This article was downloaded by: [209.45.112.5]
On: 17 April 2015, At: 14:00
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK

Building Research & Information
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rbri20

Mandating transparency about building energy performance in use

Robert Cohen[a] & Bill Bordass[b]
[a] Verco Advisory Services Ltd, Overmoor, Neston, Corsham SN13 9TZ, UK
[b] Usable Buildings Trust, 10 Princess Road, London NW1 8JJ, UK
Published online: 27 Mar 2015.

CrossMark
Click for updates

To cite this article: Robert Cohen & Bill Bordass (2015): Mandating transparency about building energy performance in use, Building Research & Information, DOI: 10.1080/09613218.2015.1017416

To link to this article: http://dx.doi.org/10.1080/09613218.2015.1017416

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at http://www.tandfonline.com/page/terms-and-conditions

BRI Building Research & Information 2015
http://dx.doi.org/10.1080/09613218.2015.1017416

Routledge
Taylor & Francis Group

INFORMATION PAPER

Mandating transparency about building energy performance in use

Robert Cohen[1] and Bill Bordass[2]

[1]Verco Advisory Services Ltd, Overmoor, Neston, Corsham SN13 9TZ, UK
E-mail: robert.cohen@vercoglobal.com

[2]Usable Buildings Trust, 10 Princess Road, London NW1 8JJ, UK
E-mail: bilbordass@aol.com

Downloaded by [209.45.112.5] at 14:00 17 April 2015

In 2002, the European Union Energy Performance of Buildings Directive (EPBD) was ratified. This paper uses the lens of one policy measure triggered by the EPBD – Display Energy Certificates (DECs) for non-domestic buildings – to describe the difficulties experienced in capitalizing on a policy intention to use transparency about actual energy performance to drive better energy management and focus energy efficiency investment on things that really work in practice. It reviews the history and precedents of UK Building Regulations and European building energy efficiency policies to identify what helped and hindered progress towards buildings that use less energy in operation; and compares and contrasts building energy certificates based on asset and operational ratings. It also looks at the development paths of operational rating schemes in the US and Australia. It identifies a tendency of regulators to focus on one part of the problem, the so-called 'regulated loads'; an unhelpful split of government ownership of the topic between various ministries and agencies; a neglect of follow-through, enforcement and feedback; and a political rhetoric that favours an abdication of central government responsibilities to market forces. Based on this evidence, it identifies a number of lessons for improvements to future policy outcomes.

Keywords: building energy use, energy benchmarking, energy efficiency, energy performance, energy policy, energy rating, governance, operational rating regulation

Introduction

Many policies seek to improve the energy efficiency of buildings through specifications of inputs (*e.g.* through building regulations and organizational processes) rather than through requirements for outcomes. The consequences include what are commonly viewed as 'barriers' to energy efficiency and major shortcomings when new buildings come into operation. These were discussed by Bordass (2001), who advocated making in-use performance both visible and actionable and highlighted the potential for the energy certificates required by a draft Energy Performance of Buildings [European] Directive (EPBD) (European Commission, 2001) to do just this. This paper examines what started as a completely valid and promising policy and its less than satisfactory outcomes; and reflects on lessons to be learnt for future policy.

In December 2002, the EPBD was ratified (European Parliament and Council of the European Union, 2003). At the time, it was widely welcomed[1] as a radical regulatory instrument that would ensure that both existing and new buildings played their part in meeting the European Union's (EU's) climate change commitments enshrined in the Kyoto Protocol. The EBPD's main thrust was also towards inputs, but Recital 4 in its introduction mentioned the importance of energy demand management, while Recital 17 encouraged good energy management. Article 7 required buildings to have energy certificates, including a public display requirement for buildings with a total useful floor area over 1000 m^2 occupied by public authorities and by institutions providing public services to a large number of persons. Recital 16 urged that Certificates 'describe the actual energy-performance situation

© 2015 Robert Cohen and Bill Bordass. Published by Taylor & Francis

Downloaded by [209.45.112.5] at 14:00 17 April 2015

of the building to the extent possible' and Article 2 allowed the energy performance of a building to be determined by the amount of energy actually consumed.

The UK[2] response to the EPBD's public display requirement was to mandate Display Energy Certificates (DECs) based on actual annual energy use. This arguably represented a first test for a buildings energy efficiency policy with a focus on outcomes. At the time the EPBD was ratified, the UK was well placed to develop a system, partly owing to government investment during the 1990s in energy performance reporting and benchmarking of buildings in operation. However, those programmes were ended by the UK government in 2002, just two years before announcing its plans to mandate the benchmarking of public buildings using DECs and four years before committing to 'widen the display [energy certificate] requirement to all private sector buildings' (*Hansard*, 2006).

Twelve years later, evidence suggests that there has been relatively little overall improvement in the energy performance of the existing non-domestic stock (Committee on Climate Change, 2013, 2014) and endemic 'performance gaps' remain between the anticipated and actual performance of new and refurbished buildings (Arup, 2013). Theoretical performance calculations (AECOM, 2011) can even contribute to an illusion that new non-domestic buildings can move towards 'zero carbon' by 2019 (*Hansard*, 2013a).

Although DECs were introduced for public buildings in 2008, they have been and remain poorly supported, as will be described below. As a result, their potential impact has been severely blunted (DECC, 2013b). The government has also drawn back from its stated intent to extend the focus on outcomes (*i.e.* DECs) to commercial buildings, preferring to leave this to the market.

The objective of this paper is to address three key questions in the special issue's Call for Papers:

- *Lessons to inform better policy-making and to produce more successful initiatives*
  The history leading to and following the introduction of DECs is used to illustrate the difficulties the British government appears to have had in mandating meaningful transparency of and accountability for actual energy performance in use; and to identify how this might be improved.

- *Following up intended outcomes in the light of actual experience*
  A Central Register database records all information submitted when lodging a DEC. The register has potential as a rich source of feedback for policy-makers, but the government department responsible (UK Department for Communities and Local Government - DCLG) has not capitalized on this resource and its operator was not given a remit to support wider energy efficiency initiatives. Another department (UK Department of Energy and Climate Change - DECC) has reviewed the suitability of DECs and assessed their impact (DECC, 2013b), when it was seeking routes to compliance for a requirement in the Energy Efficiency Directive (Council of the European Union, 2012) for non-small and medium-sized enterprises (SMEs) in the private sector to carry out energy audits. The conclusions of its review are considered at the same time as the opportunities represented by the Central Register.

- *International influences*
  The paper reviews the evolution of mandatory operational energy rating systems for non-domestic buildings in Australia and the United States (US) and the interrelationships between EU and UK policies on the energy performance of buildings.

Background review

Energy use in non-domestic buildings

In spite of efforts to reduce it, energy use in non-domestic buildings remains stubbornly high.[3] Perceived needs of occupants today tend to incur more energy inputs: better ventilation, more air-conditioning, more light for many activities, safety and security, more electrical equipment, etc. Considerable improvements in the intrinsic efficiency of plant, equipment and appliances are counteracted by their increasing numbers and extended use. Energy efficiency can be further compromised by unintended consequences, including systems and controls that do not work as intended and electrical equipment left on unnecessarily. Procurement and management processes have also tended to become more complicated and fragmented, making it harder to achieve low-energy and low-carbon outcomes.

One fundamental reason for disappointing energy performance is that the overall energy use and emissions of buildings in operation are rarely the objective function. If they were, all the players involved in designing, building and operating a building energy efficiently would be better able to focus on the actual outcomes, motivated and assisted by transparent and easily understandable reporting of real performance in practice revealing what actually works. With collective understanding that better energy performance in use was everybody's goal, the systems used in producing, occupying, altering, using and managing buildings could also measure their contribution towards it.

In some parts of the US and for large commercial office buildings in Australia, evidence is emerging that robust

and transparent reporting can motivate rapid improvements in operational energy efficiency, enhance property values, lower vacancy rates and increase yields (Australian Property Institute, 2011), transforming the priority given to energy and carbon efficiency. In one case where this holistic approach was rigorously applied in the UK, a low-energy outcome has also been demonstrated to emerge naturally (Faithful & Gould, 2014).

An important side-effect of reporting building energy performance transparently would be a powerful evidence base for policy-making, *e.g.* how much energy is used in different types of building; how it changes over time; and the impact of different policies, in situations where this can be detected.

Complexity of UK energy efficiency policy

Energy efficiency is expected to play a key part in helping the UK to achieve its statutory 2050 target of reducing emissions by at least 80% from the 1990 level (Climate Change Act, 2008). In its latest assessment of progress, the Committee on Climate Change (CCC) (2014), the body charged with ensuring the UK meets these commitments identified, *inter alia*: (1) the need to strengthen incentives to improve energy efficiency in commercial buildings; (2) the importance of businesses and organizations having good information about their energy performance and scope for improvement, to accelerate delivery and reduce administrative costs; and (3) a complex and ineffective regulatory landscape, with scope to rationalize a plethora of policy instruments.

It is argued here that while policy-makers put in place instruments designed to improve building energy efficiency, they seem reluctant to connect them up, or to follow through in order to understand how well the intended outcomes are achieved. The Committee of Public Accounts (2014) also draws attention to this problem for outsourced work. The resultant lack of feedback affects not just the efficacy of policy-making, but the ability of the market to understand which interventions work and which do not. This highlights the tension between a government prioritizing short-term economic growth and arguably paying lip service to energy efficiency outcomes, and the statutory body (CCC) set up to ensure the trajectory of actual energy use is consistent with legislated carbon budgets and emissions targets.

One obvious example of how non-domestic building policy could be better integrated would be to make effective connections between policies that affect individual buildings and those aimed at organizations that own, occupy or manage a set of buildings (*e.g.* a retail chain, a landlord's portfolio of offices or a local authority's schools).

