

DECC consultation reference: URN 12D/403 November 2012. Electricity Demand Reduction: Consultation on options to encourage permanent reductions in electricity use

A paper from CIBSE responding to the Consultation Document

Introduction

1.1 The Chartered Institution of Building Services Engineers is the professional body that exists to:

'support the Science, Art and Practice of building services engineering, by providing our members and the public with first class information and education services'

1.2 CIBSE is pleased to respond to this consultation on Electricity Demand Reduction. Its members share the view that good engineering practice could deliver substantial reductions in electricity demand without loss of efficacy of energy using systems. CIBSE has undertaken an extensive consultation with members, who have raised various points which go beyond the issues covered by the specific questions in the DECC Consultation. This paper has been prepared to set out these comments, and we trust it will be helpful to DECC in its further deliberations over potential policy measures to deliver reduced UK electricity and energy demand. Appendix 3 summarises the role and work of the Institution.

1.3 To assist the Department in consolidation and analysis of the responses CIBSE's full response to the questions posed by the Department is attached as Appendix 1.

1.4 The points in this paper are ordered under the chapter headings in the consultation document and cover those issues where CIBSE has a view to offer.

Chapter 1: Setting the scene: rationale for electricity demand reduction (EDR)

2.1 CIBSE's public policy fully supports the Government's aim, stated in para 1.1, to

"drive down energy bills for consumers, reduce input costs for industry, and cut carbon emissions".

2.2 CIBSE believes that there are other equally compelling arguments for reducing electricity demand, and an effective policy would treat these holistically;

increased security of supply, since improved efficiency of energy use allows the least secure supplies to be dropped;

increased certainty of supply, since reduced demand will have a positive impact on the (currently falling) UK electricity capacity margin and reduce the likelihood of power shortages over the short term before electricity market reforms take effect;

reduced cost to the UK economy of investing in new generating capacity, with the potential set out in the consultation for a reduction in demand on the scale proposed as feasible expected to yield a reduction of 22 replacement generating units. Even without any other consideration, such a reduction in input costs to UK economic activity would be a major contribution by releasing investment capital for potentially more productive and profitable use;

most consumers do not see peak costs in their average consumer tariffs, which leads to misallocation of resources between supply and demand.

2.3 Taking the reasons in Consultation para 1.1 together with the reasons listed above combines to provide a compelling case for electricity demand reduction to be a matter of urgent national priority. Finding effective ways to improve energy efficiency and, specifically, reduce electricity demand in a sensible way is part and parcel of creating a growing economy, which can also deliver on our carbon reduction commitments. There is an added consequence that reducing aggregate demand reduces the total installed capacity of renewables required to meet current targets under the Renewables Directive.

2.4 CIBSE also supports the Government's initial assessment that:

- (a) *"there is significant potential for greater efficiency in the use of electricity in the UK"; and*
- (b) *"with current and planned policies, the UK is likely to only realise some of this potential".*

2.5 However, it is unclear whether the projected electricity consumption expected in 2030 includes or excludes increased electricity demand expected to arise from electric vehicles and electrification of space heating for buildings? It would be helpful to have this, and the baseline case, explicitly stated.

Chapter 2: Identifying the gaps

3.1 There are a number of aspects raised by the consultation document which CIBSE thinks would benefit from further consideration as follows:

Explicit identification of policy objectives

3.2 The consultation contains references to:

- a) *"driving the efficient use of electricity in order to produce a permanent reduction in the use of electricity"; and*
- b) *"reducing overall electricity demand will help reduce emissions from electricity generation in the short term and will mean less generation will be required to meet demand as we move towards decarbonisation of the electricity sector over the longer term".*

3.3 As detailed in 2.1 and 2.2 above, there are also the following objectives supported by this policy:

- reduced input costs to businesses who use energy;
- reduced investment in new generating capacity;
- increased capacity margins and scope for growth in other uses of electricity;
- improved security of supply;
- and above all reduced demand for electrical power.

3.4 CIBSE believes that any further policy measures need to be clearly related to existing policies. The accompanying document "Capturing the full electricity efficiency potential of the UK" says in slide 23: *"Current and planned policies span all 3 sectors [residential, commercial and industrial] with 7 key mechanisms"*, confirming that DECC recognise that there are already several policy instruments intended to drive energy efficiency. The

consultation asks whether a further policy instrument is needed to stimulate investment in the efficient use of electricity, and CIBSE believes that it is important to address this question, since proliferation of instruments can hinder effective implementation.

The dependence of energy efficiency policy on related existing regulations

3.5 Additionally, a number of existing requirements relating to energy efficiency, such as air conditioning inspections and display of energy certificates and commissioning of fixed building services systems (which includes lighting) are required by EU Directives, and by the conservation of fuel and power requirements of the Building Regulations in England, Wales and Northern Ireland and by Building Standards in Scotland. These extend into requirements relating to sub metering of electricity use in buildings and provision of information to enable energy efficient operation. Unfortunately, compliance with these regulations is, in our members experience, at best patchy.

3.6 CIBSE realise that other Departments and Agencies enforce these requirements. But a parallel thrust to improve enforcement would be both efficient use of public funds and show resolve by government. The priority should be improved compliance with policies and instruments already in place and to maximise the electricity demand reduction that these measures can deliver before creating new requirements. Article 8 of the Energy Efficiency Directive requires the introduction of Energy Audits, which will require careful thought and integration with the existing regimes for building energy certification, carbon reduction commitment and carbon reporting if they are to minimise the additional requirements for industry and maximise the benefits to industry and society.

3.7 The McKinsey report which supports the consultation document is clear that many of the potential savings depend on compliance with those elements of Building Regulations and Standards which relate to conservation of fuel and power. They specifically identify lighting and HVAC systems, in particular their controls, which have significant potential to deliver savings, if they are correctly designed, specified, installed, commissioned and operated. This applies to both new and existing buildings. Yet evidence from previous requests to DCLG suggests that they have expended very limited resources on assessing effective compliance with existing Building Regulations over the past decade.

3.8 Informal evidence available to the Institution suggests that there is a serious gap between what Building Regulations are expected to achieve in terms of energy savings and emissions reductions and what they currently deliver. Some more formal quantitative assessments, such as the report prepared for the zero carbon hub on the performance gap between design aspiration and completed reality would help to clarify the level of risk to the existing expectations of savings being achieved through existing Building Regulations requirements. It is also essential that the requirements of Building Regulations and Standards are properly applied to refurbishment work for the savings identified in the McKinsey paper to be realised.

3.9 A special concern of the building services sector is that any deregulation proposed under the current review of Building Regulations and Standards in England is robustly tested for impact on energy savings policy. The government is currently committed to maintain health and safety provisions in the Building Regulations. But Part L covers conservation of fuel and power. Any deregulation of Part L provisions would necessitate complete revision of EEDO's assumed savings which underpin this consultation¹.

¹ Part L addresses conservation of fuel and power, not health and safety aspects. Safety elements of gas appliances are addressed either in Part J or in Gas Safety legislation and supporting standards.

Addressing risks and “market failures”

3.10. The consultation document repeats the old familiar litany of reasons why energy efficiency is not a priority: lack of information, bounded rationality, split incentives (a major issue for commercial offices where 62% are managed by landlords), payback periods exceeding investment requirements, availability of public sector cash, etc. There are also practical barriers such as: if it's not broken don't bother to fix it; or that, for businesses, there is understandable concern about production loss or disruption. For the majority of consumers the savings are not considered worth the bother of trying to achieve them, or they lack the funds to spend on energy efficiency measures. The quality of retrofit projects can be variable, employees may not be interested in saving their employer money, and there are various myths, such as the myth that we should “leave fluorescent lights on all the time because it is cheaper”.

3.11 The consultation does not explore the possibility that lack of regulation and a reliance on relatively weak market signals is a factor which has allowed energy efficiency and electricity demand reduction to slip down the priority order. The consultation accurately identifies the barriers to sustained energy efficiency action for the past 30-40 years. During that time only regulations and Directives have been effective in achieving significant changes in the market.

