

## THE RESEARCH PROGRAMME

### RATIONALE

According to the International Energy Agency, existing buildings account for approximately 40% of the world's total primary energy consumption and 24% of the world's CO<sub>2</sub> emissions. There is a great opportunity to make significant reductions in demand, thereby reducing the need for supply and end-use energy costs. The introduction of effective energy efficiency measures in the built environment is therefore essential if governments and business are to address successfully both energy security and ambitious carbon reduction targets.

Similarly, rising energy costs encourage households and businesses to reduce energy consumption. There is a growing body of evidence that 'greener', more energy efficient buildings are valued more highly in the property market than conventional buildings, which increases the commercial incentive to invest in properties with improved sustainability performance. Investments in energy efficiency may also be an important contributor to economic recovery.

In 2011 the Energy Efficiency in the Built Environment (EEBE) research programme with Grosvenor and Cambridge University is delivering three main research outputs that have practical relevance and which will help property owners and developers establish optimal strategies for energy management. The research will be presented in three streams:

1. generating and using scenarios for the future of energy management in the built environment;
2. investigating the interventions needed to overcome barriers to energy efficiency; and
3. contributing to the understanding of the current policy landscape and trends.

For additional information about the research programme or the research streams, please use the contact details provided on the back of this publication.

### RESEARCH STREAM 3: UNDERSTANDING POLICY

Research Stream 2 looked at the barriers to energy efficiency in the built environment and identified 'Politics' as one of the six key categories. Policy is a tool and extension of the political will. Policy can sometimes be seen as a barrier to energy efficiency yet can also be seen as an intervention, or a significant opportunity for overcoming barriers to energy efficiency.

Internationally, the building sector is subject to a high degree of regulation. Regulatory regimes, to the extent that they exist, may provide a pathway to improve efficiency for both building construction and a variety of building appliances. Policy can facilitate market transformation by focussing on the equipment and capital stock being used in the built environment. It can also change priorities and behaviours in individuals as well as corporations through the use of financial mechanisms such as taxation.

This publication: examines the policy history that has pushed energy efficiency to the top of political agendas internationally, and specifically for the UK; provides a brief overview of energy concerns and motivations as well as key over-arching energy policies for three additional countries - Australia, China and the USA; looks critically at key active and proposed policy measures from around the world that are expected to impact energy efficiency in the built environment; and concludes by suggesting areas of future policy development and how the property industry can take a greater role in advising on and shaping policy.

Sources used for this publication can be found in the accompanying report which is available on request.

## THE RESEARCH PARTNERSHIP

### ENERGY EFFICIENCY IN THE BUILT ENVIRONMENT (EEBE)

Grosvenor and Cambridge University have joined together to undertake research into 'Energy Efficiency in the Built Environment' (EEBE). EEBE's focus is the reduction of primary energy use and carbon emissions in the built environment. EEBE's specific interests are assessing policies to promote energy efficiency in the built environment and developing strategies for the future of energy management. Current and planned research activities target existing and new buildings and developments as well as residential and commercial properties, with case studies from the UK and around the world.

EEBE's four aims are to:

- Explore possible future scenarios for energy efficiency in the built environment towards 2050.
- Examine the interventions needed to overcome the barriers to energy efficiency.
- Contribute to the understanding of the current policy landscape, regulations and performance of energy efficiency in the built environment.
- Promote knowledge exchange between thought-leaders in research, government and business on the theme of energy efficiency in buildings.

This Grosvenor - Cambridge initiative was established in 2008 and is based at the Cambridge Centre for Sustainable Development. Today it represents a wider consortium of companies and organisations from both the private and public sectors. Resources are made available from members of the consortium which include: Buro Happold; Department for Communities and Local Government; Department of Energy and Climate Change; Department for Environment, Food and Rural Affairs; EPSRC; Grosvenor; Jones Lang LaSalle; LessEn; SIG; and the Urban Land Institute. Other contributors have included: AEA Technology, Arthur D Little, Arup, Cambridge City Council, Cambridgeshire County Council, London Development Agency, and Westminster City Council.