Energy efficiency paradox

In its energy efficiency strategy, the UK Department of Energy and Climate Change (DECC, 2013a) recognizes that the energy use of most non-domestic buildings is significantly higher than would be expected assuming rational economic behaviour. It identifies a lack of meaningful and actionable information as a key obstacle to simple energy management or cost-effective investment. Yet over the 40 years since the first oil crisis in 1973, it has proved extraordinarily difficult to implement policies that bring the necessary information clearly and transparently to the attention of an organization's decision-makers. Financial incentives[4] (taxes, etc.) to overcome barriers and inertia have had limited success in non-energy-intensive sectors, and it is now recognized that hard economic instruments have much greater impact when driven by 'soft' information and awareness-raising measures (Hilke & Ryan, 2012).

Several recent reviews (three of which are outlined below) have reinforced the view that UK policy should focus more on actual energy use than theoretical estimates, and that behavioural drivers for improvement are at least as important as the financial case.

In a review for DECC, CSE and ECI (2012) found the following:

- The key influence on whether investment in energy efficiency takes place may not be its profitability, but whether it confers competitive advantage strategically.
- Energy-saving investment often appears to require much higher rates of return than other investments with comparable risks. Contributors to this paradox include perceptions of 'hidden' costs; and real businesses not behaving as the rational profit-maximizers of classical economic theory.
- It does not help that energy savings are usually framed as a potential gain, not as 'avoidable waste', which most organizations are keener to excise.
- Energy consumption is usually the responsibility of operations and facilities managers, at some distance from those who set the strategic direction for an organization. Energy needs to become more visible to senior managers and its efficient use a strategic objective.
- Non-energy benefits, like better public image or comfort for staff are critical to raising the strategic value of energy efficiency – particularly in non-energy intensive sectors like offices, where the savings are unlikely to make a significant difference to the organization's cost base.

Downloaded by [209.45.112.5] at 14:00 17 April 2015

On the other hand, in a heavily caveated[5] study for DECC, Eunomia (2014) posited that public disclosure of energy use may be a weaker reputational driver than greenhouse gas emissions. It suggested that mandatory board-level sign-off of a public report on an organization's energy efficiency would help to drive investment in improvements.

A comprehensive review of the effectiveness of all UK policies aimed at energy and carbon reduction in commercial buildings (Deloitte, 2014) was strongly critical of the existing framework of policy instruments, especially its inconsistency, poor enforcement, incompatibility with the workings of the market, and inadequate integration of penalties and incentives to drive compliance. It was particularly concerned that compliance tools, especially the theoretical models used for building regulations and energy performance certificates, failed to deliver real performance outcomes. It noted:

> the strength and persistence of [property] industry campaigns to mandate the roll-out of Display Energy Certificates to commercial premises, based on the perceived merits of operational energy ratings by many in the market.
>
> (p. 42)

While property industry professionals recognize the power of transparency about actual outcomes to drive action to improve energy performance, regulators seem reluctant to embrace the concept. In general, policy-making should recognize more explicitly that energy efficiency actions and accountability necessarily occur at the building level. Policies which mandate energy and carbon reporting only at the level of whole organizations do not create 'agency', an understanding of how or where to act.

UK building regulations

Historically, national building regulations relating to 'conservation of fuel and power' focused on energy for space heating. For England and Wales, the first set of national energy standards (Ministry of Public Building and Works, 1965) included limits on the *U*-values of certain elements of the fabric of new houses. Following the 1973 oil crisis, the UK government launched an energy efficiency action programme. In 1976, insulation requirements first appeared in building regulations for new non-domestic buildings. Since then, energy-related building regulations have been progressively tightened every five years or so, while the priority given to energy efficiency has waxed and waned, depending whether the minister responsible was an efficiency enthusiast or a free-marketeer (Mallaburn & Eyre, 2014).

The Building Act (HM Government, 1984) started to move the building regulations from prescribed *U*-values to functional performance standards, with statutory guidance in Approved Documents. Their scope also widened, to include hot water and fixed building services for ventilation, cooling and lighting. Trade-offs also began to be allowed between one aspect and another. The 2002 revisions (HM Government, 2002) introduced reality checks into the completion process for non-domestic buildings, with air pressure tests to identify excessive air infiltration and signing-off the commissioning of controls. Design stage calculations of CO_2 emissions (from regulated loads under standard conditions) could also be used as an alternative route to compliance. However, construction industry suggestions to require actual annual energy consumption to be benchmarked two or three years after occupation were rejected.

In 2006 the minimum *U*-value option was discontinued (HM Government, 2006), replaced by whole-building performance calculations defined by a National Calculation Method (NCM),[6] in order to comply with the EPBD – which wanted to move building energy regulations in all EU countries from a prescriptive to a performance basis. This illustrates how UK energy policy can be influenced by policy-making at the European level. Indeed, the European unification project itself was closely aligned with energy-related issues.

European regulation of building energy efficiency

In 1951, the very first European treaty (of Paris) established the European Coal and Steel Community (ECSC). The Treaty of Rome in 1957 created a common market for energy supplies and other basic economic goods among its six founding members[7] by adding to the ECSC, the European Economic Community (EEC) and the European Atomic Energy Community (EURATOM), promoting nuclear energy cooperation. By 1967 these three institutions were merged into a single EEC, which the UK, Eire and Denmark joined in January 1973.

In 1973, Denmark was already questioning the EEC's energy policy focus on supply not demand, when the oil crisis reinforced their argument. However, not until 1985 did the European Commission's Directorate General for Energy publish an internal discussion document stating that 40% of all energy use in the EEC was related to buildings and outlining energy efficiency policy options. Formal consultations in 1986 and 1987 led to a proposed directive for energy audits of buildings (European Commission, 1987), but this was rejected by the Council of Ministers, the inter-governmental decision-making body.

In 1987, the Single European Act (SEA) also came into force, the first major revision to the Treaty of Rome.

Downloaded by [209.45.112.5] at 14:00 17 April 2015

Downloaded by [209.45.112.5] at 14:00 17 April 2015

This was significant for energy efficiency, as it confirmed that environmental protection was an aim of the European Community (EC) in its own right, to be accounted for in all policy areas. The SEA also specified qualified majority voting in the Council of Ministers on decisions about the environment, whilst energy policy remained subject to unanimity. Duly encouraged, the Commission revisited its 1987 ideas and in 1989 proposed Specific Actions for Vigorous Energy Efficiency (SAVE), a proposal eventually ratified by the Council of Ministers in 1993 as the SAVE Directive (93/76/EC) (Council of the European Communities, 1993).

Article 1 of SAVE stated its purpose as:

> the attainment by Member States of the objective of limiting carbon dioxide emissions by improving energy efficiency, notably by means of drawing up and implementing programmes[8] in the following fields:
>
> (1) Energy certification of buildings.
>
> (2) The billing of heating, air-conditioning and hot water costs on the basis of actual consumption.
>
> (3) Third-party financing for energy efficiency investments in the public sector.
>
> (4) Thermal insulation of new buildings.
>
> (5) Regular inspection of boilers.
>
> (6) Energy audits of undertakings with high energy consumption.

The SAVE Directive amounted to a declaration of intent rather than legislation with binding commitments. However, it created an important precedent that the Community could (1) implement policy on the energy use of buildings; and (2) use its environment policy to do so and therefore for it to be decided by qualified majority voting.

The UK government's Energy Efficiency Office launched an Energy Efficiency Best Practice programme (EEBPp) in 1989,[9] incidentally supporting UK compliance with the SAVE Directive, so not transgressing State Aid rules (European Commission, 2002). This and related government programmes also developed the foundations of a possible energy certification system based on operational ratings, including (1) research into the general principles (*e.g.* Field, Soper, Jones, Bordass, & Grigg, 1997; CIBSE, 1999); and (2) numerous energy consumption benchmarking guides for specific building sectors, including Guide 19 for offices (DETR, 1998) which demonstrated compatibility with these underpinnings.

SAVE was moving forward at the same time as the United Nations Framework Convention on Climate Change (UNFCCC[10]), which was adopted in May 1992, ratified by the EC[11] in December 1993, and came into force in March 1994. In March 1995, the first meeting of the Conference of the Parties, in Berlin, began negotiations on measures to reduce emissions, leading to adoption of the Kyoto Protocol in December 1997, signed by the EC in April 1998 and ratified by the EU in May 2002.

Taking account of the EU's Kyoto commitments, in 2000 the Commission adopted an Action Plan to improve energy efficiency, calling for a 20% reduction of energy use by 2020.[12] A year later, on 11 May 2001, the Commission proposed to 'adopt to technical progress' the SAVE Directive from 1993, publishing the draft Energy Performance of Buildings Directive (European Commission, 2001). This emerged as the final EPBD on 16 December 2002 (European Parliament and Council of the European Union, 2003). In England and Wales, after some delay, responsibility for transposing the EPBD was given to the Office of the Deputy Prime Minister (ODPM), the department in charge of building regulations, later renamed the Department for Communities and Local Government (DCLG).

A short history of DECs

Asset and operational ratings

The EPBD covered far more than energy regulations for new and refurbished buildings. It introduced energy certification of both new and existing buildings when sold, let or when building work was completed, to provide information to the new owners and occupiers. It also required the display of an energy certificate in buildings occupied by public authorities with floor areas over 1000 m^2. To apply energy regulations to buildings that were not new or subject to building work presented a novel challenge to policy-makers. There was considerable debate across Europe on whether display certificates should be based on theoretical (calculated) or actual (measured) performance, *i.e.* an asset rating or an operational rating. The EPBD wording and the subsidiarity principle[13] allowed member states to make their own choices.

An asset rating is intended to assess the intrinsic energy efficiency of a building's fabric, heating, ventilation and air-conditioning (HVAC) plant and lighting, items with which the construction industry is most directly concerned. These can be regarded as accounting for the energy used *by* a building, which over recent years has become known in the UK as 'regulated energy uses'. To consider the total energy use – what utility meters measure and the occupiers pay for – one must also include the energy used *in* a building, in particular

Downloaded by [209.45.112.5] at 14:00 17 April 2015

by equipment brought in by the occupier. In principle, policy-makers have other types of regulation to influence this second category, including product efficiency standards, appliance labelling, corporate reporting and taxation. However, the split causes practical problems in addressing building energy performance in use.