3.12 The case of condensing boilers illustrates the weakness of market forces and the effectiveness of regulation. First developed in about 1990, they were available for about 15 years, in which time they achieved market penetration of about 15%. Following the changes to Building Regulations in 2006, they achieved a market penetration of about 85% within months.

3.13 Given that all measures rely on exhortation, incentivisation or regulation, the evidence of the past 40 years suggests that the most rapid and effective progress is made through regulation. This is particularly true in the non-domestic building market, where measures which are cost effective over the whole life of the building require up - front investment which cannot be recouped when the initial investor sells the building. So these measures do not get installed unless they are required by regulation, and there is some measure of enforcement. The combination of the structure of the development market for non-domestic buildings, together with the agency effect of landlord tenant relationships means that apparently rational, cost effective actions are not adopted because the investment and rewards accrue to different agents.

Addressing measures at products or systems

3.14. Whether to support individual products or systems depends on the circumstances. High efficiency products as single replacements can make significant electricity savings. Similarly, systems can be designed to be electricity efficient; and indeed can incorporate high efficiency products configured appropriately. Consideration of mechanisms to stimulate savings should include whether, and when, to support individual products (ie the proposed targeted approach) and/or take a holistic and systems view, not just of the savings opportunities but also the ability of the end user to manage the operation of the product/system. For domestic consumers, a product approach (eg to support purchases of A+++ appliances) may work well but for non-domestic consumers with complex systems (such as heating, ventilation, air-conditioning - HVAC, commercial lighting schemes, industrial processes) a product approach will not be as effective as a systems approach, such as prohibiting reheating of air at terminal units, requiring the system to deliver air to the terminal unit at the required temperature.

3.15 The CIBSE Guides assemble the extensive experience of members in adopting a systems approach to design and operation for building services and could form the foundation for such an approach.

Electricity demand reduction and peak load reduction

3.16 While this consultation document focusses on electricity demand reduction, there is a parallel need to consider peak load reduction. To meet daily morning and evening peaks requires additional power generation capacity to be active and ready to dispatch compared with non-peak periods. Overlaying historically higher winter loads compared with summer loads on top of the daily peaks exacerbates the magnitude of the peaks.

3.17 The standby and spinning reserve generation costs and associated carbon emissions are significant. However, consumers tariffs do not reflect this, leading to misallocation of resources, as noted in section 2.2 above. Peak loads and the additional associated costs should be reduced as part of the national carbon emissions reduction plan. This requires (a) suitably designed supply side measures (eg tariffs to reduce peak load demand, and cooperative programmes between suppliers and end users); and (b) demand side measures in respect of buildings, building services and processes. CIBSE recommends that DECC make peak demand reduction an objective within the electricity demand reduction goal.”

Transparency of energy billing information

3.18. Energy bills are a hot topic. They are of greater concern to consumers and businesses than ever before. They are potentially one of the key ways consumers can keep track of their energy consumption and compare consumption in different billing periods, but they are currently a source of confusion to many. CIBSE support provision of clear and transparent bills for the benefit of all end users. A common standard should be devised and adopted to ensure that energy costs along with supplementary charges such as statutory levies are clearly separated and identified, to better enable consumers to understand what they are paying for energy.

Security of supply

3.19 Action to reduce electricity demand will also improve the nation’s security of supply and, as net importers of energy, our balance of payments. As noted above, there are close links between demand reduction (efficiency) and other aspects of Government energy policy. These beneficial aspects of electricity demand reduction should be included in the case for Government resources and support for action.

Potential for savings in buildings

3.20. The accompanying document “Capturing the full electricity efficiency potential of the UK” sets out various proposed savings potentials for the residential, commercial and industrial sectors. For the residential sector: the document says: *“the greatest potential is in switching to efficient appliances and electronics, followed by building shell improvements.”* For the commercial sector it states that: *“owing to the high usage of electricity in HVAC systems, the greatest potential is from building shell improvements.”*

3.21 The assumption that HVAC energy consumption is a function of building fabric performance is wrong. In most deep plan offices the HVAC load is dominated by fresh air supply, heat from lighting and heat loads from office machines and appliances. The type of HVAC system, in particular the provision of dehumidification, has a significant impact on energy use. Any building with heating and cooling in the same locations requires a robust and effective control system to prevent the two systems running together.

Improvements to the building fabric may have some effect on the HVAC load, but it is limited. This also illustrates why buildings with the same EPC rating can exhibit at least twofold variation in actual energy used, and also shows the value of display energy certificates to make real energy use transparent and to stimulate improvement action.

3.22 For the public sector: *“more than 50% of total potential is captured by building shell and lighting improvements.”* And, for industry: *“the single largest end user of electricity in the industrial sector is motors (incl. pumps): these have the highest potential for electricity reduction.”* CIBSE provides authoritative guidance on the savings potential from more efficient building services and also on such matters as the interaction between building fabric and the efficient design and operation of building services (HVAC, lighting and specialist ventilation systems).

3.23 The EDR consultation document does not address IT services, lifts and small but constant 24/7 loads. Conventional IT services (eg servers) generate a lot of heat which in turn require significant air-conditioning to maintain operating temperatures for the equipment. With our ever increasing dependence on IT little is mentioned of the need for such systems to be updated. This is a very rapidly growing sector, and its energy use is growing equally rapidly. Cloud systems, and low energy terminals have been widely publicised and in the main adopted. However, what goes on in the server rooms needs attention. Outdated and inefficient servers and switching, poorly maintained or old local air-conditioning systems, etc are a considerable demand on generating capacity. CIBSE, along with our US based sister organisation ASHRAE believe that this sector merits a specific targeted approach, and both organisation publish guidance on energy efficient data centres and server rooms.

3.24 Lift installations are high electricity users and yet little in the way of energy efficiency advice seems to be forthcoming from the lift industry. CIBSE Guide D on Lifts indicates that lifts use between 10 and 15% of electricity in a building.

3.25 The retail sector shows a very wide range of energy performance, and exhibits several energy wasting practices, such as open shop doors, even during very cold weather, open fronted fridges in food stores and uncovered freezers. There is opportunity here to encourage the use of the practices adopted in “green flagship” retail locations across the sector. This may require regulation to overcome competitive reluctance to adopt energy efficient practice.

3.26 Because final energy consumption is a systems outcome, designing a building to a high standard or installing energy efficient technology provides no guarantee of achieving savings. Reasons for this include an absence of proper control, even with sophisticated control systems (eg air-conditioning and desktop computers running 24 hours a day, lights coming on in the middle of the night, and so forth); an absence of monitoring and targeting to identify energy/electricity waste; poor standards of commissioning, especially of new buildings which have complex controls which need careful commissioning to function effectively; lack of operator training and awareness resulting in poor building service operation. All this serves to reinforce the need for buildings energy labelling to raise awareness of actual energy use and to stimulate action to reduce it.

3.27 Finally, CIBSE is aware of other approaches to reducing electricity and energy demand. These include increasing the climate change levy or the concept of Tradeable Energy Quotas (TEQs). CIBSE considers that further consideration of these policy options would be timely.