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### GROSVENOR

Grosvenor is a privately owned property group active in some of the world's most dynamic cities. We recognise that our future success as a business is tied to the sustainable growth of the cities in which we have a presence. We have a vested interest in the future shape of the urban landscape and aim to help create attractive and vibrant cities in which people want to live and work.

Grosvenor is committed to achieving environmental sustainability. We aim to reduce our environmental impact by creating and managing well-designed, environmentally-sustainable buildings and places.

In 2011 we produced our first Environment Review. This is available to download at: [www.grosvenor.com](http://www.grosvenor.com)

Future energy challenges will inevitably impact the property sector as a whole and the industry needs to be proactive in addressing this. Through our partnership with Cambridge University we are seeking to explore potential impacts and responses and share these with the wider property sector, to help move our industry towards a more sustainable future.

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RESEARCH INTO THE FUTURE OF

# ENERGY EFFICIENCY IN THE BUILT ENVIRONMENT

## HOW CAN POLICY IMPROVE THE ENERGY EFFICIENCY OF BUILDINGS?



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Energy Efficiency in the Built Environment

  
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# STREAM 3: UNDERSTANDING POLICY

## GLOBAL, EU, AND UK POLICY BACKGROUND

Over the last two decades, energy concerns have gradually moved to the top of political agendas due to the significant potential impacts of climate change, peak oil, and energy security. To understand the current policy landscape, it is important to understand some of the underlying policies that have provided the foundation for current and proposed energy-related policy initiatives.

### Global Policy

In December 1997, with mounting evidence of the reality of climate change, 37 industrialised nations and the European Community adopted an international agreement known as the Kyoto Protocol at the third United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP 3). The major feature of the Kyoto Protocol was to set binding targets for reducing greenhouse gasses (GHGs) for all ratifying countries. These amounted to an average of a 5% reduction from 1990 levels between 2008 and 2012. As of 2006, it had been ratified by 163 states and regional economic integration organisations.

The UNFCCC has stated that by the end of 2012, a new international framework needs to have been negotiated and ratified to deliver the stringent emission reductions the Intergovernmental Panel on Climate Change (IPCC) has clearly indicated are needed. To date, no binding deal has been agreed. At COP 15 in 2009, held in Copenhagen, an Accord was ‘recognised’ by 193 nations at the summit rather than ‘approved’. The Accord established that climate change issues are central to the political thinking of all countries and that global temperature increase should be limited to 2°C as per the IPCC recommendations, but carries no binding obligations.

### European Policy

Within this context, in June 2000, the European Commission responded to their Kyoto obligations by launching the European Climate Change Programme (ECCP) to identify and develop the necessary elements to implement the Protocol. The ECCP examined an extensive range of policy sectors and political instruments with potential for reducing GHG emissions. A number of policy measures resulted from the first ECCP including the EU Emissions Trading Scheme.

In 2007, the European Parliament and Council set out a common energy policy for Europe. The policy identifies challenges faced by all EU Member States stemming from: climate change; increasing import dependence; and higher energy prices. This prompted a number of strategies aimed at developing an integrated approach to climate and energy policy to combat climate change and increase EU energy security while strengthening the EU’s competitiveness. This included GHG emissions and energy targets to be met by 2020 including: a reduction in EU GHG emissions of at least 20% below 1990 levels; 20% of EU energy to come from renewable sources; and a 20% reduction in primary energy use compared with projected levels to be achieved by improving efficiency. These “20-20-20” targets became binding legislation in June 2009.

