

Evidence to the Stern Review on the Economics of Climate Change

Reducing energy use by buildings is central to climate change policy - transparency and incentives can make this happen

by the UK team developing building energy certification methodology for ODPM and the EC:

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Summary

The use of buildings and the equipment within them (excluding industrial equipment) account for nearly half the UK's CO₂ emissions. If the UK is to achieve its energy security and CO₂ emission reduction goals, there needs to be a mindset change in the approach to building energy efficiency. A new European Directive dealing with the Energy Performance of Buildings comes into force on 4 January 2006 and gives us a unique opportunity to establish a platform to achieve this. By capitalising on this foundation, we could achieve dramatic reductions in the energy demand and arising emissions from the UK non-domestic building stock within ten years.

For this to happen, it will be necessary to take the following further steps:

1. **Actual energy use by buildings must become known.** Carbon counting – making actual energy performance visible - is a prerequisite for people to take energy seriously. This will need effective energy metering at each supply point, plus mandatory informative billing, with all energy suppliers providing their customers with annual energy statements, preferably as part of each and every bill.
2. **Building energy certificates should show both theoretical and measured energy efficiency.** The Energy Performance of Buildings Directive (EPBD) requires an energy certificate to be produced when a building is constructed, sold or let and to be on prominent display in public buildings. When a building is completed, altered, sold or let, the energy certificate will need to be based on a calculated theoretical energy performance. However, once a building has been in use for a while, the theoretical calculation can be complemented by robust and at least equally meaningful information on actual energy consumption, which will be known from the carbon counting. Certificates showing both predicted and achieved performance will not only provide information which is accessible to all building owners, occupiers and managers, but will close the feedback loop to clients, designers, builders and other service providers.
3. **All larger buildings should make their energy efficiency transparent.** A timetable should be established now for a phased ten year programme which results in every large non-domestic building (say over 1,000 m² floor area to start with) needing to possess an energy performance certificate showing their Operational Rating (together with their Asset Rating wherever this has also been required as a consequence of building works or property transactions). The certificate should be displayed both on-site and on-line to maximise its visibility and its consequential impact on building owners, occupiers, investors and managers.
4. **Financial incentives should promote building energy efficiency improvements.** To ensure that visibility of energy performance leads on to significant improvements, financial eg tax incentives will be needed to catalyse the building energy efficiency market, so reinforcing the market pressures for improved energy performance. If necessary, the incentives can be fiscally neutral, by simultaneously introducing penalties for poor performance. The use of taxes to encourage lower carbon emissions from buildings is justified by the wider benefits to society.
5. **Demand-side policies are needed to underwrite the expansion of energy efficiency services.** Demand-side energy policies are needed to support the development of the energy efficiency services industry which will install the required energy saving measures.

Introduction

The operation of buildings and the equipment within them account for nearly half the UK's CO₂ emissions. Dwellings account for two-thirds of this; non-domestic buildings, the focus of this submission, the other third. More energy use arises from building product manufacture and transport, construction processes, alteration and maintenance - and travelling between poorly-located buildings. To reduce the energy needed and CO₂ emitted, we can do much all along the line – improving briefing, design, construction, installation, control, commissioning, equipment, operation, use and management; and developing and using low-carbon energy supplies (both local and central).

A new European Directive on the Energy Performance of Buildings (EPBD) comes into force on 4 January 2006 and creates a unique opportunity to transform the energy efficiency of non-domestic buildings in the UK. To maximise its impact, the EPBD needs to be followed up by further policies to raise the prominence of the performance achieved and provide incentives for building owners, occupiers and managers to improve actual performance by better management and the implementation of energy saving measures.

Energy use by buildings is not yet an economic driver

In spite of its pivotal importance, the amount of CO₂ a building creates does not yet have much of an effect on sale or rental values. Most commercial property occupiers regard energy as affordable, so CO₂ does not figure highly in their investment, selection or management decisions. Even for “sustainable buildings”, seldom are the anticipated CO₂ emissions reported in journals or in competitions; and when claims do get made they are often difficult to believe, due to over-optimistic assumptions, unclear conventions and major discrepancies between expectations and outcomes.

The situation for dwellings is equally inauspicious. For much of the population, energy costs are not high enough to be taken seriously; while the households which do suffer fuel poverty create a policy limit on the use of taxes to encourage energy saving. Regulatory attempts to encourage the housing market to take more notice of energy performance have had only limited success to date.

Generally speaking, the history of energy conservation in buildings is the triumph of hope over experience: government initiatives have not delivered the desired energy efficiency results, largely because we don't learn from previous efforts. Market forces do not generate rational energy efficiency because of the perverse and contradictory incentives which currently operate: there are simply too many barriers, too much inertia and not enough drivers or benefits to overcome them.