Chapter 3: Financial Incentives

4.1 In CIBSE's view, the options presented, with the possible exception of targeted support, are too complicated and as a result may be of limited interest to prospective participants:

- (i) **financial incentive options - premium payments:** The consultation document suggests that the simple premium payment is likely to be more straight-forward for end users to engage with. CIBSE agrees and would add that the simpler the mechanism the more likely that take-up will be good. Complexity from the end user's perspective is likely to add another transaction cost to the ones already listed in the consultation document. On the reference to the penalty regime for non-compliance, this needs careful consideration. For example, a qualifying HVAC project, well designed and monitored, could save XkWh per day at, say 25 deg C peak external temperature or YkWh/day at 27 deg C peak external temperature compared with a given baseline of electricity consumption before the project was implemented. For projects where the electricity savings are dependent on factors outwith the design and operation of the system such as external temperature, production throughput, etc., it will be very difficult to bid a given electricity savings in advance with absolute confidence. How will the savings be measured and against what base line to evaluate those savings? (Please see paragraph 5.2 (iii) for a suggested reconciliation approach to address this accounting issue.) The idea of a penalty regime for non-compliance would, we suggest, be difficult if not impossible to implement fairly. Furthermore, there is little or no policing of non-compliance with the regulations in other areas.
- (ii) **financial incentive options – a capacity market mechanism:** Whilst CIBSE has no specific expertise in the design of policy instruments, the proposed capacity market mechanism sounds very complicated and would, as a result, be difficult to operate in practice. Who would be responsible for determining the nominal electricity price and how often would that determination take place? In addition the efficacy of energy or electricity efficiency measure can decline over time to a greater or lesser extent depending upon a variety of factors including initial design, ongoing maintenance (or not), etc. How these impact on the robustness of electricity savings arising from a project or product in use is an important factor so far as the capacity market is concerned. Only by incorporating a measurement and verification regime incorporating sub-metering as part of the electricity saving project will the actual savings be verified for capacity market purposes. (Actual savings may well be less than those estimated by the system designers.) Measurement and verification can be invaluable in policing policy instruments. For example, to comply with planning requirements, biomass boilers have to be specified and installed. However, in addition, gas boilers have been installed also - to provide 100% backup. It is alleged that once the biomass system has been commissioned, the users solely operate the gas plant. A measurement and verification requirement would address this potential loophole.
- (iii) **financial incentive options – a supplier obligation:** CIBSE has no specific expertise on supplier obligations but from the description in the consultation document, it sounds like an expensive and complicated instrument. For the reasons stated above, a simpler system is, in CIBSE's view, more likely to be successful.

Chapter 4: Opportunities for additional policy: information schemes, voluntary agreements, minimum standards and loans

5.1 CIBSE can see pros and cons with each of these. Our principle concern is that single measures are unlikely to stimulate sufficient interest and commitment to drive investment in electricity efficiency products or projects. In the consultation document, DECC lists a number of barriers and “market failures” to investment in energy and electricity efficiency. Overcoming these needs a carefully selected set of measures designed to address them. Specifically on the reference to building standards and regulation, this is not a clear cut yes or no. Improving thermal insulation and air-tightness will decrease space heating needs (and associated electricity consumption) but if more air-conditioning is required to achieve desired internal temperatures in the summer, electricity consumption could increase. Whether the total winter and summer consumption is lower or higher could only be determined by monitoring buildings on a case by case basis.

5.2 To design the right systems, and operate and maintain them over their lifetimes, the supply chain needs to have, or acquire, the requisite skills. There are good building services engineers in the industry able to design, commission, install and operate energy efficient plant. It is important that these skills and experience are extended throughout the industry and the ancillary service providers. The proposed EDR policy instrument focuses on providing financial support towards costs. Whilst this is a necessary element, policy makers should also consider how to ensure that supply chains can offer effective system design and operation services at the scale required to make a success of any EDR intervention. CIBSE is willing to work with other relevant bodies and associations to extend the cadre of high quality, experienced engineers and service providers.

Chapter 5: Measurement, Verification (M&V) and Additionality

6.1 CIBSE strongly supports the focus of the consultation document on M&V. It is a well know adage in management that “what you cannot measure you cannot manage”. But care is needed. Bank of England economist Charles Goodhart observed in the 1970’s that when a measure becomes a target it ceases to be a reliable measure. This is as true of energy measures as the financial measures which Goodhart addressed.

6.2 In particular:

- (i) **measurement and verification (costs):** Ecofys says: *“the number, type and complexity of energy saving measures increase the monitoring and verification effort and expenditure for a given level of savings certainty.”* CIBSE agrees that measurement and verification is a key part of good energy management and public policy value for money reasons. However, the concern CIBSE has about undue attention to the cost of measurement and verification is that it could drive the design of the incentive instrument to support simpler measures because it is cheaper to achieve a greater degree of savings certainty than with systems projects. CIBSE considers that for non-domestic end users, one-off, systems based savings projects are likely to deliver more savings per £1 of public support than single measure technologies but would require tailor-made, and more expensive, measurement and verification procedures to give savings certainty.
- (ii) **measurement and verification (value):** measurement and verification has far more meaning to investors in savings measures if it is part of the project, initiated by the end user to ensure that, as far as possible, the savings are as near to design performance savings as possible. If this is seen as the primary

use of measurement and verification it would resonate much more with investors and end users because it would drive value for money considerations from their perspective. Data from measurement and verification procedure could also be used to assess the cost-effectiveness of public expenditure support. The important point, however, is that with the right drivers, all interest groups will get value from expenditure on measurement and verification whereas with the wrong drivers, the investor will see measurement and verification as a cost burden not a cost benefit.

- (iii) **measurement and verification (capacity market):** if financial incentive payments are made as part of a capacity market mechanism, there needs to be a high degree of assurance about the magnitude (and timing) of the electricity savings. In this context, measurement and verification has a different role from that in (ii) above to do with programme and investment effectiveness. The following questions arise: what is an acceptable degree of assurance; who benefits from the data provided; and who should contribute to the costs of the measurement and verification process? It may be that a given electricity savings project under- or over- performs. To bring efficiency savings into the frame, there may well need to be an accounting system so that under or over achievement compared with the savings offered in the bidding process can be reconciled from one bidding event to the next. Insurance products, akin to exchange rate fluctuation risk management instruments, can no doubt be designed to meet the needs of the capacity market.

6.3 CIBSE notes that much attention is focussed on whether a given investment is additional or not. The Ecofys accompanying document says: *“The purpose of an M&V and additionality approach is to filter the efficiency projects in order to pay only for permanent (long-term kWh saved) and additional (compared to a baseline) electricity demand savings.”* Ecofys go on to say: *“Additionality can be an elusive concept because proving it involves comparing real events against a hypothetical scenario.”* CIBSE agrees. However, one simple way to deliver baseline energy data on buildings would be Display Energy Certificates, which, if rolled out to the private sector, would deliver both individual building (or building campus level) data, as well as providing a dataset amenable to broader statistical analysis and to inform further policy development.

6.4 Whilst CIBSE understands the need for value from public expenditure, and avoiding “deadweight”, it considers that additionality concerns should not take precedence over the principal policy objective to stimulate investment to improve the efficiency of electricity use, reduce electricity waste, and build critical mass in the market for electricity efficient goods and services. Investment decisions are made after considering a wide range of factors, of which Government financial support or other public inducement is but one. Unless the percentage of financial support level is significant in relation to total project or purchase cost, Government support may not necessarily be the main reason why decisions to invest/purchase go ahead. To try and unravel whether a given investment decision was solely as a result of Government financial support is likely to be a complex and costly exercise with little chance of an unequivocal conclusion.

6.5 DECC should review the costs and benefits of setting up additionality criteria and running assessment procedures, to avoid yet another hurdle for prospective decision makers considering engaging in the process.

6.6 CIBSE would be very happy to discuss with DECC any of the points raised in this paper or in the responses to DECC’s questions at Appendix 1 following.

CIBSE Responses to the DECC Questions in the EDR Consultation

Consultation Question – Chapter 1

1. DECC would welcome further evidence and analysis to support and increase our understanding of the potential for cost-effective energy-efficiency measures, the abatement potential and the cost of abatement.

CIBSE and its members have extensive knowledge and experience of the UK's non-domestic building stock, (and increasingly of the residential sector). The building stock represent a huge potential for energy efficiency improvements – from space heating, air-conditioning, lighting and small power loads (such as office equipment, lifts etc). Specifically for electricity consumption, as the Government's initial assessment shows, there is scope for significant energy, electricity, cost and carbon savings. This scope can be found through most of the building life-cycle: design, construction, occupation and refurbishment.

Work undertaken by the CIBSE over many years has shown that Post Occupancy Evaluation of buildings is a proven tool for delivering better building performance and value for money. CIBSE provides a series of case studies, known as the Post Occupancy Review of Building Engineering (PROBE) Studies, which describe practical evaluation studies on a number of buildings. Further details on these, including web links to the published studies, are given in Appendix 2.