For example, non-domestic asset rating models used for energy performance certificates and building regulations compliance in the UK calculate energy performance relative to a reference building. The results are not intended to estimate real-life energy consumption, even for the 'regulated' energy end uses because, to provide comparability between different buildings, the models assume 'standard' activities and 'standard' hours of use for the spaces concerned. The results only take account of the presence of energy-saving features and controls, not whether these elements are operating efficiently, so perversely give no encouragement or reward for better energy management in use – which is not only the cheapest and simplest way of saving energy, but also promotes understanding and feedback of what capital and operational measures are successful in practice.

Those favouring operational ratings in the UK pointed to the sound foundations created by the EEBPp (see above), the reality check they provided on in-use performance (Bordass, Cohen, & Field, 2004), and successful precedents in Australia and the US, which are reviewed towards the end of this paper. They also warned about the high cost and potential inaccuracy of collecting data about an existing non-domestic building to populate a theoretical model of energy performance. It was also realized that in many non-domestic buildings, the carbon emissions originating from 'unregulated loads' can easily be similar to or greater than the regulated ones. They feared that if asset ratings were used for energy certification, confidence in the regulatory regime would be undermined because the results would bear little relationship to the actual performance experienced by occupiers through their utility bills, an outcome confirmed in reality (Jones Lang LaSalle, 2012). At the same time, it was acknowledged that since an operational rating system needed to be replicable and low in cost, it might be difficult to take proper account of how intensively a building was used, which might penalize buildings that made efficient use of space (see the section below on Benchmarks for public buildings).

For England, Wales and Northern Ireland, a large group of government officials and property and construction industry experts prepared proposals for public consultation (ODPM, 2004). These recommended that, for sale or letting, certification of new and existing buildings should be on an identical basis. This was perceived to require an asset rating, as new buildings and major refurbishments would not have operational data[14] at the point of sale, while existing buildings might be unoccupied and/or not have current or relevant energy data. On the other hand, the consultation recommended that the certificate for display in public buildings should be based on actual annual energy use and renewed annually, to encourage energy management and continuous improvement.[15]

These proposals were broadly welcomed. On 14 June 2006 a written Statement by the Minister for Housing and Planning announced:

> We will adopt a system of calculated asset ratings when energy performance certificates are required upon construction, sale or rent and allow for the use of operational ratings, derived from measured [actual] energy consumption, for those public authorities obliged to provide certificates for public display. This is important as the public sector should be seen to be taking the lead in respect of disseminating energy performance and actively seeking ways of reducing their energy consumption. We are committed to widening the display requirement to all public and private sector buildings where it can be demonstrated this is cost-effective to do so. We shall be publicly consulting on this to take full account of stakeholders' views.
>
> (*Hansard*, 2006)

In March 2007 regulations were laid before Parliament (HM Government, 2007). These came into force for non-domestic buildings in October 2008, with Energy Performance Certificates (EPCs) based on asset ratings and DECs based on operational ratings. Many commentators had hoped that operational ratings would secure wider use in commercial buildings immediately, but it was a sea-change to get regulators to accept them at all; and there was a logic to pilot them in the public sector, where more extensive in-use energy benchmarks were also available. The introduction of EPCs has led to extensive efforts to understand (Carbon Trust, 2011) and close the performance gap (Arup, 2013) between theoretical and actual performance. However, the rest of this paper concentrates on how DECs themselves have fared.

Benchmarks for public buildings

In late 2006, DCLG asked the Chartered Institution of Building Services Engineers (CIBSE) to advise on benchmarks for public buildings to prime the scheme for DECs. The review for CIBSE (Bordass & Field, 2007) identified severe limitations with the available benchmarks for non-domestic buildings, as collated in Section 20 of CIBSE Guide F:

Downloaded by [209.45.112.5] at 14:00 17 April 2015

- Most were based on information 10–20 years old and produced by the EEBPp.
- They had been prepared by different teams, with little consistency of approach.
- They could reinforce the status quo, *e.g.* giving elevated benchmarks to air-conditioned buildings. Whether these allowances were deserved required careful examination, in the light of the policy requirement for rapid reductions in energy use and greenhouse gas emissions.

The benchmarking process proposed for DECs had four main components:

- A 'graduated response', with a simple entry level, benchmarking annual fuel/heat and electricity use per m^2, with a headline comparison in units of CO_2 emissions.
- A limited set of benchmark categories (29 were chosen) each with separate values for fuel/heat and for electricity, with the option to combine area-weighted categories for mixed-use buildings.
- Mandatory adjustments for regional weather, applied to the benchmarks.
- Optional adjustments[16] for use where people felt the entry level did not take proper account of the nature of their building, *e.g.* if it had long occupancy hours or contained 'specials' – items like data centres or regional server rooms.

The DCLG accepted CIBSE's recommendations. During 2007, CIBSE developed initial 'placeholder' benchmark values, in consultation with sector representatives. These were published as TM46 (CIBSE, 2008) with documentation of the DEC methodology in TM47 (CIBSE, 2009). The TM 46/47 procedure deploys tailored benchmarking: instead of normalizing a building's energy use to compare with fixed benchmarks, the benchmarks themselves are adjusted for weather, hours of occupancy and other relevant factors. The approach had several advantages: a consistent system, particularly when making updates; avoiding confusion between absolute and normalized data; and potential for integration with other systems (including carbon accounting, carbon trading and portfolio aggregation), that take account of absolute, not normalized data. One disadvantage is that the headline comparison between different buildings uses a dimensionless performance indicator – their numerical 'operational rating'. However, the certificate also shows annual energy use of fuel/heat and electricity, the associated customized benchmarks, and the proportion of energy supply attributable to renewable sources.

It was recognized that the more intensively used examples of a building type (which also tend to be more common in the private sector) were likely to get poorer grades when DECs were first introduced. For example, 'specials' (see above) might not be metered; and no simple, low-cost method could be found to take account of high densities of occupation without creating major risks of misuse by the unscrupulous. The operational rating scheme deployed in Australia does take account of occupation density, as described towards the end of this paper, but this is an investment grade approach, that was not considered affordable for the introduction of mandatory DECs.

In anticipation of extending DECs to commercial buildings, TM46 covered all non-domestic building types, not just the mandated public sector buildings. However, it was recognized that (1) the benchmarks for public buildings would need review in the light of initial results and (2) much more work was required on the benchmarks for private sector buildings.

The government also sought tenders for developing and operating a Central Register to capture data from every DEC and allow an evidence base to be developed that would be of immense value to policymakers and assist ongoing refinement of benchmarks.[17] This was won by a commercial operator, Landmark Information Group.

Credible benchmarks were critical to sustain faith in the scheme, prove its value and embolden government to extend it to the private sector. By virtue of publishing the initial benchmarks, CIBSE appeared to have a *de facto* responsibility for their maintenance and development, but had no specific mandate or government budget. In summer 2010, CIBSE appointed a small group of building energy performance experts to examine the unprecedentedly rich set of data collected from the first 18 months of the scheme's operation: 45 000 DEC records lodged in the Landmark register to February 2010. In October 2010, the group reported its comprehensive analysis to a CIBSE Committee and recommended further work to decide the changes needed to the benchmark values and associated allowances. CIBSE published the group's report seven months later (Bruhns, Jones, & Cohen, 2011), with a short section detailing the further work needed to quantify any necessary refinements to the benchmark values and in the longer term to put the DEC process on a firmer footing.

Extension of operational ratings to all non-domestic buildings

At the same time, in the policy sphere, calls for DECs to be extended to the private sector were reaching a crescendo. In March 2010, almost four years after it was

promised and two months before a general election, a consultation on making better use of DECs (DCLG, 2010) signalled the government's intention to do just that, saying:

> The Government thinks there is a growing case to extend DECs to such buildings. The Committee on Climate Change (CCC) recently recommended extending DECs to all non-residential buildings by 2017. We therefore propose requiring DECs for commercial buildings. This is outside of the scope of the current EPBD regulations and will require primary legislation. Therefore, we would be seeking an appropriate legislative vehicle for implementing this change.

In autumn 2010, another government report, by the Low Carbon Construction Innovation and Growth Team (Morrell, 2010), included the following recommendations:

- (6.20) bring forward the requirement for the posting of Display Energy Certificates (DECs) for all non-domestic buildings, with ratings and accompanying recommendations made widely available'
- (6.21) review the benchmarks used to calculate DEC ratings in order to ensure that they are consistent and robust, and effectively differentiate on energy performance for buildings of different types, and simplify the process to the greatest practical degree.

In March 2011, a property industry Task Group Final Report (UK-GBC, 2011) recommended:

(1) Annual Display Energy Certificates (DECs) should become mandatory for all non-domestic building occupiers, with a phased roll out starting in 2012. We believe this could be achieved through the Energy Bill currently going through Parliament.

(2) Annual DECs for landlords' services should become mandatory, starting with multi-let non-domestic buildings over 1000 m^2, with a phased roll out. It should be mandatory for landlords to pass data to occupiers; this should be based on the Landlord's Energy Statement (LES).

(3) DECs (for occupiers and for landlords) should be introduced to non-domestic buildings via a 'mandatory soft start' in 2011/12, to take place prior to the formal display of certificates from 2012/13. This will ease administrative adjustment and allow for data collection and benchmark refinement before the results are disclosed and displayed.

In line with the previous year's consultation by the Labour administration, the Coalition government enshrined the rollout of mandatory DECs in its new Carbon Plan (HM Government, 2011a) and most meaningfully in an amendment to the Energy Bill 2011, to provide enabling primary legislation for such a move. In June, the Committee on Climate Change (2011) called for a mandatory rollout of DECs to all non-domestic buildings by 2017.[18] Similar recommendations were made by property industry and occupier bodies including the Aldersgate Group,[19] the Carbon Trust, UK Green Building Council (UK-GBC) and the Confederation of British Industry (CBI).[20]

CIBSE did not commission the work needed to match the benchmarks for public buildings with the newly available empirical data. At the same time, some seemingly modest changes to the DEC rules, introduced by the government, had the effect of further undermining the benchmarks for public buildings located on a campus.[21] The CIBSE benchmarks steering group report (Bruhns et al., 2011) also made clear the need for substantial work on the benchmarks for commercial buildings, to update and refine them from the initial 'placeholders'.