The Directive on Energy Performance of Buildings, adopted in 2002, is the main legislative instrument at EU level to achieve

energy performance in buildings. In 2008 it was recast to strengthen performance requirements and to clarify and streamline some of its provisions, and was re-adopted in May 2010. The Directive recognises that in the EU, buildings are responsible for 40% of energy consumption and 36% of CO<sub>2</sub> emissions, and that energy performance of buildings is key to achieving the EU climate and energy objectives. The Directive stipulates that by 2021 all new buildings be nearly zero energy buildings, requires Member States to draw up national plans for increasing the number of zero energy buildings, and stipulates requirements for establishing and issuing energy performance certificates (EPCs).

### United Kingdom Policy

Responding to global and EU initiatives, in 2003, the Department for Trade and Industry published an Energy White Paper, “Our Energy Future - Creating a Low Carbon Economy”, which set out a long-term strategic vision for energy policy combining environmental, energy security, competitiveness and social goals. It set a target of a 60% reduction of GHG emissions from 1990 levels by 2050. The paper emphasised the need to decouple energy use from economic growth.

The implementation of the 2003 White Paper was taken forward via the Sustainable Energy Policy Network (SEPN). Through SEPN, the Sustainable Energy Act 2003 made provisions for the development and promotion of a sustainable energy policy and amended the Utilities Act 2000. The following year, the Energy Act 2004 implemented a range of commitments from the earlier White Paper.

Progress on achieving the goals set out in these Acts was reviewed in 2005 and resulted in “The Energy Challenge” report of 2006 which called for a package of proposals to help address the long term challenges for UK energy policy. This formed the basis for the ‘Energy White Paper 2007: Meeting the Energy Challenge’. This concluded the work of SEPN.

The Department of Energy and Climate Change (DECC) was created in October 2008 as a consolidated single government location for managing energy policy and tackling global climate change. As their first legislative step, DECC took three Bills through Parliament which comprised the Government’s strategy to secure long-term prosperity and quality of life: The Planning Act 2008, The Energy Act 2008 and the Climate Change Act 2008.

The Climate Change Act 2008 set a target for carbon dioxide emissions to be 80% lower than in 1990 by 2050 and 26% lower by 2020. It also established: a system for carbon budgeting; a climate change committee; trading schemes to incentivise mitigation activities; provisions for adaptation; financial incentives for reducing waste and increasing recycling; charges for single use carrier bags; and renewable transport fuel obligations.

The Energy Act 2008 included provisions that allowed: payments to small scale generators of low carbon electricity; and payments in respect of the renewable generation of heat.

UK energy policy continues to develop with the 2009 Low Carbon Transition Plan, the Energy Act 2010, the Energy Bill 2010-11 and the Electricity Market White Paper 2011.

## SELECT NATIONAL POLICY SNAPSHOTS

The preceding page details the UK policy context. In making policy, each government is responding to a unique set of energy and climate drivers. Each country therefore has a unique history and path towards energy efficiency policy. Below are three very different countries: Australia, China and the USA to provide a flavour of their unique challenges and responses.

### Australia

Australia is a net exporter of energy with substantial export income, however, it is one of the most coal-dependent countries in the world. Low-cost coal and natural gas, along with oil-based products, are currently the primary sources of Australian energy use. Because of this, in 2000 Australia was the highest emitter of GHGs per capita in the developed world. It has shaped its current energy policy towards “prosperity, security, and sustainability” while trying to maintain its energy-market position.

KEY POLICIES	INTENTION
<b>Energy Efficiency Opportunities Act, 2006</b>	Improve identification and uptake of cost effective energy efficiency opportunities to reduced GHGs; and increase energy security for large energy consumers. Rigorous energy assessment and public reporting is mandatory for all businesses that use more than 0.5 petajoules of energy a year.
<b>National Framework on Energy Efficiency (NREE) Stage II, 2008</b>	Expand and enhance the Minimum Energy Performance Standards Programme; develop an HVAC strategy; phasing out of incandescent lighting in the residential sector; stimulate energy efficiency in commercial buildings through green leases; develop measures for national hot water strategy; and data gathering and analysis.
<b>The National Strategy on Energy Efficiency (NSEE), 2009</b>	A 10-year program of work for promoting energy efficiency in Australia. Does not set any overall targets but aims to accelerate energy efficiency across all governments and to help households and businesses reduce their energy costs. Incorporates and builds on measures agreed by the Council of Australian Governments and the Ministerial Council on Energy.