CIBSE also publishes the benchmarks which underpin the Display Energy Certificates (DECs) which are required in public buildings under the Energy Performance of Buildings Regulations². These are based on work undertaken under the Energy Efficiency Best Practice Programme. A review³ of the two years' experience of DECs showed that the office and school benchmarks, which accounted for almost 60% of the buildings rated, were both within 2% of the observed stock median for aggregate carbon emissions, showing that they are an accurate reflection of energy use in the existing public stock.

The Display Energy Certificate system offers an opportunity to gather and analyse actual building energy performance. CIBSE and a number of other bodies, including the British Property Federation and British Council for Shopping Centres are on the record in calling for Government to introduce DECs across the non-domestic building stock, starting with the larger buildings. Indeed, some larger property companies such as British Land are doing significant work using the DEC methodology across their own portfolio, yielding significant savings.

Article 8 of the Energy Efficiency Directive calls for energy audits. CIBSE and others believe that it would be timely to review the DEC methodology to improve it in the light of the first five years of rating experience, and to extend it to the whole building stock over a realistic de minimis size.

² CIBSE TM46, Energy Benchmarks, 2008, ISBN 978-1-903287-95-8

³ [CIBSE Report on First 45,000 DECs \(May 2011\)](http://www.cibse.org/content/Technical_Resources/Technical_Reports/Technical%20Report_CIBSE%20Report%20on%2045000%20DECs.pdf) Harry Bruhns, UCL Energy Institute, Phil Jones, Building Energy Solutions, Robert Cohen, Camco with additional material by Bill Bordass OBE, Usable Buildings Trust

Now that half-hourly metering is widely used, there is a vast amount of data available but a dearth of analysis of data related to the building. As a first step, location, floor area, nature of activity in the building and hours of occupancy would be sufficient to identify inefficiencies such as high base load and poor correlation with weather (in relation to lighting and heating/cooling).

Consultation Question – Chapter 3

2. Do you have evidence on whether offering a financial incentive is likely to be an effective way of overcoming the barriers that prevent efficiency measures being taken up in non-domestic buildings, bearing in mind the policy measures that already drive energy efficiency in non-domestic buildings?

Well-designed financial instruments and incentives will help encourage consideration of opportunities arising from energy efficiency and related policy measures in place. Often payback periods for energy/electricity efficiency investments fail to meet business payback requirements, which can be as little as 2 years. (Whereas payback periods are among the most often used investment criteria, CIBSE advocates that investors look also at whole life costing and cost in use analysis to get a better picture of the real value of efficiency investments.) A financial incentive to reduce the payback period will attract attention and, if set at the right level, will be influential in the business decision to spend. The challenge is that the size of financial incentive required to meet a 2 year payback could be significant. And, whilst a targeted financial instrument can encourage investment on a given electricity demand reduction project, it does little to put energy efficiency and electricity demand reduction on a strategic level in the organisation – which, really, should be one of the main objectives of the policy intervention.

Rightly or wrongly, lack of finance is often cited as a barrier to action. The commercial energy services company (EsCo) model can provide the capital. It is well developed but little taken up in the UK. Most prospective clients don't understand the EsCo shared savings approach and view it with suspicion. CIBSE recommends that if Government want to explore ways to overcome financial barriers through measures which don't involve significant public expenditure, it should consider how to incentivise EsCos - for example, by providing a quality standard and Code of Practice for the EsCo industry to provide greater confidence to prospective clients.

CIBSE suggests attention should be paid first to the **complex policy landscape** for energy supply and demand, energy efficiency and decarbonisation. It is generally considered that the energy and climate policy landscape is already complicated and therefore unlikely to be well understood by the people on whom the policies are focused. The accompanying document to this consultation, "Capturing the full electricity efficiency potential of the UK", says in slide 23: "*Current and planned policies span all 3 sectors [residential, commercial and industrial] with 7 key mechanisms*". CIBSE considers that before adding new instruments to the mix of policy measures, it would be appropriate to review the overall energy efficiency, decarbonisation and supply policy landscape.

It is worth considering, for each decision-making group affected by the policies,

what encourages or inhibits investing to improve the efficiency of electricity use. One of the reasons that the climate change agreements were taken up and were successful was that senior managers in the energy intensive industries recognised that the savings on the climate change levy were worth having; and that the full rate of levy would have a significant financial impact. Similar analysis in other areas would assist in considering the current and proposed measures.

3. Do you have evidence on whether offering a financial incentive is likely to be an effective way of overcoming the barriers that prevent efficiency measures being taken up in industrial processes? Explain your point of view.

CIBSE has no direct experience of industrial processes but is aware of work done by industry and, for example, at De Montfort University which has identified the potential for very large savings simply by using better controls - for example turning on equipment only when needed - at zero or minimal cost. The barriers here are to do with information, lack of resources to investigate, a 'better to leave it on just in case' attitude etc. rather than financial. They could be addressed through the information hub.

For capital investments, business assesses opportunities in terms of costs, returns and risks – and whether the opportunity is core to the business. Efficiency measures, when the equipment isn't broken, are a discretionary investment which almost always fail the internal rate of return (IRR) hurdle rate or payback period – which can be as short as 2 years. (It is worth bearing in mind that the choice of price/kWh could make a significant difference to payback periods – not just likely rises in electricity prices year on year, but also the time of day value of a kWh used in peak times compared with non-peak.) Financial incentives would be needed to bring marginal cases into the frame for serious consideration. (It is well worth comparing the 2 year payback hurdle with the interest rate on the Green Deal of around 7.5% and typical payback periods well over 3 years expected. A payback of 2 years represents a very high rate of return compared to any investment. The fact the payback required is so short in industry shows that massive incentives would be needed to tip energy efficiency and electricity demand reduction projects into the “acceptance zone” for business investment - far more generous than the incentives under the Green Deal. It is important to convince business leaders that energy efficiency and electricity demand reduction investments are longer term, strategic investments which need to be treated accordingly. Successful projects should be independently assessed and promoted in order to encourage other business decision makers to do likewise.)

Whereas the sums required for investment into process plant could well be significant, simple replacement of electric motors, pumps, compressors etc when they reach end of life is another matter. They could save electricity compared with the old equipment. However, although they would be much less expensive than a root and branch review of the process as a system they would not achieve the full savings potential of a systematic approach. CIBSE recommends that as part of whatever financial instrument(s) are put in place to stimulate electricity use efficiency there is support for systems analysis appraisal of processes to help decision makers assess what the most cost-effective investments are.

The chosen incentive mechanism should be very simple if it is going to have any chance of appealing to busy factory managers, and preferably not involve a long term commitment. For example, the boiler scrappage scheme was very effective and simple to administer. Furthermore, policy makers and scheme designers should bear in mind that incentives alone are probably insufficient and may not make best use of either public funds or private investments. Information and advice on the scope for savings, and how to manage the systems purchased, are a necessary adjunct to financial incentives.

4. Should Government consider a product-specific financial incentive in the domestic sector in spite of the risks and limited potential (23% of domestic product untapped potential as set out in Chapter 2)? If so, how could we design an incentive that would drive better purchasing or usage, rather than early product replacement?

Factors influencing purchasing decisions by domestic consumers are complex. Decisions are not just made on purchase cost, important though that is to many. Brand and extra amenity over current product both feature in the factors affecting purchase. But energy efficiency features low down, if at all, on the list of factors considered. To encourage purchase of more energy efficient but more expensive products needs not only a financial incentive but also impartial information on cost of ownership, coupled with promotion of a low energy lifestyle to help convince consumers that they can do their bit to tackle climate change.

Energy labelling now provides information on many large appliances has been introduced. The key step now is to get prospective purchasers to take electricity running costs into account when comparing different products. For any product incentive schemes to achieve their potential it is important to know the usage regime and to encourage people to turn equipment off when not in use. Another factor which could be significant for some products is what % of electricity consumption comes from use and what % from standby? Standby is an important issue, particularly with wi-fi and digital TV which means 24/7 use is much more likely than standalone devices of a few years ago. This can be addressed through standards. The plethora of electronic devices that are used in the home nowadays have a significant background load (through transformers still drawing current etc), as well as a fair load whilst in use. It is a growing phenomenon.