However, when the Energy Act 2011 was laid before Parliament in October 2011, the late amendment to include DECs for private sector buildings had been removed. The reported reasons for the government reneging on this commitment were: (1) that DECs could create unnecessary regulatory bureaucracy; and (2) concerns about the benchmarks. In December, a revised Carbon Plan (HM Government, 2011b) instead required DCLG and DECC to encourage voluntary take-up by the commercial sector.

The extension of DECs to the commercial sector might have been perceived by ministers as unfinished business from the June 2006 ministerial commitment (see above), and a legacy of the transposition of the EPBD. It therefore became vulnerable in 2011 because the new UK government had pledged to change the way in which EU law was transposed into national law in order to avoid 'gold-plating' and minimize the burden of over-regulation on UK businesses (Miller, 2011). However, given their widespread support for the extension, not surprisingly the response of the commercial property sector was scathing:[22] the decision perceived to be more the result of government dogma than evidence-based energy efficiency and climate change policy-making.

Downloaded by [209.45.112.5] at 14:00 17 April 2015

Downloaded by [209.45.112.5] at 14:00 17 April 2015

A further opportunity: the EPBD recast

Further setbacks to the development of DECs occurred in 2012. At the EU level, 'EPBD2' (the recast of the EPBD) ratified in May 2010 (Council of the European Union, 2010) was to come into force in January 2013. Its Article 13 required *all* buildings over 500 m^2 and frequently visited by the public (including privately owned buildings) to display an energy certificate, if they had one. The UK (except Scotland) had implemented the EPBD with two types of certificate: EPCs based on asset ratings for property transactions and DECs for display. For consistency, and had there been an ambition to maximize its impact by deploying the subsidiarity principle, the UK transposition of Article 13 could have required commercial buildings frequently visited by the public to display a DEC. In April 2012, CIBSE's benchmarking expert group proposed a research programme to work with the affected sectors to establish credible benchmarks.[23] By the end of 2012, researchers at University College London (UCL) had analysed a new extract from the Central Register with the data for 120 000 DECs lodged up to June 2012 (Hong & Steadman, 2013; see also Hong, Paterson, Mumovic, & Steadman, 2014). This reconfirmed shortcomings in the benchmark values. However, no work was commissioned to recommend any changes to the benchmarks for public or commercial buildings.

Despite the views of most stakeholders responding to its consultation three years earlier, in January 2013 DCLG transposed Article 13 of EPBD2 by requiring commercial buildings frequently visited by the public to display an EPC if they had one; a DEC was not an acceptable alternative. As a result, occupiers and visitors entering commercial buildings see entirely different energy certificates from those in public buildings.

EPBD2 also required display certificates in smaller public buildings (500–1000 m^2 from January 2013 and 250–500 m^2 from July 2015). DCLG decided that DECs for buildings smaller than 1000 m^2 could have a 10-year validity,[24] not the annual renewal required for larger buildings. This and the displayed commercial EPCs squandered the opportunity to integrate DEC production with other policy measures, including smart metering, energy audits and portfolio reporting; and removed any motivation for year-on-year performance improvement. In addition, DCLG no longer required all public authority buildings over the size threshold to obtain a DEC, but only those frequently visited by the public.

The UK government's own market research (DECC, 2013b) suggested limited evidence that DECs supported energy management activities or reduced emissions arising from the use of non-domestic buildings. Most of the people surveyed (both occupants of the building with a DEC and members of the public seeing it) did not understand a DEC and/or did not view it as a significant motivator for action. The inference was that this was an intrinsic fault of the DEC instrument. In reality, it can be seen as a consequence of limited policy follow-through, including the following:

- No public information campaign to raise awareness of DECs.
- No public investment in the ongoing development of benchmarking since the EEBPp ended in 2002.
- Little connection forged between sources that could have automated production of some of the information required to produce a DEC, including Valuation Office property records and automatic utility data reporting.
- Little action taken to exploit a DEC's potential to create reputational pressure to drive action on energy efficiency: for example, using data on the Central Register to produce league tables of energy performance of public buildings.
- Unnecessary barriers imposed on independent parties seeking to use data from the Central Register to make peer group comparisons, including high access charges and limits on the amount of data that can be requested for each record.
- The Central Register's operator equally does not have a remit to consider ways in which the data could be used to support activities or policy-making which seek to improve building energy efficiency.
- A lack of policing or enforcement (by Trading Standards Officers), *e.g.* for buildings that have never had or displayed a DEC.
- Not using the Central Register to identify grossly overdue renewals Over half the buildings with a DEC have never had a single renewal and only one quarter meet the regulations by lodging an annual DEC routinely (Hong & Steadman, 2013).

One result of this lack of awareness-raising and enforcement was fewer lodgements on the Central Register and a lower income for the operator. By April 2013, the lodgement rate of non-domestic energy certificates was so much lower than anticipated that the government agreed to increase the lodgement charge by 120%. Commentators wondered (*e.g.* Davies, 2013) whether stronger enforcement would have been a better way to sustain the income required, not doubling the fee for those obeying the rules. Then, in September 2013, the House of Commons was informed

that the lodgement fee increase had proved insufficient; and DCLG reluctantly agreed to pay £5.7 million to cover a shortfall in anticipated income from operating the register from 2008 to 2013,[25] providing an example of the lack of oversight of outsourced work reported by the Committee of Public Accounts (2014).

Detailed analysis of the data for the 120 000 DECs lodged up to June 2012 (Hong & Steadman, 2013), found that some 22 000 buildings in England and Wales had at least one valid DEC of which 2900 (13%) were for office buildings, almost all in the public sector, covering 11.7 million m^2 gross internal area. DEC coverage therefore amounts to roughly 10% of the total 120 million m^2 (VOA, 2012) of commercial and public office floor space in England and Wales. Around 30% of the buildings were graded B or C, 50% D or E and 20% F or G.

Downloaded by [209.45.112.5] at 14:00 17 April 2015

Energy audits: resurrection for operational ratings?

Thirty years after first being proposed by the European Commission in 1985, energy audits were mandated by the EU's Energy Efficiency Directive (EED) (Council of the European Union, 2012) – ratified in October 2012.[26] Article 8 of the EED requires large private sector organizations (non-SMEs) to complete an energy audit by December 2015 and every four years thereafter. In the UK, Article 8 is being implemented through the Energy Savings Opportunities Scheme (ESOS). Government guidance (Environment Agency, 2015) has confirmed that DECs represent one way to comply, potentially joining up a policy aimed at organizations which own and/or occupy a portfolio of buildings with a policy designed to influence individual buildings. This may revitalize DECs: it also reinforces the urgent need to put in place suitable benchmarks for commercial buildings and to update the benchmarks for public buildings to bring them into line with empirical data.

Landlords and tenants

DECs do not distinguish between the energy used by the fixed services in a building and that used by occupants. This creates some difficulties, particularly in multi-tenanted buildings where landlords are often responsible for energy used in common parts and 'shared' services (*e.g.* HVAC supplies to the whole building), and tenants for equipment and lighting in their spaces.

In anticipation of the need to produce DECs for rented commercial offices, in 2007–08 the British Property Federation developed the Landlord's Energy Statement[27] (LES) and the Tenant's Energy Review (TER). LES-TER was a low-cost method of summarizing annual energy supplies purchased by the landlord by type of fuel, and allocating the appropriate portion to each tenant. LES-TER also enabled each tenant to prepare a DEC directly comparable with DECs for whole buildings.

When the government decided not to extend DECs to commercial buildings, the industry had no business case to invest in the supporting infrastructure. As a result, the LES is only used by a small number of landlords as part of their energy management and reporting procedures. A few public authorities occupying more than 1000 m^2 in a multi-tenanted building require a LES from their landlords in order to display the DEC that is legally required, but most simply fail to comply.

In the absence of a mandatory requirement, demand built up from property developers and portfolio managers for a voluntary investment-grade rating to be available for the operational performance of their buildings, to mirror the success of the National Australian Built Environment Rating System (NABERS) system discussed below. The Better Buildings Partnership,[28] a collaboration of leading UK commercial property owners and occupiers, therefore initiated the development of a Landlord Energy Rating (LER). The LER is designed to assess the intrinsic operational energy efficiency of a building, *i.e.* the energy required in common areas and the energy to provide a comfortable working environment in tenant areas, but excluding energy used by tenants' lighting and equipment, expressed per m^2 of rentable space and graded in comparison with benchmarks that take account of the building's occupancy hours and voids.

The LER could enable commercial landlords to demonstrate that better rated buildings definitely had lower energy use and costs. It could create solid foundations for tenants and investors to make meaningful comparisons between different buildings, and a vibrant market for energy efficient offices. These aspirations make the LER considerably more expensive to produce than the LES, because more information needs to be collected and verified, especially because the servicing and metering arrangements in many UK offices do not map neatly onto the landlord–tenant boundaries associated with the LER methodology.

For new buildings and refurbishments, the LER could also become a powerful incentive for all stakeholders to work together to achieve projected levels of in-use performance, as occurs with the Commitment Agreement of the NABERS scheme in Australia.

Experience in other countries

United States

EnergyStar is a voluntary programme developed and supported by the Environmental Protection Agency

Downloaded by [209.45.112.5] at 14:00 17 April 2015

(EPA) and the Department of Energy (DoE). It includes the Portfolio Manager building energy performance benchmarking system which, free of charge, allows building managers to rank the measured operational energy performance of their buildings in relation to their peers and obtain an EPA rating – a percentile score on a range from 1 (least energy efficient) via 50 (median) to 100 (most). Ratings first became available for office buildings in 1999. Portfolio Manager now covers banks and financial institutions, barracks, care homes, courthouses, data centres, dormitories, hospitals, hotels, schools, medical offices, retail stores, supermarkets, and various warehouses and industrial plants. Campuses, mixed use buildings or multi-tenanted buildings can be built up from their component space types, allowing area-weighted composite benchmarks to be created. 'Other' categories include an extensive list of other building types; but a valid Energy Star score can only be awarded if these account for less than 10% of gross external area.

