and organisations, such as travel to work (commuting) patterns, must also be considered as an integral element to reducing overall emissions.

e. ***Unite existing assessment standards to cover existing stock*** – Adapting current BREEAM standards to form a singular-focused rating standard for

existing non-domestic buildings with a mandatory provision in current Building Regulations.

2.0 TCPA Response to Main Topics

2.1 Barriers to reducing emissions from existing commercial buildings

2.1.1 There are a number of key questions which need to be asked to address barriers to reducing emissions from existing buildings. If existing buildings evidently comprise the majority of the building stock, what are the reasons for policy focus and guidance aimed at new builds? Is this due to human nature's preference for convenience, simplicity, impatience or down to development economics, lack of knowledge and skills or a lack of understanding of the true situation in the built environment profession?

2.1.2 Existing buildings do not exist in a vacuum in the built environment and to what extent do their existing, perhaps out-dated building technologies adversely contribute to the causes of climate change? This has to be coupled with a policy appreciation and sensitivity for incurring the costs of retrofitting towards more energy efficient technologies for greener buildings. If not, policy-makers need to consider ways to encourage building and land owners into taking greener actions in proactively retrofitting buildings. They should also consider how businesses within the buildings can be incentivised to reduce their carbon footprint and be compensated for disruption to daily operations?

2.1.3 In an age of pessimism, vast information and challenge overload, it may be more appropriate to take a progressive, proactive and optimistic 'sunshine' approach. What are the opportunities and benefits to be gained economically, socially and culturally? If existing non-domestic buildings can be given a clean bill of environmental health and achieve a certain standard of environmental and quality criteria?

2.1.4 In making policy interventions and incentives, it is important to also appreciate the specific needs, limitations and different emission levels of sub sectors and land use activities within the non-domestic building category as well as in different spatial scales of the street/ block, neighbourhood, district, city centre, urban fringe or industrial estates. This is a bottom-up evidence-based approach which will enable a more fulfilling and effective targeting of emission causes as well as the ability to instil real culture change in the society. The 'reduce, remedy and mitigate' approach may be the most pragmatic solution to tackling the challenges of the existing stock. But commitment must come in the form of policy targets from appropriate Government legislation and local and regional planning policies.

2.1.5 In making the value case, it would require appreciation that improving the performance of existing buildings applies more to high intensity / long duration activities such as hospitals, than to low intensity / short duration activities such as schools. The nature of the building use may, however, make it harder to adopt certain sustainable strategies, given also that the nature of ownership structures may affect the effectiveness of delivering change. Natural ventilation may have only limited application in hospitals, for instance, due to requirements for infection control, but can be widely adopted in other buildings such as schools. So although sustainable strategies can be applied to any building, their extent and value case differ significantly and require specific consideration.

2.1.6 The UK Green Building Council's report on carbon reductions for non domestic buildings[59] outlined a range of existing barriers in implementing zero-carbon in new non domestic buildings. Although this report focused on new buildings, its identification of systemic barriers across existing practice, especially shortfalls in current policy development, implementation and monitoring, is applicable to existing non domestic buildings. Such barriers prevent existing buildings to function more efficiently, in particular in their operating energy, user consumption of energy and *recurring embodied energy*, as research has shown that the energy efficiency of a building decreases with age by proportionally expending *recurring embodied energy.*

[*According to research,* b*y year 25, a typical office building will see an increase of almost 57% of its initial embodied energy due mostly to envelope, finishes and services. By year 50, recurring embodied energy will represent about 144% of the initial embodied energy, and it was projected that by year 100, this proportion would rise to almost 325%.*][60]

2.1.7 Policies can be easy and convenient to amend. However the fundamental causes of climate change begin from the level of significant human-impacts on the environment. The behavioural patterns and culture of people and organisations cannot be easily rectified without a combination of forward planning, stringent management and control, and basic awareness-raising. In particular, carrying out daily activities through transportation such as travel to workplaces (in non-domestic buildings), is the primarily contributor to UK energy consumption and related carbon emissions.