5. Would a financial incentive be effective in driving efficient product choices in the non-domestic sector? What evidence is there of this and what are the differences, if any, to the case with domestic products?

Yes, provided the incentive was large enough. Private sector organisations assess investment in terms of costs, returns and risks. Efficiency measures, when the equipment isn't broken, are a discretionary investment which almost always will fail the internal rate of return (IRR) hurdle rate or payback period requirement, which can be as short as 2 years. Serious financial incentives (eg ~25% of costs) would be needed to bring demand reduction measures into the frame for serious consideration. Public sector organisations will certainly have demand reduction opportunities but are cash limited and may well not have funds to contemplate any significant capital investment.

CIBSE's expertise and knowledge is in relation to buildings and building services. Opportunities for savings arise throughout the lifetime of the building – via product or system replacement when equipment fails, through to replacement of building services plant when buildings are due a major refurbishment. It is at the major refurbishment point where the potential for significant savings can be considered and planned for. However, savings do not accrue simply because of judicious product choice. Good systems design, installation, commissioning and management are essential. However, these do not happen automatically. CIBSE recommends that consideration should be given to providing incentives not only for product purchase but also professional design, installation etc services – and sub-metering (see elsewhere in CIBSE's response for a more detailed view of the merits of sub-metering). For buildings it is vital to address whole systems and not just products. For example, energy efficient lighting will only deliver savings when installed with appropriate controls, and commissioned and operated correctly. This in turn will only happen when lighting is designed and installed by suitably competent practitioners and adequate user information provided.

For buildings due a refurbishment, the opportunity for significant savings arises because it opens the door to a re-appraisal of service systems (rather than individual products) many of which were designed in an era of lower cost energy. However, the sums required to encourage investment in the efficient option could well be significant unless the incentives were carefully designed to support the initial appraisal and only the additional cost of the efficient system over a notional standard system which just met the Building Regulations standards.

An added point to note is the respective decisions of landlords and tenants. Landlords will tend to take a longer term view of their assets, and only invest to comply with minimum standards. Their interests focus on landlord controlled spaces in the building. Tenants, on the other hand, will take a view based on the remaining period on the lease, the terms of the lease, and what investments or purchases make sense.

6. If a targeted financial incentive for non-domestic buildings were available, which efficiency measures should be a priority for the scheme? What evidence is available to support your view?

Targeted support is relatively simple (at least compared with other instruments proposed in the consultation document) and can deliver savings – eg replacing lamps and luminaires when existing lighting is either end of life or no longer fit for purpose. But the concern CIBSE has over targeted support is that although some savings will be achieved, the incentive risks prolonging a “one-off” action and a “like for like” culture – the latter could prolong situations where lighting controls are either non-existent or sub-standard. There is also the risk, from the policy maker's perspective, that there has been no behavioural change: ie, when the incentive ceases the propensity for action ceases also. DECC should be encouraging decision makers to review their current systems and see what system improvements can be achieved (see under answer 5 above). Paragraph 3.31 in the consultation document says: *“There is a risk that both the use of ECAs and any new targeted financial incentive may result in the replacement of individual components with more efficient models, but without consideration of whether greater gains could be made by considering how the system is configured . . .”* CIBSE fully endorses this view.

However, if there is to be a targeted approach as part of the EDR instrument mix, then HVAC, electric motors, lighting and controls and small office loads reduction would be worth considering. These are, relatively speaking, low cost measures offering good electricity savings potential. As with our response to Q5, attention should be given to system controls and the building energy management system. If none exists, DECC should consider making appropriate and adequate controls, BEMS, or sub-metering requirements for schemes above a given size. This is another area in which this policy activity is significantly dependent on Part L of the Building Regulations, in particular the requirements which relate to controls and commissioning.

Also, consideration should be given to what happens to the equipment that has been replaced. Can it be sent for refurbishment and recycled into use as re-manufactured, “good as new” equipment? There is a need to balance the drive to upgrade system performance and the growing pressure to reuse or recycle. This is a subject of ongoing discussion between CIBSE and the Waste Resources Action Programme (WRAP).

CIBSE notes that the consultation makes no reference to voltage and power factor correction. Suitably applied these measures can provide savings in non-domestic and possibly domestic electricity consumption, although care is needed to measure the savings that are genuinely attributable to the voltage and power optimization, rather than associated concurrent actions. These measures should be considered for inclusion in any technology list drawn up for a targeted financial incentive approach.

In drawing up any list, it is essential to consider how new approaches are added to the list without creating a significant barrier to innovation – the whole issue of renewable technologies in SAP and SBEM serves as a salutary warning.

It is also important that any technology list is focused on achieved outcomes, not just on inputs using listed products.

- 7. Do you consider a targeted financial incentive an effective way of encouraging higher and additional efficiency in industrial processes? Which efficiency measures should be a priority for any scheme? What evidence is available to support your view?**

Given the multitude and complexity of processes, a targeted approach would not be effective. It would, by definition, focus only on specific components of the process; and encourage “like for like” replacement rather than a strategic, system approach to process efficiency improvement. It could have a high degree of 'free riders' who would have had to replace component parts of plant anyway.

- 8. Should Government consider a targeted financial incentive to support the purchasing of higher energy-efficient products? How could the efficiency of such a scheme be maximised? Would a voucher or certificate scheme work? If not, what other options should we consider? Please make clear in your response whether you are referring to the domestic or non-domestic sector or both.**

Domestic: in principle, an upfront rebate scheme could work. Spreading the incentive over years would be less likely to appeal to domestic consumers who would be faced with all the purchase costs upfront. The incentive needs to be visible and linked to the policy goal of electricity demand reduction and management and cost and CO₂ reduction. It needs to be set at the right level to encourage purchase. There could be deadweight whereby people already intending to buy high efficiency products would benefit but how they could be distinguished from those the scheme needed to incentivise would be hard. Also, it is important to ensure that the replaced product is not left for use in the household, eg a second fridge in the garage. As mentioned above in response to Q3, a scrappage scheme avoids the fridge in garage problem and the complexity of a long term process. Cars and boilers were effectively dealt with this way.

For the domestic sector, we know that energy efficiency policy initiatives have tended not to achieve their full potential unless the support levels are high (eg the loft insulation schemes of the 1980s run by the local authorities). There needs to be a real attention grabber to stimulate interest. One idea would be to provide as part of the purchase papers a numbered kWh/carbon reduction certificate which gives useful information on savings and how to operate the appliance efficiently. Stimulate take-up by setting up kWh/CO₂ lottery where certificate numbers are entered into a prize draw – paid for by the consumers as part of the purchase. The success of lotteries shows their appeal to people and promoted in the right way a CO₂ lottery would reinforce the message that we all can do something practical to cut our carbon emissions and save electricity.

Non-domestic: targeted incentives for specific items of equipment (eg lamps and luminaires – or better still, lighting systems) would help managers decide to go ahead with lamp replacement but would probably preclude the opportunity to rethink the system designed years ago to deliver an amenity such as lighting or air-conditioning at the much lower energy prices prevailing at the time. Before incentivising decision makers to replace individual items consider a more sensible approach which would encourage a rethink about the system into which these energy efficient products operate. A systems support approach would be more likely to achieve those untapped electricity savings. A further consideration is that electricity savings are not simply achieved by addressing the electricity consuming equipment. The interaction of fabric with building services is complex. Attention to fabric and glazing will help reduce demand for heating – though it is not clear whether demand for cooling would rise or fall. Maximising the use of daylight will reduce the demand for artificial lighting and hence will save electricity but to achieve daylight benefits will require a lighting appraisal to determine the right layout of luminaires and the right control regime.

9. What restrictions, if any, should there be on which sectors and measures are eligible to participate in a market-wide scheme? Please explain.