Least squares regression analyses are undertaken on DoE's nationally representative commercial buildings energy consumption survey (CBECS) data set, which uses billed energy data. For each building type, relationships are extracted between annual source energy (similar to primary energy) use intensity and variables such as the numbers of computers, cash registers or refrigeration units. Weather, operating hours and number of workers are also used to normalize the data. A cumulative distribution of energy performance of the sample population is used to produce benchmark scores, which only tend to be provided for larger buildings, as buildings of less than about 500 m^2 exhibit too much variance. A building in the upper (best) quartile is eligible to apply for an Energy Star label, which requires verification by a professional engineer (PE).

The availability of Portfolio Manager as a national voluntary benchmarking platform has allowed other jurisdictions to use it for statutory purposes. An early example was California, which progressively introduced three pieces of legislation that mandate its use across the state:

- Executive Order S-20–04 (2004) committed the state to aggressive action to reduce electricity usage in its own existing, new and retrofitted buildings; and to encourage cities, counties, schools and commercial building owners to do the same. The order required the state's technical arm, the California Energy Commission (CEC), to propose a benchmarking methodology and building commissioning guidelines for both government and private commercial buildings. CEC chose Portfolio Manager.

- Senate Bill 1 (SB 1 2006) required CEC to develop guidelines for the solar roofs programme, to avoid financial support being given to inefficient buildings. CEC required commercial buildings seeking solar incentives to be benchmarked using Portfolio Manager, or the equivalent for buildings that Portfolio Manager was unable to rate.

- AB1103 (2007) required electric and gas utilities to maintain records of the energy consumption of all the non-residential buildings they supply, in a format suitable for Portfolio Manager, and to upload this regularly following authorization from the customer, in a manner that preserved the customer's confidentiality.

- AB1103 also required a non-residential building owner or operator to disclose Energy Star Portfolio Manager benchmarking data and ratings to a prospective buyer, lessee, or lender. The original target date for disclosure was January 2010, but after a number of delays, it finally came into force in January 2014.

According to the EPA Energy Star website, about 55 000 office buildings representing 930 million m^2 of US office space had been rated up to the end of 2012, of which 30% are in California (EnergyStar, 2014). Some 7000 of these (total floor area 170 million m^2) have received the verified Energy Star certification. The data for all buildings rated (not just offices) state that more than 40% by floor area of the total commercial buildings market has been assessed. Although uptake varies hugely across the US (Gilleo et al., 2014), Portfolio Manager demonstrates the support a national benchmarking scheme can give to energy efficiency policies. However, it does not address two key issues: providing energy saving advice and the landlord/tenant split.[29]

Australia

NABERS is a federal government initiative to measure and compare the environmental performance of Australian buildings. For buildings in use, it covers energy, water, waste and indoor environment. Its office energy rating scheme was launched in New South Wales as the Australian Buildings Greenhouse Rating system (ABGR)[30] in 1998. For its first decade, energy ratings were available for offices only. Later additions include business hotels, data centres, and landlord's services in shopping centres, though offices still predominate. Versions for other building types are under development.

Until 2011, NABERS ratings were voluntary, with building owners and others using them to report and promote their performance. However, since 2004, an increasing number of government departments have required a minimum rating for space they occupy, which accelerated uptake. Property investment premium asset grades are also linked to NABERS

performance: a Property Council of Australia 'A' asset grade requires a rating of at least four stars. From November 2011, under the Building Energy Efficiency Disclosure Act 2010 Commercial Building Disclosure (CBD) programme, the federal government has required most sellers or lessors of office space of more than 2000 m^2 net lettable area to obtain and disclose a current Building Energy Efficiency Certificate (BEEC), when advertising space or undertaking a transaction. A BEEC is valid for 12 months and publicly accessible on the online Building Energy Efficiency Register. It consists of:

- a NABERS Rating for the 'Base building'
- an assessment of the energy efficiency of the lighting in the tenanted area being sold or leased
- general energy efficiency guidance

Some 862 office buildings, covering 13.4 million m^2 of office space, are reported to have rated their energy efficiency using NABERS Energy (CBD, 2014). Australia has a total of about 23 million m^2 of commercial office space spread across more than 3900 buildings (DCCEE, 2012). Research indicates that higher NABERS Energy ratings enhance property values, reduce vacancy rates and increase yield (Australian Property Institute, 2011). When mandatory disclosure legislation was introduced – forcing poorer performers to obtain and/or declare their ratings – the area-weighted average rating dipped from about 3.6 to 3.3 stars, but within a year it was back to 3.6 stars: since then it has increased steadily, reaching 4.2 stars by June 2014 (IPD, 2014).

In New South Wales, when ABGR was launched, the nature of the landlord's services in most large office buildings was relatively standard, which made it simpler to benchmark and rate the base building. Uniquely for benchmarking schemes available at the time, ABGR offered three types of rating: (1) 'Base Building' for the landlord's services; (2) 'Tenancy' for energy used in a tenancy only; and (3) 'Whole building' for total energy use. The scheme therefore began life attempting to align itself with the market. As traction increased with voluntary take-up, the market was encouraged to align itself with the scheme, enabling, after ten years, a relatively smooth introduction of a mandatory requirement, although not without some criticism, *e.g.* of benchmark values.

NABERS base building ratings do not count the energy used directly by the tenants (*e.g.* for lighting, small power and information and communication technology), and do not take account of occupation density. Benchmarks for the tenancy and whole-building rating variants do take account of the density of workstations in use, which are counted by the assessor and signed off by the managers of all departments concerned in the building or tenancy. A base building rating hence is more akin to an assessment of the intrinsic efficiency of the building itself and its HVAC plant – the energy used *by* the building – whilst the tenancy rating measures the energy intensity of the building's users – the energy used *in* the building.

A BEEC including the NABERS Energy assessment is not cheap, costing in the region of £3000–5000, so is not suited to smaller buildings. It is affordable in larger ones, where it has begun to affect property values, partly owing to policies of government and some other tenants not to occupy poorly rated property.

Penetration and progress in the UK, US and Australia

This paper has compared the UK's implementation of and experience with operational ratings for non-domestic building energy performance with that in two other countries, the US and Australia. The percentage of floor area in the offices sector reached by operational energy ratings is summarized in Table 1. Australia leads with about 60% of its stock, accounted for by fewer than 900 large buildings. Most of these ratings are for base buildings only, so although tenant lighting assessments are undertaken for each BEEC (CBD, 2014), the actual energy used by the tenants for their lighting and equipment is not counted, as it is for DECs and Energy Star. The voluntary system in the US includes 55 000 offices, possibly 40% of the stock. In the UK, the 2900 public office buildings using the mandatory DEC system account for only 10% of the office stock. However, the penetration of NABERS outside office buildings is relatively small, whereas offices account for only 13% of the number of UK buildings with a DEC.

In the US, Portfolio Manager illustrates the value of a free government-operated operational energy benchmarking platform, while California demonstrates how local policy-making can benefit from a central unifying technical resource. The two together allowed other things to emerge, specifically:

- the California 2004 requirements for state buildings to be benchmarked led to the utilities in California working with Portfolio Manager to develop automated uploads, to improve accuracy and timeliness of energy information and reduce its cost
- with this upload capability then available, the state was able to mandate Portfolio Manager and automated benchmarking for non-residential buildings
- with this infrastructure available, more jurisdictions then followed California's lead to mandate

Downloaded by [209.45.112.5] at 14:00 17 April 2015

Table 1 Penetration of operational ratings into offices in three jurisdictions

	Number of office buildings rated	Total floor area (m^2, millions)	Mean floor area (m^2)	Approximate coverage of the office market (%)	Extent of services covered
England and Wales (DECs)	2900	11.7[a]	4000[a]	10	Whole building
US (Energy Star)	55 000	930[b]	17000[b]	40	Whole building
Australia (NABERS Energy)	860	13.4[c]	15500[c]	60	The vast majority are base building with tenant lighting assessments

Notes: [a]Gross internal floor area.
[b]Gross external floor area.
[c]Net internal floor area.

disclosure using Portfolio Manager, particularly for office buildings

In Australia, the ABGR-NABERS benchmarking platform has also helped to transform the market, this time starting from the other end: a relatively expensive, investment-grade system at the state level, starting with only one building type. In both countries, a transition from voluntary to mandatory has put the benchmarks under more scrutiny.[31]

In the 1970s, the UK government introduced energy regulations for non-domestic buildings and a range of other measures reviewed by Mallaburn and Eyre (2014). From 1989, its Energy Efficiency Best Practice programme (EEBPp) researched and published energy consumption guides, case studies and guidance for most non-domestic building sectors. UK government research programmes in the 1990s also explored the performance of buildings in use and developed underpinnings for energy certificates; while Australia had little of this kind. By 2014, the UK, taking advantage of European energy certification policy, could have had a world-leading operational rating system for all non-domestic buildings.

Why did this not happen? In the early 1990s, one UK government department (the Department of the Environment – DOE) was responsible for all the above, supported by a national laboratory, the Building Research Establishment (BRE); and an independent research programme (Partners in Innovation – PII) into which anyone could bid. Ten years later this had all been pulled apart:

- The energy functions of DOE were dispersed. Five ministries are now involved.[32]
- BRE had been privatized, depriving policy-makers of a central technical body to assist national efforts. Several of the US Department of Energy's National Laboratories have major programmes on energy and buildings.
- In 2002, the EEBPp was closed down. Remnants were transferred to an independent agency, the Carbon Trust, from which government funding has now largely been withdrawn. The trust's remit was to help business, not to develop technical infrastructure like benchmarking to help government and assist policy convergence.
- The PII programme was transferred to the Department of Industry, which soon closed it down, on the assumption that the construction industry should largely fund its own research (Fairclough, 2002).

As part of its deregulatory agenda and a desire to assert national sovereignty by resisting European policy initiatives, the UK's current administration has implemented EU Directives in the most minimal way possible (BIS, 2013). An unfortunate effect is to overlook opportunities to create coherence and convergence with national initiatives, as the EU's principle of subsidiarity allows. The results appear not to be better UK regulation, but in the name of market competition to resist the potential to build public infrastructure to support joined-up policy for buildings and their energy efficiency.