### The People's Republic of China

China has been a net importer of energy since 2000. China is currently the world’s largest emitter of GHGs but, due to also having the world’s largest population, only ranked 78<sup>th</sup> in 2008 in its CO<sub>2</sub> emissions per capita. Energy efficiency and conservation are its highest energy priorities with unprecedented attention to conservation efforts. In June 2007, China became the first developing country to publish a national strategy addressing global climate change. China is the world’s leading renewable energy producer.

KEY POLICIES	INTENTION
<b>11th Five-Year Plan, 2006-2010</b>	Cut energy consumption per unit of gross domestic product by 20% over the course of the plan by 2010. (Achieved 19.1% reduction.)
<b>National Action Plan on Climate Change, 2007</b>	Control GHG emissions; enhance capability of continuous adaptation; promote climate change science, technology and R&D to a new level; raise public awareness; strengthen institutions and mechanisms on climate change.
<b>Emissions Reduction Pledge, 2009</b>	Prior to Copenhagen, China pledged to reduce the intensity of carbon dioxide emissions per unit of GDP by 40-45% by 2020 compared to 2005 levels.
<b>12th Five-Year Plan, 2011</b>	Shift emphasis from investment toward consumption and from urban and coastal growth toward rural and inland development. Enhance environmental protection. Control population below 1.39 billion by 2015. Work to meet 2009 Pledge through provincial and sector targets and monitoring progress.

### The United States of America

The USA is a net importer of energy, highly dependent on external sources and sensitive to external events. Increasing energy efficiency has long been part of the strategy to reduce dependence on foreign countries. Policy, funding, and programme management can take place at both federal and state levels. Covering many climatic zones, different regions of the country have different energy needs and efficiency requirements leading to the adaptation of policies by individual states in implementation.

KEY POLICIES	INTENTION
<b>Energy Independence and Security Act, 2007</b>	Improve vehicle fuel economy; increase production of biofuels; energy savings through improved standards for appliances and lighting; energy savings in buildings and industry; energy savings in government and public institutions; alternative energy R&D; carbon capture and sequestration; improved management of energy policy; and small business energy programs.
<b>National Action Plan for Energy Efficiency “Vision for 2025”, 2008</b>	A private-public initiative to create a sustainable, aggressive national commitment to energy efficiency. The Vision lays out a proposed energy efficiency action plan for state policy makers that if implemented by all states could lower energy demand by 50%. Encourages investment in low-cost energy efficiency programmes.
<b>Energy Efficiency and Conservation Block Grants, 2009</b>	Provide federal grants to units of local government, Indian tribes, states and territories reduce energy use and GHG emissions and for improvements in energy efficiency.

## SIGNIFICANT CURRENT AND PROPOSED POLICIES

The previous pages show interntional and national policy frameworks already in effect. The table below shows some of the more specific progressive policies, both current and proposed, affecting energy efficiency in buildidngs. Further discussion of the polices below and additional policies of interest are in the accompanying report which is available on request.