[*According to travel trends in the recent National Travel Survey 2006, it indicated that trips to work (commuting) made by cars continue to be prevalent and average commuting length increase by 6%, although total number of trips has decreased by 8%.*]

2.1.8 In existing communities and neighbourhood centres, existing commercial buildings are the centre point for social gathering, learning, interaction and social and economic exchanges. There is scope for planning authorities, developers, land owners, building occupants and local community groups in promoting innovative and creative initiatives through and joint-partnership working to take into account the pivotal role of such buildings through architecture and planning, and to transform them into built environment champions for other existing buildings, not just people.

2.1.9 Finally, there is a completely insufficient research and evidence base specifically exploring the ecological footprint of existing non domestic buildings to inform policy-makers and industry leaders in the UK. This is an issue which this Review must address and prioritise for future government action. This may indicate a lack of skills and resource capacity within organisations overwhelmed by the task to deliver and to effect high environmental standards for existing non domestic buildings, not only new builds.

[59] CLG, December 2007, *Report on carbon reductions in new non-domestic buildings. Report from UK Green Building Council*, Section 8
[60] Cole, R.J. and Kernan, P.C., 1996, 'Life-Cycle Energy Use in Office Buildings', *Building and Environment*, Vol. 31, No. 4, pp. 307-317.

2.1.10 Unless action is taken now, work to reduce our carbon footprint will be less effective than it could be.

2.2 Policy initiatives needed to address these effectively

2.2.1 The TCPA believes local government is the most appropriate mechanism to take this proposal forward. Local government once again has a strategic role to play in planning for the future needs of our communities by:

- Demonstrating leadership in their communities
- Providing planning and financial support through policy, regulations and financial incentives
- Establishing partnerships to demonstrate and invest in new technologies
- Engaging with businesses (tenants and landlords) and citizens to educate, raise awareness and deliver on policy actions.

Planning and Development Management Measures

2.2.2 The Planning System, which has adapted reasonable effectively towards climate change concerns for new developments, can be similarly strengthened to adapt to concerns for existing non domestic buildings. Support the bringing forward of renovation and redevelopment plans by improving the efficiency of approving demolition consents and planning applications for new builds through the planning system. Exploring viable measures including reducing fiscal burdens in the development management process through concessions in developer contributions (such as section 106 agreements) or negotiating bonus floor areas may be useful to incentivise the developers or delivery partnerships.

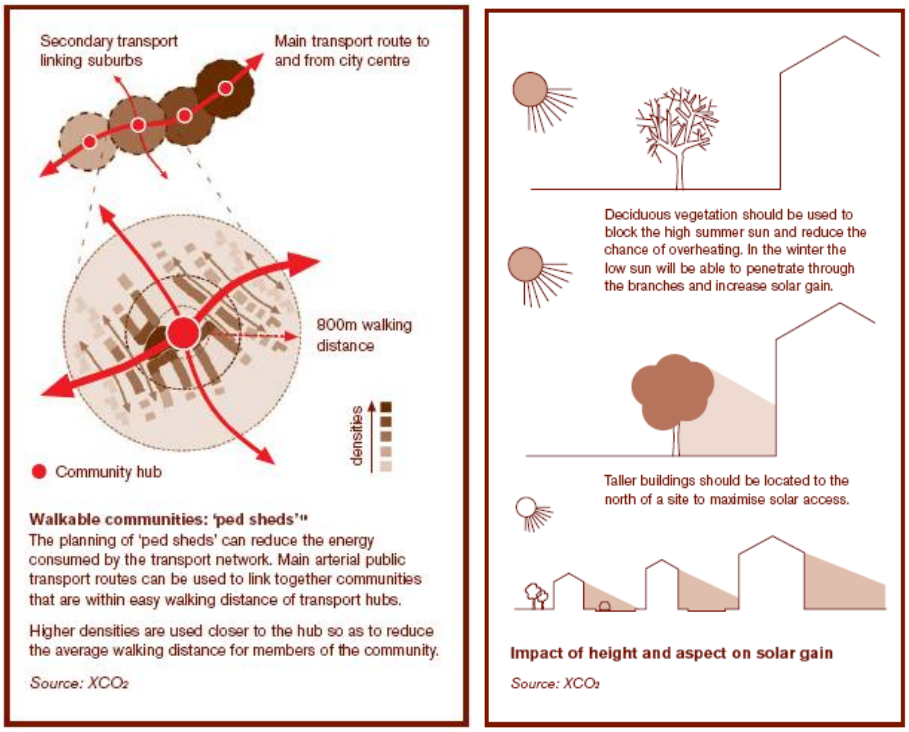
2.2.3 One example of existing good practice in policy is the Mayor of London's "*Climate Change Action Plan*" for London[61]. It has a dedicated section addressing the climate change implications of existing non domestic buildings with supporting case studies. We believe such a commitment at the sub-regional level, with supporting local evidence base reflect the comprehensiveness of the portfolio approach, are required across the country with a distinctive local policy and delivery emphasis.