Energy use by buildings is not visible

The technical and management skills exist to slash building energy demands and to lessen their dependence on supply-side measures. But these skills are not yet focused: few can tell you how their buildings are performing, even in the simplest terms. Many in the construction industry would have you believe that performance is far better than the actual, real world situation. Even if it wants to, the supply side of the building industry does not always serve its customers well; as it does not know enough about how its products perform and what really needs to be improved.

In short, most people within the system are flying blind. To move forward the energy performance of buildings needs to be made visible, with:

- greater awareness of how buildings use energy and cause carbon emissions
- better understanding of the components which contribute to performance, and how they interconnect;
- clear ownership of responsibility for achieving good results; and
- more encouragement for all parties involved to do their bit in striving to achieve better performance.

Performance - anticipated and achieved, needs to become an explicit market criterion for buildings:

- When they are procured or altered, and particularly at the key points of decision: inception and briefing, scheme design, planning approval, detailed design, regulatory approval, specification, equipment selection, construction and completion.

Achieving excellent energy and carbon efficiency must become a professional ethic.

- When they are sold or let. This will make the projected or achieved performance clear to the customer, who will then be able to value it properly and reward the building provider appropriately for the investment they have made. There could also be grounds for redress if the performance levels defined within the purchase or lease contract are not achieved.

The potential for excellent energy efficiency must become a badge of a good building.

- For their management, including owner occupiers, landlords and outsourced services.
Achieved low energy use and low carbon emissions must become a badge of good management.

Building energy performance will soon become more visible

One of the core aims of the EPBD is to improve the energy performance of buildings across the EU by the process of energy benchmarking and certification. Energy certificates will be required when buildings are constructed, sold or let and will need to be placed on prominent display in larger public buildings¹. Following detailed consultations by ODPM since the Directive was ratified three years ago, we understand that the UK legislation covering energy certification and the timetable for its introduction will be announced by the government by the legal deadline of 4 January 2006.

In principle, the EPBD allows an energy certificate to be based on either estimated or actual energy consumption. In the UK, if the legislation adopts the plans endorsed by the consultation process, in many cases the required certificate will be based on a calculated 'Asset' rating, the building's theoretical energy performance, assuming standard usage, based on its construction geometry and materials and its heating, ventilation, cooling and lighting plant. Initially, only the certificates displayed in occupied public buildings will need to show their actual annual energy consumption and relevant benchmarks – an Operational Rating.

Improving transparency between expectations and outcomes

Once confidence is gained in the calculation and use of Asset and Operational Ratings, the system can be geared up. We recommend that a ten year timetable is announced for all larger non-domestic buildings to display on-site an energy performance certificate showing their Operational Rating (together with their Asset Rating wherever this has also been required as a consequence of building works or property transactions), for example as summarised in Table 1 and detailed below.

Table 1 A ten year timetable for larger non-domestic buildings to obtain and display an energy certificate

Building category	Proposed policy	Target date
Public buildings visited by the public	This is the category of buildings we anticipate will be covered by the UK's initial implementation of the EPBD. We recommend the requirement to display an energy certificate is phased in over the three year period allowed by the Directive. Initially all buildings in this category should be required to report their annual energy consumption by fuel whilst building sectors like offices and schools should also be required to show relevant benchmarks. By the end of the three year period, all sectors should be required to show relevant benchmarks. To maximise transparency, these buildings should also disclose their Operational Rating on the web.	2006 - 2008
Public buildings not visited by the public	Buildings occupied by the public sector but not visited by the public should be required to follow those that are. Disclosure on a national electronic register on the web would be the most useful and powerful requirement.	2009 - 2010
Private buildings visited by the public	Once all public buildings are displaying their energy performance, privately owned buildings frequented by the public, eg hotels and retail outlets, might reasonably be expected to follow the public sector's lead.	2009 – 2010
Private buildings not visited by the public	By 2015, all larger buildings should be displaying an energy certificate, as part of their license to operate, just as they are now required to display a Health & Safety certificate. A five year period should be allowed for compliance to be achieved.	2011 - 2015
New buildings and refurbishments	From 2006, new buildings and major refurbishments should be required to measure their Operational Rating and add it to their energy certificate within three years of occupation.	2009

¹ The precise wording of EPBD Article 7.3 is "buildings with a total useful floor area over 1,000 m² occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons". The initial UK application, as envisaged in ODPM's public consultation, is for public authority buildings over 1,000 m², frequently visited by the public. These are likely to include local administration offices, public libraries, sports centres, schools, universities, and hospitals.