Discussion

Transparency about operational energy performance is viewed by many as the key to unlocking more activity on building energy management and well-focused investment in energy-saving measures, probably more so than a compelling financial case. Although disclosure of energy performance does not in itself improve energy efficiency, it is an essential foundation for accountability and reputational pressure, a convergence point for a whole range of initiatives by all players involved, and a mechanism to provide feedback on which interventions work well and which do not.

The successful schemes operating in the US and Australia indicate that getting markets to move requires

Downloaded by [209.45.112.5] at 14:00 17 April 2015

substantial government investment and support in providing the necessary infrastructure. Although in both the US and Australia, disclosure started voluntary, once systems have been run in, mandation can bring much wider take-up.

The UK's membership of the EU has made it subject to European regulations in addition to its own. These have provided several opportunities for the UK to develop and implement a world-class approach to building energy performance transparency, followed by accountability. Having begun to lay firm foundations, particularly between 1989 and 2002, the UK government's diffuse policy-making, strong deregulatory agenda and distaste for 'gold-plating' EU Directives has left it expecting the market to deliver a platform for transparent reporting and benchmarking that will focus everyone on energy performance in use and create the momentum for radical improvements. At times in the past decade, the UK came tantalisingly close, but the opportunities were not taken. The current result is an excess of regulation *and* weak outcomes, as identified by the Deloitte (2014) report and the Committee on Climate Change (2014).

Conclusions

Lessons to inform better policy-making and to produce more successful initiatives

The history of DECs illustrates how the British government has vacillated in mandating meaningful transparency of and accountability for the actual energy performance of buildings and failed to achieve a convergence of policy measures with industry drivers. A mandatory transparency scheme was introduced for public buildings, with a commitment to extend it to the private sector. In practice, this scheme has been neglected and its planned extension to the private sector abandoned – in spite of support from the private sector itself and compelling evidence of the effectiveness of comparable transparency schemes in Australia and the US. Apart from changes in governments at elections, reasons for this breakdown include a division of buildings and energy policy across multiple Ministries, an absence of a coordinating point of technical support,[33] and a limited appetite of the UK government to capitalize on policy-making opportunities presented by European Directives.

Lessons for future policy include the need for consistent and well-coordinated strategies and a clear assignment of departmental responsibilities in order to ensure continuity of implementation. Policies aimed at organizations which own and/or occupy a portfolio of buildings should be joined-up with policies designed to influence individual buildings.

The success of initiatives to mandate transparency about in-use energy performance in Australia and the US has arisen in no small part from the investment by governments there in substantial technical infrastructure to support their national schemes. This gives all stakeholders confidence that the scheme will be in place for the long term, backed by the authority and independence of government.

In the wake of the global financial crisis of 2007–08, the scale and reach of government activities are subject to fierce scrutiny. Some reductions in government spending (aka austerity measures) are driven by fiscal necessity, others by an expectation that a service is better delivered by the private sector and subject to market forces. As discussed in the final paragraphs below, the US and especially Australia provide useful models of how the market and government-funded infrastructure can work in tandem to improve the energy efficiency of commercial buildings: mandating transparency and funding a platform to make it visible may be things which are not best left to the market. As Abraham Lincoln said:

> The legitimate object of government, is to do for a community of people, whatever they need to have done, but can not do, at all, or can not, so well do, for themselves – in their separate, and individual capacities.

Following up intended outcomes in the light of actual experience

DCLG was and remains the department responsible for implementing DECs. However, five years after their introduction, it was another Department DECC (2013b) which commissioned research into the impact of DECs to inform the UK's transposition of Article 8 of the EED, which requires private sector non-SME organizations to carry out energy audits by the end of 2015. The review's conclusions were at best ambivalent. However, the arguments presented in the current paper suggest that any failings can be seen to have arisen more from limited policy integration and follow-through, than from intrinsic faults in the policy instrument. In the event, DECs were accepted as one of several routes to compliance for EED Article 8, but at the time of writing there are no signs of government plans to rectify the neglect of the supporting technical infrastructure, specifically the development of trustworthy benchmarks for different types of private sector buildings. A key lesson is for policy instruments, intended to motivate the market, to be kept under review, in order to gain and then retain the confidence of the organizations they are intended to influence.

The Central Register of data from EPCs and DECs was established by DCLG to support their implementation,

Downloaded by [209.45.112.5] at 14:00 17 April 2015

although it was not a facility mandated by the EPBD. It now stands as a tremendous potential resource for policy-makers. It has however not yet been exploited to accelerate the impact of DECs, for example through better enforcement, improved benchmarking or incentivising better performance through a 'healthy competition' attitude. The Register's operator equally does not have a remit to consider ways in which the data could be used to take forward the cause of energy efficiency. A key lesson for future policy is that data not only needs to be collected but put to effective use, with somebody required to make regular reviews of the data and report their findings to government and the public.

International influences

The current paper has discussed the interactions between EU and UK policy-making designed to improve the energy performance of buildings. In recent years, the relationship has become increasingly uneasy as the politics of the EU have become more strained. The 2002 EPBD singled out public buildings to set an example: the UK's transposition in 2008 responded to this call by introducing DECs based on actual metered energy use and updated annually. Five years later, when the EPBD recast of 2010 was transposed, the new UK government was less willing to deploy subsidiarity to capitalize on EU Directives, and so did not take the opportunity to extend mandatory DECs to private sector buildings visited by the public.

Markets are known to fail to deliver optimum results when the market players lack transparent information. In comparison with Australia, there is some irony in the UK government providing the infrastructure for mandatory DECs in the public sector but preferring to leave to the market the delivery of transparency about the actual energy performance of commercial buildings. In Australia, government has long supported rating actual energy consumption. It started by deliberately aligning its approach with landlord and tenant responsibilities in the commercial office market, and with measured outcomes rather than designed performance. The direct association of building ratings with the actual energy used by landlords and tenants allows the government's national energy security and climate change mitigation objectives to coincide with the financial drivers of the private sector. As a result, the Australian market has embraced government policy as a genuine business objective, to the extent that a building's actual energy performance has become a status symbol, with a market value probably higher than would be justified by energy running cost savings alone. The alignment of operational energy efficiency with lettability and thereby shareholder value in commercial property has created a virtuous circle between policy objectives and market forces.

Learning the lessons from Australia's success (both the principles and what works) should be part of any further policy review process. The key lesson here is that a government can effectively support the achievement of energy performance outcomes in the private sector by mandating transparency (which removes uncertainty and information asymmetries) and creating one independent, robust and authoritative system which enables credible information to be collected and communicated effectively.

Postscript

As this paper was going to press (February 2015), DCLG unexpectedly issued a consultation entitled 'DECs: current regime and how it could be streamlined and improved' (DCLG, 2015). In the consultation document, DCLG suggests that DECs are no longer needed to comply with the EPBD, constitute 'gold-plating' and could even be abolished altogether. It proposes that all energy certificate requirements in England and Wales could in principle be satisfied by the EPC, renewed every ten years. The proposals also suggest re-defining a building 'frequently visited by the public' as one with an area of at least 500 m^2 that the public 'enter on a daily basis, or, for example, it is also used as a community centre in the evenings'. This would exempt the vast majority of buildings at schools and universities from the DEC regime: they would only need to obtain and display an EPC when sold or let. Since this rarely happens to this type of building, DCLG is effectively adding them to the list of buildings (those of 'special historical merit, places of worship', etc.) exempted from the energy certificate regime altogether. School and university buildings account for two-thirds of UK DECs.

Despite its encouraging title, all the proposals for 'improvement' constitute the opposite. There are no suggestions for making the DEC regime more effective by better integration with other industry and policy measures, or by strengthening its beneficial impact on the energy management of public and commercial buildings.

With the establishment in 2008 of the statutory body, the Committee on Climate Change, the UK government committed to a long-term programme of greenhouse gas emissions reduction. In February 2015, the leaders of the three main UK political parties re-confirmed their pledge 'to accelerate the transition to a competitive, energy-efficient, low-carbon economy' (Harrabin, 2015). These DCLG proposals are not consistent with this pledge: the reduced use of DECs would hinder the ability and practices needed to understand and improve how buildings actually perform in use. It would also deprive policy-makers and the market

Downloaded by [209.45.112.5] at 14:00 17 April 2015

of feedback about the impacts of current and future initiatives on actual performance and outcomes.

A key lesson is that a lack of commitment, consistency and continuity in policy and strategy sends mixed signals. Such turbulence for policy instruments is detrimental as this undermines the confidence needed for sustained efforts (by investors, owners, management, occupiers, etc) to improve building performance; and makes long-term planning impossible.

Disclosure statement

No potential conflict of interest was reported by the authors

References

AECOM. (2011). *Zero carbon non-domestic buildings: Phase 3 final report for department for communities and local government*. London. Retrieved from: https://www.gov.uk/government/publications/zero-carbon-non-domestic-buildings-phase-3-final-report

Aldersgate Group. (2012). *Building Britain: The path to sustainable growth for the built environment*. London. Retrieved from: http://www.aldersgategroup.org.uk/reports/page:2?ext=html

Arup. (2013). *The performance gap: Causes & solutions*, report to Green Construction Board Buildings Working Group, London.

Australian Property Institute. (2011). *Building better returns: A study of the financial performance of green office buildings in Australia*. Research commissioned by the Australian Property Institute (API) and the Property Funds Association of Australia (PFA) undertaken by the University of Western Sydney (UWS) and the University of Maastricht, Netherlands in conjunction with Jones Lang LaSalle and CBRE. Retrieved from http://www.api.org.au/folder/news/building-better-returns-research-report

BIS. (2013). *Gold-plating review: The operation of the transposition principles in the government's guiding principles for EU legislation*. London: Department for Business, Innovation & Skills.

Bordass, W. T. (2001). *Flying blind: Everything you wanted to know about energy in commercial buildings but were afraid to ask*. London: Association for the Conservation of Energy. Downloadable from www.usablebuildings.co.uk

Bordass, W. T., Cohen, R. R., & Field, J. (2004). *Closing the credibility gap*, IEECB'04 International Conference, Frankfurt.

Bordass, W. T., & Field, J. (2007). *Energy and CO_2 emissions benchmarks for non-domestic buildings*, unpublished report to CIBSE and DCLG.