2.2.4 A portfolio of measures approach with a time dimension is the most appropriate to address the environmental impacts of existing non-domestic buildings within the various actors of the built environment – including different sectors, size of organisations to new developments and green spaces (*see diagrams below*) and step changed over a period of time.

2.2.5 Similarly, Building Regulations, within which Part L – Conservation of Fuel and Power recently amended, should be strengthened to secure energy efficiency and emission reductions from existing buildings through the building consents process. The TCPA suggests adapting existing rating systems to form a dedicated 'existing buildings' energy efficiency rating system within BREEAM - similar to the U.S. Leadership in Energy and Environmental Design (LEED) for Existing Buildings. The TCPA believes that such a rating system needs to be included as a mandatory performance standard in the current planning system and Building Regulations.

DIAGRAMS: Portfolio Initiatives at Neighbourhood/ City and Street/ Block Scales

[61] Greater London Authority, Feb 2007, *Action Today to Protect Tomorrow. Climate Change Action Plan*



Source: TCPA, January 2006, Sustainable Energy by Design

Technical and Technological Change Measures

2.2.8 The TCPA recognises concerns for significant refurbishment practicalities and development viability. But we believe in the medium to long term significant cost savings through improving existing buildings' operational energy efficiency, recurring embodied energy and energy generation sources.

2.2.9 On-site and building-oriented technical solutions will need to be combined with solutions which look to the wider spatial implications and potentials of the street block and vicinity in the cases of business parks and retail centres. Certainly the delivery of technologies must be planned and enabled through the planning and building systems. (Illustrated in the 'hypothetical city' model of TCPA's *Community Energy* best practice guide, see summary below for appropriate areas). In combination with other technologies, these measures will look at passive actions such as energy efficiency savings of heating and lighting, as well as exploring opportunities to be proactive, forward thinking and joined-up collaboration through decentralising energy production with renewable sources.

Hypothetical city spatial framework

City centres

Mixed-use centres provide a major opportunity for large-scale deployment of combined heat and power (CHP) to supply district heating and for the large-scale deployment of solar photovoltaics on public and commercial buildings.

Edge of centre

The heat densities of hospital and university campuses and new residential/mixed-use developments can support CHP/district heating, supplemented by communally deployed renewable technologies, such as solar thermal.

Inner city districts

Housing market renewal, through improvement, remodelling and selective demolition, creates opportunities for communal-scale CHP, district heating and solar photovoltaics.

Industrial estates
Existing uses and often exposed locations can make industrial areas suitable for the location of larger energy projects, including those requiring large volumes of traffic, such as energy from waste (including biogas) and biomass CHP, and those with significant visual impacts, such as large-scale wind power.

Urban extensions and new settlements
Urban extensions and new settlements, such as those proposed in the eco-towns programme, provide some of the best opportunities for putting the principles of low-carbon, decentralised energy generation into practice – focusing on communal energy networks.