POLICY MECHANISM	INTENTION	CHALLENGES
<b>FEED IN TARIFFS OR ‘FITS’</b> <b>LOCATION:</b> In over 40 countries, states or provinces including Germany, Japan, South Africa, Spain and the UK <b>STATUS:</b> Current	Legislation for the effective introduction of renewable energies onto the market as well as the promotion of research and development in renewable energies enabled by a premium rate paid for electricity fed back into the grid from a designated renewable generation source.	<ul style="list-style-type: none"> <li>Can impose a higher cost on the economy, especially on energy consumers.</li> <li>Primarily focussed on wind and solar energy.</li> <li>May result in higher than justified profits for equipment producers.</li> <li>May be incompatible with competitive national electricity markets.</li> </ul>
<b>MANDATORY DISCLOSURE OF COMMERCIAL BUILDING OPERATIONAL ENERGY EFFICIENCY</b> <b>Location:</b> Australia <b>Status:</b> Current <b>Location:</b> UK <b>Status:</b> Proposed	Intended to add a new level of transparency in the commercial building market (currently) and to enable tenants and purchasers to make better informed decisions.  Includes prescribed penalties for failure to disclose information. This may include civil action, fines, and the ability for prospective tenants or purchasers to withhold funds depending on the disclosure.	<ul style="list-style-type: none"> <li>Additional cost to owner.</li> <li>Adds to the regulatory burden on businesses.</li> <li>New buildings may be discriminated against as they will not be able to prove operational performance.</li> <li>Buildings with high turn over and/or frequent use change may be difficult to measure correctly.</li> </ul>
<b>ENERGY EFFICIENCY STANDARDS FOR NEW BUILDINGS + THERMAL BUILDING CODES</b> <b>Location:</b> EU, USA, Canada, New Zealand, Iran <b>Status:</b> Current	Building energy codes that use performance-based approaches with the aim of improving flexibility, clarity, and effectiveness. Regulations are written in terms of the required outcome rather than by prescribing the process by which the specified outcome can be achieved, allowing the possibility of new and innovative solutions to the construction process.	<ul style="list-style-type: none"> <li>May not apply to existing building retrofit - key issues around scope of work and heritage.</li> <li>Actual performance reliant on code enforcement.</li> <li>Actual operational energy performance is often measured as being far greater than the design performance expectation.</li> <li>Additional regulatory burden.</li> </ul>
<b>PERSONAL CARBON TRADING SCHEME</b> <b>Location:</b> Norfolk island (Australia) <b>Status:</b> Current	Three year voluntary scheme where residents are allocated carbon units on a card which they will spend whenever they buy petrol and power. At the end of the year, extra credits can be sold, while those in deficit will have to buy extra credits. Each year the quota will be reduced.	<ul style="list-style-type: none"> <li>Participants may run out of rations but may not be able to afford more.</li> <li>Voluntary scheme may allow participants to ‘cheat’ through non-participant assistance.</li> <li>Currently grant-funded.</li> </ul>
<b>‘PAY AS YOU SAVE’ FINANCE INSTRUMENTS FOR ENERGY EFFICIENT RETROFIT</b> <b>Location:</b> UK (Green Deal) <b>Status:</b> proposed <b>Location:</b> USA (PACE) <b>Status:</b> Suspended	A framework to enable private firms to offer consumers energy efficiency improvements to their buildings at no up-front cost.  Businesses will provide the capital, getting their money back via the improved energy bill. Estimated savings on bills will always equal or exceed the cost of the work (the ‘Golden Rule’). The debt is attached to the property.	<ul style="list-style-type: none"> <li>Additional incentives may be required to encourage participation from households and businesses.</li> <li>No guarantee that bills will be reduced for individual consumers.</li> <li>The fuel poor and difficult to heat homes will require additional support to bring costs low enough to meet the Golden Rule.</li> </ul>

### Conclusion & Recommendations

In a rapidly changing world, policy can also change at a fast pace. Yet the impact of some policies may take years to understand properly, and a thorough independent evaluation of their effectiveness is needed. As well as staying abreast of policy changes, the property industry needs to take a more active role in shaping future policy - through acting in greater partnership with local government and academic institutions. Possible areas for future policy that could benefit both industry and government are policies that:

- links energy efficiency and value,
- ensures energy efficiency measures deliver, and
- focuses on end-user behaviour.

Industry has an opportunity to provide expert insight into the effects of current policies, and to shape future policies. By joining together and sharing information, industry stakeholders can strengthening future business operations while helping achieve government goals.