Bruhns, H., Jones, P., & Cohen, R. R. (2011). *CIBSE review of energy benchmarks for display energy certificates – Analysis of DEC results to date*. London: Chartered Institution of Building Services Engineers.

Carbon Trust. (2011). *Closing the Gap*, CTG047.

CBD. (2014). *CBD Second Year of Mandatory Disclosure – Statistical Overview 1 November 2012 – 1 November 2013*; Retrieved from http://cbd.gov.au/overview-of-the-program/cbd-program-statistics

CIBSE. (1999). *Technical memorandum TM22, Energy assessment and reporting methodology: Office assessment method*. London: Chartered Institution of Building Services Engineers.

CIBSE. (2008). *Technical memorandum TM 46, Energy benchmarks*. London: Chartered Institution of Building Services Engineers.

CIBSE. (2009). *Technical memorandum TM 47, Operational ratings and display energy certificates*. London: Chartered Institution of Building Services Engineers.

Climate Change Act. (2008). Retrieved from http://www.legislation.gov.uk/ukpga/2008/27/pdfs/ukpga_20080027_en.pdf

Committee on Climate Change. (2011). *Meeting carbon budgets: 3rd progress report to parliament*. London. Retrieved from: http://www.theccc.org.uk/publication/meeting-carbon-budgets-3rd-progress-report-to-parliament/

Committee on Climate Change. (2013). *Fourth carbon budget review – Technical report – sectoral analysis of the cost-effective path to the 2050 target, Ch3: Reducing emissions from buildings*. London. Retrieved from: http://www.theccc.org.uk/publication/fourth-carbon-budget-review/

Committee on Climate Change. (2014). *Meeting carbon budgets – 2014 progress report to parliament*. London. Retrieved from: http://www.theccc.org.uk/publication/meeting-carbon-budgets-2014-progress-report-to-parliament/

Committee of Public Accounts. (2014). *Transforming contract management*. London: House of Commons. HC 585, page 4.

Council of the European Communities. (1993). *Council directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE)*. Brussels. Retrieved from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31993L0076&from=EN

Council of the European Union. (2010). Official Journal of the European Union: *Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the Energy Performance of Buildings (recast)*. Brussels.

Council of the European Union. (2012). Official Journal of the European Union: *Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency*. Brussels.

CSE and ECI. (2012). *What are the factors influencing energy behaviours and decision-making in the non-domestic sector? A rapid evidence assessment*. London: Centre for Sustainable Energy and the Oxford Environmental Change Institute for Department of Energy & Climate Change.

Davies, H. (2013). Taxpayers count cost after landmark case, *CIBSE Journal*, November, page 12.

DCCEE. (2012). *Annual Report 2011–12* produced by Commonwealth of Australia (Department of Climate Change and Energy Efficiency).

DCLG. (2010). *Consultation on making better use of EPCs and data. Chapter 6 extending display energy certificates to commercial buildings*. London. Retrieved from: https://www.gov.uk/government/consultations/making-better-use-of-energy-performance-certificates-and-data

DCLG. (2015). *Display Energy Certificates: current regime and how it could be streamlined and improved*. London: DCLG. Retrieved from https://www.gov.uk/government/consultations/improving-the-display-energy-certificates-regime-for-public-buildings

DECC. (2013a). *Energy efficiency strategy 2013 update*. London. Retrieved from: https://www.gov.uk/government/publications/energy-efficiency-strategy-2013-update

DECC. (2013b). *Exploring the use of display energy certificates*. London. Retrieved from: https://www.gov.uk/government/publications/exploring-the-use-of-display-energy-certificates

Deloitte. (2014). *Carbon penalties & incentives: A review of policy effectiveness for carbon reduction and energy efficiency in the commercial buildings sector*. Report prepared for Investment Property Forum. London: Deloitte LLP.

DETR. (1998). *Energy consumption guide 19: Energy use in offices*. London: Best Practice Programme, Department for the Environment, Transport and the Regions.

DTI. (2003). Energy White Paper: *Our energy future – creating a low carbon economy*, Presented to Parliament by the Secretary of State for Trade and Industry (Cm 5761). London.

Downloaded by [209.45.112.5] at 14:00 17 April 2015

Downloaded by [209.45.112.5] at 14:00 17 April 2015

EnergyStar. (2014). Energy_Star_Snapshot_Spring_2013. Retrieved from http://www.energystar.gov/sites/default/files/buildings/tools/ENERGY_STAR_Snapshot_Spring_2013.pdf

Environment Agency. (2015). *Complying with the Energy Savings Opportunities Scheme*. London. Retrieved from: https://www.gov.uk/government/publications/comply-with-the-energy-savings-opportunity-scheme-esos

Eunomia. (2014). *Evidence review of the impact of central and public disclosure methods for reporting energy use and energy efficiency*. London: DECC.

European Commission (1987). *Proposal for a Council Directive on information on the energy efficiency of buildings*. [COM(87) 401 final].

European Commission. (2001). *Proposal for a directive of the European Parliament and of the Council on the energy performance of buildings*. COM (2001) 226 final. Brussels.

European Commission. (2002). *State aid NN 51/02 – United Kingdom energy efficiency best practice programme (EEBPP)*. Brussels: C(2002)3736fin.

European Parliament and Council of the European Union (2003, January 4). *Directive 2002/91/EC: Energy Performance of Buildings (dated 16 December 2002)*. Official Journal of the European Communities, L 1/65 – L 1/71.

Fairclough, J. (2002). *Rethinking construction innovation and research*. London: Department of Trade & Industry and the Department of the Environment, Transport and the Regions.

Faithful & Gould. (2014). *Marks & Spencer Cheshire Oaks Store Final report (phase 2 studies) 1 May 14*, Retrieved from http://www.carbonbuzz.org/projectdocuments.jsp

Field, J., Soper, J., Jones, P., Bordass, W. T., & Grigg, P. (1997). *Energy performance of occupied non-domestic buildings: Assessment by analysing end-use energy consumptions. Building Services Engineering Research and Technology*, *18*(1), 39–46. doi:10.1177/014362449701800106

Gilleo, A. et al. (2014). *The 2014 state energy efficiency scorecard*, Report Number U1408, American Council for an Energy-Efficient Economy.

Hansard. (2006). Written ministerial statement Wednesday 14 June 2006: *EU Energy Performance of Building Directive*. Retrieved from http://www.publications.parliament.uk/pa/cm200506/cmhansrd/vo060614/wmstext/60614m0001.htm.

Hansard. (2013a). Written ministerial statement Tuesday 30 July 2013: *Building Regulations: the next step towards zero carbon*. Retrieved from http://www.publications.parliament.uk/pa/ld201314/ldhansrd/text/130730-wms0001.htm

Hansard. (2013b). Written statements Friday 13 September 2013: Contract Liabilities. Retrieved from http://www.publications.parliament.uk/pa/cm201314/cmhansrd/cm130913/wmstext/130913m0001.htm

Harrabin, R. (2015, February 14) Party leaders make joint climate commitment. BBC News. Retrieved from: http://www.bbc.co.uk/news/science-environment-31456161

Hilke, A., & Ryan, L. (2012). *Mobilising investment in energy efficiency: Economic instruments for low-energy buildings*. Paris: International Energy Agency.

HM Government. (1984). *Building Act 1984*. Retrieved from http://www.legislation.gov.uk/ukpga/1984/55

HM Government. (2002). *The building regulations 2000 approved document L2: Conservation of fuel and power in buildings other than dwellings (2002 Edition)*. London. Retrieved from: http://www.planningportal.gov.uk/uploads/br/BR_PDF_ADL2_2002.pdf

HM Government. (2006). *The building regulations 2000 approved document L2A: Conservation of fuel and power in new buildings other than dwellings (2006 Edition)*. London. Retrieved from: http://www.planningportal.gov.uk/uploads/br/BR_PDF_ADL2A_2006.pdf

HM Government. (2007). *The energy performance of buildings (Certificates and Inspections) (England and Wales) regulations 2007*. London. Retrieved from: http://www.energyreport.co.uk/Energy_Performance_Regs.pdf

HM Government. (2011a). *Carbon plan*. London. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47621/1358-the-carbon-plan.pdf

HM Government. (2011b). *Carbon plan: Delivering our low carbon future*. London. Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf

Hong, S.-M., & Steadman, P. (2013). *An Analysis of Display Energy Certificates for Public Buildings, 2008 to 2012*, report to CIBSE from University College London.

Hong, S. M., Paterson, G., Mumovic, D., & Steadman, P. (2014). Improved benchmarking comparability for energy consumption in schools. *Building Research & Information*, *42*(1), 47–61. doi:10.1080/09613218.2013.814746

IPD. (2014). *Exploring movements in the NABERS Energy ratings of offices in the IPD Database and potential causes*. Investment Property Databank / Department of Industry NABERS Energy Office Market Analysis. Sydney. Retrieved from: http://www.cbd.gov.au/files/files/Exploring%20movements%20in%20the%20NABERS%20Energy%20ratings%20of%20offices.pdf

Jones Lang LaSalle. (2012). *A tale of two buildings: are EPCs a true indicator of energy efficiency?* London: Better Buildings Partnership.

Mallaburn, P. S., & Eyre, N. (2014). Lessons from energy efficiency policy and programmes in the UK from 1973 to 2013. *Energy Efficiency*, *7*(1), 23–41. doi:10.1007/s12053-013-9197-7

Miller, V. (2011). *EU Legislation: Government action on 'gold-plating'*. Standard Note: SN/IA/5943, House of Commons Library.

Ministry of Public Building and Works. (1965). *The building regulations 1965 part F Thermal insulation. Applicable to dwellings only*. London.

Morrell, P. (2010). *Low Carbon Construction Innovation & Growth Team Final Report* London: Department of Business, Innovation and Skills.

ODPM. (2004). *Proposals for amending part L of the building regulations and Implementing the EPBD*. Consultation Document. London. Retrieved from: http://webarchive.nationalarchives.gov.uk/+/http://www.communities.gov.uk/publications/planningandbuilding/partl

UK-GBC. (2011). *Carbon reductions in existing non-domestic buildings*, Final report of Task Group on Display Energy Certificates and the Carbon Reduction Commitment Energy Efficiency Scheme. London: UK Green Building Council.