Rural hinterland
Opportunities for wind generation and for the development of biofuel supply chains may become apparent by considering a town or city's energy supply in the context of its rural hinterland. Projects may also create beneficial relationships with the farming community, helping to support the rural economy.

Source: TCPA, March 2008, Community Energy: Urban Planning for a Low Carbon Future

Social and Cultural Change Measures

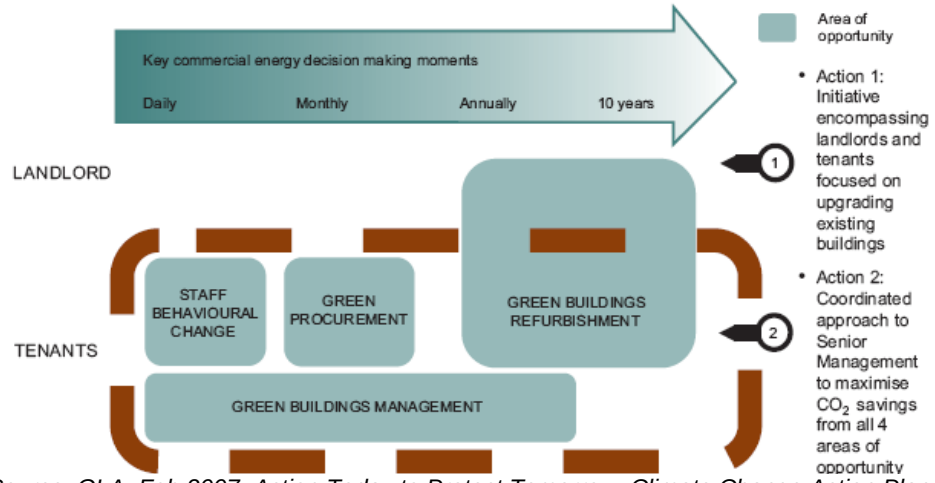
2.2.10 Similarly, the consumption of energy is as much dependent on the behavioural patterns of users and building occupants, and therefore requires a greater emphasis to promote corporate social responsibility to give effect to real reductions. These measures are the most practical and doable without the need for significant changes and burdens associated with legislation and regulation amendments. However as mentioned before, the barriers presented by different needs and perspective of landlord, building owners, building occupants (in most cases are different people) need to be understood and measures tailored to incentivised/ disincentivise towards the appropriate party.

2.2.11 Carbon reduction targets will vary across the cities, sub regions and regions given that each locality will demonstrate different proportions of non domestic buildings subject to varying socio-economic elements, as well as across different sectors and organisation sizes. A champion organisation, such as that of the Carbon Trust or the Better Buildings Partnership in London[62], to promote and lobby the case for reducing emissions in existing premises will be required to see real change from the ground. Such organisations have opportunities to utilise a number of mechanisms to give effect to change, including undertaking exemplar projects as physical evidence of possibilities.

DIAGRAM: Example of a Comprehensive Culture Change Programme – Greater London Authority

[62] For further information, please refer to the GLA *Climate Change Action Plan*, section 4.2

Figure 38 Areas of opportunity for London should focus on to maximise emission reductions



Source: GLA, Feb 2007, Action Today to Protect Tomorrow. Climate Change Action Plan

2.2.12 As a closing comment, in implementing any proposals to promote and ensure reductions in emissions from existing non domestic buildings, Government and key decision-makers must recognise the financial burdens that will certainly be placed on organisations to deliver change. Therefore, mitigation measures using practical financial incentives must form the core delivery and support framework as an extension of the pledge by the Secretary of State for Environment, Food and Rural Affairs Hilary Benn recently in a speech relating to the impacts of the Climate Change Bill on businesses[63].