In CIBSE's view, the first issue for consideration is not at the level of restrictions within and detailed design of a prospective EDR measure but at the level of the existing complex and crowded policy landscape and specific instruments already active in a given market segment – eg climate change agreements for the energy intensive sectors; EU Emissions Trading Scheme; CRC Energy Efficiency Scheme; ECAs for plant and machinery (but not building fabric), and so on. Rather than try to fit an EDR instrument with its own restrictions, eligibility criteria

etc into the current complex policy landscape, CIBSE recommends DECC stop and think about that landscape they have in mind to make more complex. The risk is that the more complex the landscape the less likely will electricity end users take up any discretionary measures which involve them spending their own money any sooner than they absolutely have to.

10. What are your views on the comparative merits and disadvantages of targeted financial incentive schemes and market-wide ones? Please explain your response.

If DECC introduce an EDR instrument for non-domestic end users, CIBSE can see opportunities for targeted and market-wide interventions as appropriate to those segments of the market the policy instrument is designed to address. Some end users will be stimulated by a targeted scheme to replace old lighting or old fridge-freezer units. In such cases, an upfront subsidy would be more likely to be of interest – as per paragraph 3.68 in the consultation document *“an upfront lump sum payment as often seen with targeted schemes was preferred by medium size businesses and landlords, partly because it was simpler than some of the alternatives presented”*. Others may look more deeply at their requirements for lighting or refrigeration and decide to have a new system which suits their current needs better, is more efficient, saves money and reduces their carbon emissions liability. CIBSE thinks that market based interventions are more likely to stimulate these types of projects.

However, neither type of intervention, as currently envisaged, seems to consider wider strategic issues such as helping energy/electricity end users to develop a strategic approach to energy/electricity efficiency across their operations and working with the equipment manufacturers and supply chains to accelerate the development of the next generation of high efficiency equipment (eg, electric motors), systems (eg, HVAC) and processes (eg, pottery firing). What DECC currently envisage appear to be policy instruments operating on the consumer to stimulate demand for efficient products etc. The risk is that these instruments simply subsidise today’s good practice (with luck), or yesterday’s good practice (without luck). What is needed, in CIBSE’s view, is an approach which supports the improvement of equipment efficiency and the provision of systems design advice services for the non-domestic end user. Deep efficiency gains will only come from a systems approach and, importantly for any kind of capacity market instrument, a systems approach is more likely than a targeted one-off product approach to have sub-metering to provide reliable data on savings.

11. Should Government consider a market-wide financial incentive to support further electricity efficiency measures? Please explain your response.

Rather than introducing a new policy instrument, it would be much better to review and tidy up the existing policy landscape. Only then should a new instrument be considered.

Paragraph 3.70 of the consultation document states: *“Any possible additional scheme must fit with other policies to avoid rewarding participants twice for the same activity.”* Simply adding new instruments and “fitting them in” to the current landscape will not be effective, and will cause confusion in the market place. This

"fitting them in" approach is adding to the policy landscape complexity. There are too many instruments chasing energy and carbon savings opportunities. It is a recipe for confusion and in times of financial and economic stress, end users have other things to worry about.

It is worth bearing in mind that energy efficiency and making better use of electricity is not top of mind for the vast majority of energy end users. If DECC decides to put in place a new policy instrument to encourage efficient electricity use it needs to be eye-catching, simple and well-designed to address the barriers to action which are known to exist.

On the market-wide instruments described in the consultation document, it is worth considering the desired outcome. A good outcome of policy interventions would be that over time they achieve sufficient market activity that the need for the intervention recedes. To achieve the requisite volume of market activity, CIBSE recommends policy makers err on the side of simplicity and focus on stimulating investment by end users which in turn should help equipment manufacturers gear up to meet larger markets and achieve economies of scale and therefore lower project costs.

12. What are the key elements of a financial incentive scheme to encourage participation? Including but not limited to payment level, length of payback period, who manages the scheme, whether the level of payment is known upfront or determined through the sale of a certificate. Please provide evidence to support your views and reference relevance to the different sectors as appropriate (domestic buildings and products, non-domestic buildings and products and industrial processes).

Key elements include a clear statement of objectives, how scheme applicants can benefit and for each prospective participant a firm offer of support for each electricity savings product. It is vital that incentives do not vary during the course of the investment, and that processes are simple and clear, especially for non-domestic buildings projects. Incentives should not just be for purchase but for system design and installation advice and cover commissioning, maintenance and performance monitoring to keep performance up to scratch.

We have the following comments on specific elements of the consultation paper:

(i) payment level (domestic): unless DECC have carried out market research into the levels of subsidy which will make end users purchase products, start savings projects before they have to (eg as distressed purchasers), this is going to be difficult to determine. In addition, the range of product prices for the same product (especially for domestic products) is wide, and there is the distinct possibility that the difference between the top and bottom of the range could be of the same order of what would be seen as a fair and reasonable public subsidy.

(ii) payment level (non-domestic): for non-domestic projects, the payment level should be set so as to bring the payback period (or internal rate of return) nearer to business payback criteria up to a capped level. How near is "near" is a moot point which needs thinking about. Within classes of non-domestic projects (eg lighting schemes, HVAC, refrigeration) there will be ranges of payback periods according to capital cost, cost of borrowing, project life, assumptions about energy prices etc. If DECC need help to estimate what the cost to the

public purse is likely to be, CIBSE would be willing to discuss further so far as building services projects are concerned.

(iii) length of payback period: we know that in the private sector, energy efficiency and electricity savings projects would have to compete with “mainstream” projects offering 2 year paybacks, notwithstanding that efficiency savings contribute directly to profits. Most efficiency projects have longer paybacks and are not considered part of core business. Hence, they tend not to be funded when investment funds are tight. Whether a public subsidy should bring energy efficiency investment into the 2 year payback category or near to it is a matter for debate.

(iv) who manages the scheme: there is a case for having separate managing agencies for domestic and non-domestic/industrial because of the different knowledge base and skills sets required for the two broad economic sectors.

A further point to note with any scheme that depends on end users deciding to participate is that the equipment manufacturers, providers and supply chains see only one by one individual orders for products and installations. CIBSE suggests that DECC looks into ways in which end users’ products/projects can be aggregated to create opportunities for economies of scale and discounts.

13. Do you have any other views or evidence on the relevance of a financial mechanism not captured by the questions above?

Financial instruments alone are insufficient to encourage participation. Relevant, impartial information to help end users make informed decisions are essential. For domestic consumers, the Energy Saving Trust, local authorities, energy companies all provide information and advice on energy efficiency opportunities. For the non-domestic sector, there is a serious lack of impartial information to guide those responsible for energy use. In CIBSE’s experience case studies and trade and professional press articles can be very effective provided they form part of a coherent set with a common format, common information and metrics. The CIBSE PROBE studies supported under the former Energy Efficiency Best Practice programme in the 1990s are a good example. CIBSE recommends that DECC enter into discussions with interested parties, including CIBSE, to explore how a programme of case studies could be developed and funded.

A second essential requirement is a cadre of good quality, experienced systems designers and installers. This cadre exists but (a) finding out who they are isn’t straightforward; and (b) whether they are available in sufficient numbers nationwide to cope with the increased demand the EDR incentives are intended to stimulate, isn’t clear. The professional and trade bodies should work in partnership to address these points.

Consultation Question – Chapter 4

14. For businesses, what would be a useful form of information on the efficiency of the products and equipment you purchase, recognising how decisions are taken in your organisation? Would your organisation find it useful for running cost information to be included in product information? Please provide an explanation.

Chapter 4 of the consultation document “*outlines options to drive additional electricity demand reduction without providing a direct financial incentive*”.

The formulation of Q14 seems to be orientated towards individual products rather than systems. For standalone products such as domestic appliances and laptops an A-G rating with annual running cost estimates or Energy star style information programme would work, provided of course that end users know how to enable the Energy star savings program on their laptops, or it was set as the default. For products in systems, such as HVAC, lighting and elsewhere in the non-domestic sector then a group of high efficiency products may, with knowledge, skills and experience, be configured into an efficient system. But unless the requisite knowledge, skills and experience are available, or are developed, provision of information on products will not be an effective policy instrument.

Running costs are not a sensible metric for non-domestic installations because electricity and fuel prices and the user profile will vary hugely between organisations (more so than in domestic situations).