Public buildings visited by the public

A specific objective of the EPBD is for larger “public” buildings to set an example by displaying their energy certificates. Since these buildings do not often change occupancy or ownership, a Certificate based on measured energy use is not just relevant but essential, informing the occupier and the public about the true energy efficiency of the building. ODPM has indicated that public buildings that are visited by the public will form the vanguard of buildings required to display an energy certificate. The Directive allows energy certification to be phased in over a three year period from 4 January 2006. We recommend that initially all buildings in this category should be required to report their annual energy consumption by fuel whilst building sectors like offices and schools should also be required to show relevant benchmarks as these already exist. By the end of the three year period, all building sectors should be required to show relevant benchmarks, as these can be developed over this period for those sectors which currently do not have them. To maximise transparency, these buildings should also disclose their Operational Rating on the web.

Public buildings not visited by the public

In addition to the anticipated requirements of the UK’s initial legislation, we recommend that all buildings occupied by the public sector (including contracted-out Public Finance Initiative and Public-Private Partnership buildings) should be required by law to disclose their operational rating on a national electronic register and on the web.

Private buildings visited by the public

Larger public buildings represent only a fraction of the non-domestic building stock. Privately owned buildings frequented by the public, eg hotels and retail outlets, might reasonably also be expected to display an energy certificate in due course. An intention to do this (e.g. by 2010) should be signalled now. This would help to ensure the development of the necessary systems (including appropriate benchmarks) and expertise. Early adopters may even wish to display certificates on a voluntary basis in support of their Corporate Social Responsibility and environmental policies. Again these certificates should show the Operational Rating (together with the Asset Rating wherever this has also been required as a consequence of building works or property transactions).

Private buildings not visited by the public

By 2015, we believe that all larger buildings should be displaying an energy certificate, as part of their license to operate, just as they are now required to display a Health & Safety certificate. The requirement for private buildings not visited by the public to follow those that are might be instigated in five years time, giving a five year period for compliance to be achieved. Once the larger public and private buildings have been done, the requirement could be extended to smaller and smaller buildings.

New buildings and major refurbishments

New buildings and major refurbishments are a special case in any new programme because they are subject to Building Regulations. It is widely recognised that real in-use energy performance seldom matches up to theoretical expectations and we therefore recommend that a measured Operational Rating should complement the calculated Asset Rating within, say, three years of occupation. If both anticipated and actual performance is available, it will help to close the credibility gaps between design intention and reality. Making this feedback a statutory requirement will encourage the building’s owners, occupiers and managers to get the building’s performance on track (if it isn’t), while the procurement and design team will learn what is working well, what isn’t and why.

Making building energy performance assessment easy

In energy surveys, a large amount of time and effort is often taken up by the tedious task of just getting hold of reliable annual fuel consumption data. Frequently meter readings are estimated (and may not even be available for “new” buildings²), bills are never seen on site, accounts are aggregated for corporate customers, and ledgers are kept in money, not energy. In a streamlined certification procedure, such data collection overheads will be completely unacceptable. Instead, we recommend a

² In the Probe post occupancy research studies undertaken by the authors in the UK from 1995 to 2002 and in some of the office case studies before them, verified fuel bills were not yet available from the suppliers two or three years after the completion of the building. Recent anecdotal evidence suggests that the situation has not improved since then.

statutory requirement for energy suppliers to make records readily available, e.g. with annual statements of energy supplied to each supply point, where possible based on actual readings a year apart, and with automatic estimation of 365-day requirements otherwise³.

Another EU Directive, the forthcoming Energy End Use Efficiency and Energy Services Directive (EESD), contains a general requirement in its Article 13 concerning the information which energy suppliers should collect from their energy meters and provide to their customers. The UK's implementation of this Article could easily be used to create the legislation necessary to mandate annual energy statements. This information should also be directly accessible to accredited energy certification assessors, ideally electronically, or perhaps by a statutory requirement for occupiers to keep a log book on site.

Landlords and tenants

In some rented buildings (e.g. serviced office space), all energy is supplied and paid for by the landlord and the tenants pay for it within the service charge. In others (e.g. whole buildings rented to a single occupier or head tenant), the head tenant pays for it all. In most rented buildings responsibilities are split: the landlord pays for "landlord's services" and divides up the costs between the tenants, tenants pay directly for services within their demise and may also pay for fuel to services added in their fitout. Even for the main services, landlord/tenant splits can be complex. Energy certification offers a way of overcoming this barrier to transparency in energy consumption and efficiency. We recommend that EESD Article 13 is also used to require the landlord of a multi-tenanted building to give each of their tenants a Landlords' Statement of the energy supplied to them, to accompany the annual accounts which justify the landlord's service charge.