…. frameworks do not cut emission. Individuals, communities and businesses cut emissions. (Secretary of State for Environment, Food and Rural Affairs Hilary Benn, April 2008)

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[63] From a transcript of the speech by Secretary of State for Environment, Food and Rural Affairs Hilary Benn at the Environmental Industries Commission on 24 April 2008, about how climate change and the Climate Change Bill will affect British businesses.

WRITTEN EVIDENCE SUBMITTED BY UNIVERSITY OF MANCHESTER

The invitation mentions the UN IPCC. It is worth noting that Chapter 6 of the IPCC Working Group III contribution to the Fourth Assessment Report reviews the technical fixes and policies for reducing energy and mitigating carbon emissions from buildings. Although the invitation mentions that the IEA and IPCC "have identified the buildings sector as the segment of the market with the largest potential for energy efficiency gains", which highlights the importance of the built environment, it should be noted that the IPCC included the electricity used in buildings in the buildings sector rather than associating it with electricity generation.

This raises an interesting point. Fabric, glazing and shading measures can reduce the need for heating and cooling in UK non-domestic buildings to virtually zero but electricity will still be needed for lighting and equipment. Although these are generally becoming more efficient, the amount of electrical equipment installed is increasing and hence electricity consumption is rising. Demand reduction and the use of locally produced renewable energy are therefore both important.

Re information: The current Building Regulations (L2A) applying to energy use in commercial buildings do require the installation of metering to determine 90% of annual energy consumption. Estimated carbon emissions are determined at the initial design stage in order to comply with the regulations. However, at present there is no regulation of actual emissions once the building is functioning. These can exceed design levels because of deficiencies in construction or because use differs from the anticipated level. One area for consideration is therefore the governance of emissions following occupation.

The future changes to the regulations that have been announced should significantly reduce the carbon emissions from both new and refurbished buildings and plant. However, the regulations should in future include assessing the building not as a single building in isolation but in its location. Work at the University of Manchester on climate change and the urban heat island (EPSRC project ASCCUE [Adaptation Strategies for Climate Change in the Urban Environment] and the ongoing EPSRC project SCORCHIO [Sustainable Cities: Options for Responding to Climate cHange Impacts and Outcomes]) suggest that the not only the characteristics of the individual the building but also those of its locality are crucial to building energy consumption, primarily because of the latter's impact on cooling and comfort (eg through the ability for heat to be dissipated by wind through open spaces and for green areas (as well as open water) to dissipate the heat by evaporation. It is therefore suggested that future Building Regulations, for both new and refurbished buildings, should require the performance of buildings to be assessed using future, weather data that incorporates climate change scenarios (not historic data as at present) and within their locale to determine their carbon emissions. Planning applications might require submission of simulation data and CAD drawings of planned buildings suitable for including in a local area simulation.

Refurbishment and the performance of the existing stock are the important considerations in determining future emissions. However, regulations only impact on this at the time of refurbishment. An "MOT" for all buildings and plant would help reduce barriers to investment in energy efficiency measures here.

Concerning the "lack of information", work at Manchester (CaRB project) has shown the importance of metering and measuring consumption. A Joule–funded project at Manchester has shown that intelligent smart meters (meters that show the

consumption of specific energy users such as pumps, fans, lights etc) are a possibility and that communicating sub-meters area available.

Re costs and benefits to owners and occupiers. This highlights the problem of who takes ownership of the energy expenditures and savings and the agent-principal barrier can occur, with misplaced incentives. Energy Service Companies may have a role here in overcoming this barrier. The refurbishment of commercial buildings and the role of tenant and landlord in optimizing energy use is one of the factors being assessed at Manchester in the Bruntwood-funded BISC (Bruntwood Initiative on Sustainable Cities) project.

Prof John Handley, Professor of Land Restoration and Management.
Prof Geoff Levermore, Professor of the Built Environment and a Lead Author for the Intergovernmental Panel on Climate Change.
Prof Simon Guy, Professor of Architecture.
Dr Sarah Lindley, Lecturer in Geographical Information Systems.
Prof Roger Courtney, Visiting Professor, Champion of SCORCHIO project.

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