Whilst CIBSE understands why DECC would have had to include a consideration of non-financial incentives as an alternative option, it would be better to do so as part of a holistic set of policy instruments rather than thinking that non-financial instruments alone would be effective. The thinking behind this question does not seem to be based on an analysis of barriers, failures, risks, resource needs, opportunity cost, etc. It is not a question of financial or non-financial measures. Analysis of the risks, as perceived by non-domestic end users, will help determine which set of interventions (ie, not a single financial or non-financial intervention) is likely to be most effective.

The domestic sector will behave differently from the non-domestic sector and is, generally, more amenable to simple labelling schemes for appliances – though whether a label alone will drive purchase towards the more efficient but more expensive product would need to be tested.

It becomes more complex for non-domestic end users because each savings project will be different. Paradoxically, the savings have the potential to be more reliable provided the EDR interventions encourage the installation of appropriately scaled measurement and monitoring/sub-metering systems.

15 Is there interest in a dedicated information source on industrial electricity efficiency opportunities?

Yes. CIBSE has had less involvement in the industrial sector than in other non-domestic sectors, but has specialist knowledge on industrial space heating, lighting, and ventilation. This information is available via its Knowledge Portal.

16. What available sources of information could the Hub include that are not covered elsewhere? How could this information be sourced and validated?

CIBSE's system of producing impartial guidance and information to building services engineers produces guidance to the highest professional standards, and

is extensively relied on in professional activity and in litigation about what constitutes acceptable levels of professional knowledge and practice. CIBSE could help develop an updated set of building energy performance benchmarks. See also Appendix 3 on CIBSE's role as a provider of professional guidance.

17. Are there any other better ways of raising awareness in the industrial sector that the Government should consider? Please provide relevant evidence.

No comment.

18. If organisations need more specific information about electricity use, can the Government intervene helpfully in this space – for example to encourage a higher take up of sub metering?

CIBSE agrees that sub-metering is important to achieve good performance management, particularly for complex non-domestic systems and industrial processes. CIBSE produces the technical guidance on building energy sub-metering which is cited in Approved Documents and L2A and B as the basis of demonstrating “reasonable provision” of sub metering in a building. This provides guidance on the benefits of sub-metering and how to provide a solution appropriate to the complexity of the system or process being managed.

19. Would a Buyer's Commitment to purchase high-efficiency products be of interest to your business? What aspects make this approach appealing?

No comment.

20. What kind of recognition would be valuable to your organisation if considering engaging in a Buyer's Commitment? Would a recognised accreditation that you could display externally increase your interest in participating in a Buyer's Commitment?

No comment.

21. To what extent do you think efficiency standards in buildings will deliver permanent reductions in electricity demand when implemented?

Building standards alone will not deliver permanent reductions in electricity demand. Standards on their own don't achieve savings. They need to be accompanied by impartial authoritative guidance, and properly applied and complied with, even policed, to have impact. CIBSE is aware that there are performance gaps between systems as designed and as used owing to operating regimes, occupancy behaviour, lack of maintenance, etc. A detailed analysis of the performance gap in domestic housing is attached with this response as an example of the failure to achieve design outcomes in practice. Appropriate measurement and performance monitoring can help identify when performance is dropping and is to be recommended. Again, for non-domestic buildings, DEC's provide simple baseline performance data on real operational performance, which can be used effectively to motivate and inform performance improvement.

The interaction between the HVAC services and the building fabric means it is by no means straightforward whether higher thermal insulation standards would lead to electricity savings or reductions in electricity demand. It should do so in the winter heating season but if the trend towards warmer summers continues it may be that higher thermal insulation standards (and air tightness) inadvertently leads to higher summer electricity demand from air-conditioning. Electricity savings can, in principle, be achieved via more efficient lighting delivering the required lux levels, controls and effective use of daylight. However, a big factor is user behaviour. High efficiency systems will not automatically deliver savings compared with the systems they replace if user behaviour is such that lights are left on when not needed, due to inadequate controls, etc.

Lastly, reducing electricity demand per se is only part of the story. Reducing peak electricity demand is, some would argue, equally important to achieve for cost, energy and carbon savings reasons. Setting standards will not address the question of managing peak demand. Good practice guidance, driven by price signals, is more likely to be successful at tackling this challenge.

(It is worth noting the different responses to regulation and standards in buildings and appliances respectively. Whereas appliance manufacturers viewed regulation and standards as a minimum performance standard to exceed as part of market competition, those organisations subject to Building Regulations view them as maximum standards with which to comply rather than exceed. Appliance labelling coupled with minimum standards have brought about a permanent improvement in appliance efficiency as happened with refrigeration labelling, and is happening with lighting. DECC could usefully reflect how different policy instruments impact on different segment of the market.)

There is another important factor to be addressed when considering electricity demand reduction – peak electricity demand. Reducing peak electricity demand is particularly important to achieve for cost, energy and carbon savings reasons. To meet daily morning and evening peaks requires additional power generation capacity to be active and ready to dispatch compared with non-peak periods. Overlaying the historically higher winter loads compared with summer loads on top of the daily peaks exacerbates the magnitude of the peaks. The standby and spinning reserve generation costs and associated carbon emissions are significant, yet the tariff system does not address this, and consumers are unaware of the costs of high peak demand. These costs can, and should, be reduced as part of the national carbon emissions reduction plan.

However, as with electricity demand reduction per se, setting standards will not address the question of managing peak demand. On the supply side, tariffs could be designed to discourage end users from using electricity over the peak periods. Utilities should also be encouraged to work in partnership with end users to devise cooperative programmes. On the demand side, in respect of commercial buildings and building services specifically, peaks can be “smoothed”, reduced or shifted by, for example, increasing the building’s thermal time constant (thereby making the building less responsive to external temperature changes and therefore the need for building services to be brought into play to maintain internal temperatures within a prescribed range). Similar reduction measures can be applied to ventilation, lighting, general office services and desk computing. Thermal and electricity storage can, in some circumstances, have a part to play.

CIBSE can provide more information on these and other measures if DECC would find that helpful. It recommends that DECC make peak demand reduction a distinct objective within the electricity demand reduction goal

Lastly, an alternative to regulation and standards would be to apply the approach adopted in Switzerland and Ireland which sets limits the power input to specific types of buildings. This would give control of the design and the challenge to the architect, consulting engineer & suppliers to meet the specified criteria. It would also allow a steady reduction in allowable power and help to force the adoption of lower energy strategies such as LED lighting.

22. Do you have relevant evidence on the effectiveness of standards in driving electricity demand reduction?

Please read in conjunction with the response to Q21. CIBSE is aware of research papers published by the Environmental Change Institute at Oxford University, eg the DECADE project. The PROBE studies (see response to Q1 and Appendix 2) also flag areas where standards may have a role to play.

23. Do you agree with the Government's assessment against minimum efficiency standards for industrial processes? If not, please provide evidence of how mandatory minimum standards for industry could be set and why, and the impact they could be expected to have.

No comment.

24. Should Government consider any other policy options aimed at overcoming the barriers that prevent the full take up of efficiency opportunities in:

- Domestic or non-domestic buildings
- Domestic or non-domestic product choices
- Industrial processes?

For domestic and non-domestic buildings CIBSE recommends a review of the current policies and their effectiveness, in particular levels of active compliance, to ensure that the existing policy mix is delivering the intended benefits. In particular, the current review of Building Regulations, focussing on deregulation and removal of measures which are not deemed essential to health and safety, may have severe impact on energy saving in buildings. This requires attention before any additional policy measures are introduced, possibly quite urgently.

Policy has developed and evolved year on year, and from Government to Government. It would be helpful to consider how the current policy mix appears to end users in order to devise interventions which are likely to tip their decisions in favour of energy efficiency and electricity demand reduction actions. For example, in addition to publicly funded financial instruments, energy services and third party shared savings models should be explored. These are more popular outside the UK. Would support for and regulation of energy services offerings offer an effective, lower cost route to energy efficiency and electricity demand reduction? CIBSE recommends that DECC explore this option more deeply.