Fiscal incentives to reward good energy performance (or penalise poor performance)

Neither energy use, nor CO₂ emissions nor even energy costs are yet a market driver: the energy demand of buildings is relatively inelastic to energy price. For the price mechanism to overcome the inertia constraining implementation of energy efficiency measures, even those with attractive pay back periods, energy prices would need to be increased to a socially and economically unacceptable level.

To break this economic logjam, carrots are needed as well as sticks. We understand HM Treasury has already examined a range of tax incentives to assist the implementation of building energy efficiency measures: e.g. moderating Business Rates, Council Tax or Stamp Duty to reward buildings with better than average energy efficiency and, if the arrangements need to be fiscally neutral, penalising buildings with worse than average energy efficiency. Such policies can flow naturally and cheaply from the establishment of universal building energy certification and are explicitly encouraged by Recital 16 of the EPBD: "The [energy certification] schemes adopted should be supervised and followed up by Member States, which should also facilitate the use of incentive systems." In the domestic market, the imposition of higher rates of VAT on energy efficiency products than for fuel supplies has long been a cause of criticism from the energy efficiency industry.

Governments are sensitive to accusations of creating unnecessary red tape and "gold plating" European Directives. However, in practice a minimum implementation of the EPBD could well be more disruptive than a well-integrated one: some annoying hurdles to jump, instead of an integrated driver of continuous improvement. Obliging building owners and occupiers to examine their energy performance and to reward good results (and perhaps eventually to penalise bad ones) will establish a fertile environment for reductions in energy demand and CO₂ emissions, through investment, purchasing, improvement and management measures and by individual efforts.

³ The authors have raised this issue with the UK government on various occasions, but the feeling has been that such a requirement would not be acceptable to the UK energy Regulator (OFGEM), to whom they attribute the view that it is up to the consumer to pay for this additional information should they require it. However, OFGEM's attitude may be changing. We hope it is, because ready availability of such information is absolutely essential to achieving the objectives of the EPBD whilst minimising unnecessary administrative burdens on UK organisations and businesses.

Making it easier to implement energy efficiency measures

Demand side energy policies are needed to support the development of the energy efficiency services industry which will install (and perhaps operate and finance) the required energy saving measures for minimum effort by the owner, occupier or manager. HM Treasury has already tried to foster this process by its Enhanced Capital Allowances scheme. Although promoted as a financial incentive, this benefit of the policy has been widely reported as negligible. However, the endorsed list of approved energy efficiency products and equipment has proved to be very useful for both suppliers and purchasers.

Other ways need to be developed to make it easier for building owners and occupiers to implement energy efficiency measures, for example removing barriers (such as fully repairing leases) which prevent landlords or tenants investing to improve the energy efficiency of rented buildings. With effective energy certification of rented buildings, tenants would begin to demand them and occupy them accordingly; while landlords would achieve faster lets and eventually higher rents.

Two policies in other countries demonstrate how far the UK has to go to keep up with its EU partners in the task of creating a low carbon economy:

- In Denmark's initial implementation of the EPBD, it will be mandatory in some circumstances to carry out within five years the cost effective energy efficiency measures identified by energy certification. Plans are being made to support this by the development of on-line energy efficiency services.
- In Germany, the agreement on energy policy within the Grand Coalition seeking to form the new government is understood to include a new policy that 5% of all dwellings constructed before 1978 are to undergo energy efficient refurbishment annually. As a result, existing financing mechanisms are to have their budget increased from €360 million per annum to €1.5 billion per year. The mechanisms themselves will change in broad terms from low interest loans to outright payments.

Summary of key recommendations

1. The EPBD can form the foundation for dramatic reductions in the energy demand and the related carbon dioxide emissions from the UK non-domestic building stock within ten years. However, for this to happen, it is essential to take the following further steps.
2. Building energy certificates coming into use under the EPBD should eventually show both theoretical energy performance (the Asset Rating) and actual energy consumption (the Operational Rating).
3. All suppliers of energy to a building should provide the customer with annual energy statements. These will make it easy to determine the building's Operational Rating.
4. A timetable should be set down now which makes it mandatory within say ten years for all larger non-domestic buildings to display on-site an energy performance certificate showing their Operational Rating (together with their Asset Rating wherever this has also been required as a consequence of building works or property transactions).
5. The information used to prepare these certificates should be stored on an online database and be freely accessible.
6. Financial eg tax incentives (which might be fiscally neutral) are needed to catalyse the building energy efficiency market to achieve better energy performance.
7. Policy drivers are also needed to support the development of the energy efficiency services industry which will help to deliver the energy saving measures.