VOA. (2012). Valuation office agency, UK. Retrieved from http://www.voa.gov.uk/corporate/statisticalReleases/120517_CRLFloorspace.html. go to Table 3.3 Offices, Administrative Areas in England and Wales, Floorspace.

Endnotes

[1]It was 'welcomed by the UK government for the impetus it gave to building energy certification [and in particular] the challenge the Directive presents to extend certification to all buildings' (DTI, 2003).

[2]The implementation of the EPBD in Scotland and Northern Ireland was the responsibility of their respective devolved administrations. Where this paper cites the UK's implementation, it is usually referring only to England and Wales. In practice, the transposition in Northern Ireland has been virtually identical to that in England and Wales, whilst the transposition in Scotland has incorporated many notable differences.

[3]'[I]n the non-residential sector, emissions have been fairly flat, with not much sign of significant energy efficiency improvement' (Committee on Climate Change, 2013); across commercial

Downloaded by [209.45.112.5] at 14:00 17 April 2015

buildings, 'overall progress has been slow, with little evidence of uptake of cost-effective abatement opportunities, particularly for reducing electricity consumption [which account for 79% of emissions]' (Committee on Climate Change, 2014).

[4]In the UK, taxes on non-domestic energy use were introduced by the Climate Change Levy (CCL) in 2001 and the Carbon Reduction Commitment Energy Efficiency Scheme (CRCEES) in 2010. The imposition of the CCL was accompanied by incentives for companies to invest in energy efficiency: Enhanced Capital Allowances (ECAs) were made available for businesses to invest in designated energy-saving plant and machinery, whilst voluntary Climate Change Agreements (CCAs) allowed eligible energy-intensive industries to receive up to 90% reduction in the CCL if they signed up to stretching energy efficiency targets agreed with government.

[5]The evidence for the research findings is acknowledged to be extrapolated from other topics.

[6]The NCM allows the calculation for non-domestic buildings to be carried out either by approved simulation software or by simplified software called SBEM – Simplified Building Energy Model. SBEM, based on CEN standards (the European Committee for Standardization), calculates monthly energy use and CO_2 emissions given a description of the building geometry, construction, use, HVAC and lighting equipment. The development of SBEM and the CEN standards took account of the Dutch methodology NEN 2916:1998 (Energy Performance of Non-Residential Buildings). SBEM determines compliance with Building Regulations by calculating annual energy use and comparing it with that of a comparable 'notional' building with default fabric and servicing characteristics. A similar process produces an 'asset rating' for a new or existing building for use in Energy Performance Certificates (EPCs).

[7]Belgium, France, Italy, Luxembourg, the Netherlands and West Germany.

[8]Programmes can include laws, regulations, economic and administrative instruments, information, education and voluntary agreements whose impact can be objectively assessed.

[9]The Department of the Environment's (DoE) Energy Efficiency Best Practice Programme was launched by the UK Government Energy Efficiency Office in 1989 (Mallaburn & Eyre, 2013) to stimulate the take-up of energy-efficient good practice throughout the economy. The programme was jointly managed on behalf of the DoE by the Building Research Energy Conservation Support Unit (BRECSU) at Watford and the Energy Technology Support Unit (ETSU) at Harwell. BRECSU was responsible for energy efficiency in buildings whilst ETSU was responsible for the programme's industrial component.

[10]The UNFCCC defined the principle of 'common but differentiated responsibility' to tackle climate change but does not contain commitments in figures, detailed on a country-by-country basis, in terms of reducing greenhouse gas emissions.

[11]Under the 'Maastricht Treaty' (1992) the EEC was renamed the European Community (EC).

[12]Eventually to become one of the '20–20– 20' by 2020 targets set by EU leaders in 2007.

[13]Under subsidiarity, member states can transpose EU Directives to complement their national regulations.

[14]Even a new building can be given a tentative operational rating before it is occupied, *e.g.* the NABERS Commitment Agreement in Australia involves new buildings disclosing their targeted operational rating, modelled in accordance with certain protocols.

[15]EPBD recital 16 recommended public authority buildings and buildings frequently visited by the public should set an example by applying energy certification on a regular basis.

[16]Such optional adjustments would only be permitted if they were examined rigorously using accredited procedures, *e.g.* with the 'special' items sub-metered and accompanied by a report on their energy efficiency and potential for improvement.

[17]By December 2014, about 220 000 DEC records had been lodged (see https://www.ndepcregister.com/lodgementStats.html).

[18]'Given the importance of information, and limited roll-out to date, we recommend mandatory roll-out of EPCs and DECs to all non-residential buildings by 2017.'

[19]The Aldersgate Group is an alliance of leaders from business, politics and civil society that drives action for a sustainable economy. Members include some of the largest businesses in the UK with a collective global turnover of over £300 billion and politicians of all parties (see http://www.aldersgategroup.org.uk/).

[20]Letter to the House of Commons Public Bill Committee on the Energy Bill 2010–11: cc Ministers Mark Prisk and Grant Shapps: 'I am writing to reaffirm the CBI's support for the Energy Bill (2010–11), and to endorse its use as the enabling legislation to mandate the extension of Display Energy Certificates (DECs) to the commercial sector. [...] We believe that DECs are a powerful tool for helping businesses better understand their energy use from buildings [...] companies can not only improve their bottom line by reducing overheads, but will also cut carbon emissions and gain reputational benefits. Once primary legislation is in place, a number of parameters must be clarified to ensure that DECs are fit for purpose. It will be crucial that the labels are measured using appropriate methodology, and are suitably tailored to commercial properties. [...] Much of this detail will require business input and we would be very happy to work with officials to ensure that the regulation is workable.'

[21]In November 2009, DCLG ceased the site-based DEC 'Transitional Arrangements' for a school, university or hospital campus, undermining a key principle of the TM46 benchmarks: the floor area of the subject building(s) should coincide with the metered energy boundary.

[22]'The lack of actual performance data continues to capture significant attention within the property sector and has led to large numbers of organisations (including UK-GBC and Aldersgate Group, as well as developers, property companies, NGOs and corporates), supporting campaigns for the roll-out of DECs to commercial buildings. This has secured widespread support within Cabinet and led to Government signalling its commitment to their statutory implementation by October 2012 in its draft Carbon Plan published in March 2011. The expectation was that the Energy Act 2011 would provide the primary legislation for such a move, but in the lead up to the Act receiving Royal Assent, the Government reneged on the commitment. Whilst a number of leading property companies is now pushing them out voluntarily in recognition of their benefit, they are doing so on an inconsistent basis. The Aldersgate Group supports entirely the principle of mandating operational energy ratings for commercial buildings and encourages Government to revisit this at the next legislative opportunity. We also recognise that DECs in their current format have some significant limitations, in that they contain insufficient normalisation metrics to account for the impact of building type and use intensity on the energy consumption profile. In preparing plans for the roll out of operational ratings to commercial buildings, Government should work closely with industry to define the scope and the basis for ensuring comparable application to different building uses' (Aldersgate Group, 2012).

[23]Preparatory activities were in train with the entertainment, hospitality and retail sectors. For example, the expert group was providing guidance to Julie's Bicycle and Theatres Trust who had collected data for entertainment venues, and demonstrated a clear need for the TM46 benchmarks to be revised.

[24]Many if not most of these sub-1000 m^2 buildings are on multi-building sites where their energy use is rarely directly metered. If that is the case, these misleading DECs will be based on site energy use prorated by floor area and can remain on show for 10 years as the statement of energy performance, even if sub-metering was installed in the intervening period.

[25]*Hansard* (2013b): Minister for Housing (Mr Mark Prisk): 'I wish to inform the House of spending that the Government have been forced to undertake as a result of poor decisions made by the last Administration. As a result of low transaction volumes, due to the economic down turn under the last Administration following the financial turmoil in 2008 and 2009, and a number of enhancements to register services, the revenue from fees for entering documents onto the registers has not been sufficient to meet the full cost of operating the registers. This has left the current Government with a contractual obligation to meet the cost of services that had been delivered through the register contracts but which had not been covered by revenue from fees for entering documents on to the registers. As a result, the Department has reluctantly agreed to make a payment of £5.7 million to cover these costs to April 2013.'

[26]It is notable that the EED repeals and supersedes its precursor the Energy Services Directive (2006/32/EC), which itself repealed the SAVE Directive of 1993, which can now be fully appreciated as the forerunner of all the EU's efforts at promoting energy efficiency in buildings.

[27]See www.les-ter.org/.

[28]See http://www.betterbuildingspartnership.co.uk/working-groups/landlord-energy-rating/.

[29]Partly because in many jurisdictions landlords were required to include energy costs within the rent.

[30]The Australian Buildings Greenhouse Rating system (ABGR) was developed by SEDA, the Sustainable Energy Development Authority for New South Wales, with technical advice and in consultation with leading players in office property. In 2008, it was rebranded NABERS Energy to recognize its incorporation into a national scheme.

[31]See http://www.thefifthestate.com.au/property/commercial/airah-survey-calls-for-more-robust-nabers-rating-system/31777/.

[32]The DCLG oversees EPCs, DECs and Building Regulations; the DECC, the Energy Savings Opportunities Scheme, and, with HM Treasury, the Carbon Reduction Commitment Energy Efficiency Scheme; the Department for Environment Food & Rural Affairs (DEFRA), mandatory greenhouse gas reporting; and the Department for Business, Innovation and Skills (BIS) hosts the Green Construction Board (which has a remit of energy and carbon saving) and Innovate UK, which sponsors related research. Further fragmentation is introduced by Ofgem, the Office of Gas and Electricity Markets, the government regulator for the electricity and downstream natural gas markets.

[33]A further difficulty was that the Carbon Trust (which took over the 'curation' of the EEBPp's benchmarking publications in 2002) saw itself unable to develop an improved benchmarking system for DECs, as its remit was to go beyond what government was obliged to do, not to subsidise the implementation of a statutory measure, the EPBD.

Downloaded by [209.45.112.5] at 14:00 17 April 2015