Irrespective of policy options, attention needs to be paid to building energy performance benchmarking. This has been neglected for years and yet it is a sure-fire way of helping building energy managers assess where they stand. There is a need for a programme of national benchmarking which is resourced and properly maintained. For the non-domestic building sector CIBSE would be willing to discuss this idea with DECC officials.

Consultation Question – Chapter 5

25. What further evidence exists on the accuracy of these approaches to M&V, and how this varies by types of efficiency intervention? What may be the basis for distinguishing which approaches are most relevant for which efficiency projects?

CIBSE supports the principle of encouraging or requiring reasonable and proportionate M&V to track performance and give confidence to savings claims, as long as the costs of M&V methods are commensurate with the scale of the efficiency measure. The IPMVP protocol provides a route for determining energy/electricity savings, but the use of IPMVP may be too complex and onerous for some simpler measures. CIBSE would support work to strengthen the DEC advisory report measures and to incorporate monitoring into the energy audits required by the Energy Efficiency Directive. For some applications the use of DEC's or energy audits may be more cost effective than the full IPMVP regime.

For domestic sector end users, it would be worth considering how, or whether, smart meters can be used to advise consumers about shifting non-essential demand in order to reduce peaks. CIBSE are aware that DECC has already commissioned analysis of detailed appliance data.

For non-domestic sector and industry end users, M&V should be linked with sub-metering used to monitor performance. The means to measure and verify savings is also the means to manage the system. Only actual and verified savings should be offered into supplier obligation schemes. Data from sub-metering and M&V could also provide essential data for mandatory reporting as this is rolled out from April 2013.

26. For which electricity demand reduction measures and technologies do you believe new policy would most likely be additional? What evidence is available on this?

CIBSE agrees with Paragraph 5.21 of the consultation document, which says that "*Additionality is unlikely to be a clear-cut issue*". The principal additionality considerations are: would the activity have happened anyway; would it have happened sooner; or would it be bigger or more effective with EDR support? With the policy landscape as it currently stands, it is difficult to link cause to effect. Regulation apart, what drives investment decisions in organisations is not simply one policy instrument. How savings were stimulated, and whether they would have been achieved anyway without the policy intervention, will be hard to unravel and assign to one particular intervention.

The other way of looking at this is not to get bogged down with additionality considerations. Savings are savings and the consequences of not getting to grips with reducing electricity consumption are far greater than whether some savings would have happened anyway, or whether there has been some hard to quantify use of public money which has been used less efficiently than economic theory would have us believe is possible. It is far better to recognise that the electricity demand reduction policy goal is vitally important to the nation – far more important than whether a given intervention leads to action some of which might have happened anyway. Whether some electricity efficiency improvements would have taken place anyway is, relatively speaking, a small price to pay when set against the importance of achieving the policy goal. The primary focus needs to be on reducing demand, and on measurable reductions, rather than undue focus on how the reductions might have been achieved.

If, notwithstanding the above, DECC has no choice but to follow conventional thinking on the importance of ensuring additionality at all costs, then targeted measures would be mostly likely: (a) to be identified; and (b) to be capable of being assessed on practical grounds as to whether they would be additional. For example, data exist on lifetimes of lighting schemes. For those schemes which are nearing end of life, a decision to replace them is more likely to be taken on the basis of end of effective life. An EDR incentive would not really be needed to drive that particular investment decision and hence could be deemed to be deadweight. However, "average lifetimes" and "generally speaking" considerations will not be foolproof. There will be cases where, on change of tenancy for non-domestic end users for example, there is no change to the lighting; or the opposite, a perfectly adequate lighting system will be ripped out because it doesn't suit the new tenant. In such cases, would EDR support drive additionality? This case serves to show how difficult it is going to be to set additionality criteria and allow/reject applications for support on those grounds.

27. Specifically, what evidence is available on the likely additionality of measures in industrial processes and non-domestic buildings?

In order to consider this question it is necessary, to examine not only the ways in which the savings from a given measure can be quantified but also the policy landscape in which the EDR measure will sit. M&V via appropriate sub-metering would provide a robust assessment of the amount and timing of the savings compared with performance of the previous system, if this information is available. It is then necessary to determine, by interview with the decision makers for example, what made them take action. If there had been one policy intervention, then it is likely to be the case that that intervention was instrumental in driving the decision. However, for non-domestic buildings, there are several policy interventions relevant to energy efficiency and carbon emissions reduction: Building Regulations and CO₂ emissions targets for new build and major refurbishment; DECs for existing building energy performance, ECAs for certain HVAC equipment; CRCs. New build apart, it will be nigh on impossible to allocate savings to each of these interventions. The same would apply to any EDR interventions. Take targeted measures as applied to lighting for example. A high efficiency lighting scheme could be eligible for or subject to enhanced capital allowances, the commercial loan scheme for energy efficiency projects, and the EDR if it is decided to implement this intervention. Under these circumstances, not only would it be necessary to sub-meter the lighting scheme to show

absolutely what savings could be attributed to the measure but also even then it would be difficult, if not impossible, to determine which of these policy instruments actually had the effect of driving the investment. Estimating the numbers of angels dancing on pinheads come to mind.

We need to reduce electricity demand, which will require a variety of actions, encouraging compliance with existing policy measures as well as any new EDR mechanism. We need to focus on outcomes and not be distracted by looking backwards at how we achieved them in undue detail.

28. In the context of a financial incentive scheme, would the flexibility and accuracy of taking a case-by-case approach to additionality justify the administrative burden that this would require? What evidence is available on this?

No. Please see our response to Q27.

However, if DECC require additionality as a primary consideration for EDR support, then CIBSE thinks that the amount of effort required to determine additionality should be commensurate with the scale and complexity of the efficiency project. A case by case basis would be very expensive, time-consuming, onerous and therefore off-putting to prospective applicants.

29. What, if any, is a practical approach to identifying the additionality of projects ex-ante (including measures such as those identified above)? Which types of measures and sectors are suitable for financial incentives and how should the acceptable projects be identified?

Please see response to Q27.

Determining the real savings from targeted interventions would require monitoring “before” and “after” consumption for the measure specifically. If the test requirements are too complicated, people will be put off doing anything. The policy goals should rank more highly than working out complex additionality tests – so much the more important if there is a risk that complex additionality tests discourage participation of end users in any EDR incentive scheme.

30. Could coefficients be used to reward projects which are partly additional? How should such coefficients be calculated? If so, what are the best practice examples of this approach we should consider further?

CIBSE takes the view that too much attention is being paid to additionality, so much so that it risks making an already complicated instrument and landscape unattractive to prospective applicants. Following on from an extensive section on M&V and Additionality, the concept of “partly additional” is introduced. What is the definition of “partly additional”; who wants to know; and what would they do with the information?

CIBSE
London
31 January 2013

Post Occupancy Studies and the “PROBE” Series

During the period from 1995 – 2002 CIBSE, through its Journal, was involved in a research project, part funded under the then “Partners in Technology” (later “Partners in Innovation”) programme run by the Department of Environment and its successor Departments over that period.

It was carried out by Energy for Sustainable Development, William Bordass Associates, Building Use Studies and Target Energy Services. Further details about the scope and methods of the PROBE Case Studies can be found at the CIBSE website⁴ and also at the [Usable Buildings website](#).

The full set of 20 practical evaluation studies on a number of buildings is available on the CIBSE website on the Post Occupancy Studies page⁵. The work undertaken by the CIBSE over many years has shown that Post Occupancy Evaluation of buildings is a proven tool for delivering better building performance and value for money.

A number of later post occupancy case studies can be found in the [CIBSE Journal](#), including a [Post Occupancy Evaluation special in March 2012](#).

The Technology Strategy Board is currently running a successor programme to PROBE, called the Building Performance Evaluation programme, which is currently underway, and is confirming the need for practical action after contractual “completion” of buildings to ensure that they perform as designers intended and as occupiers expect.

⁴ <http://www.cibse.org/content/Ed/PROBE/Introduction%20to%20Probe.pdf>

⁵ <http://www.cibse.org/index.cfm?go=page.view&item=2481>

About the Chartered Institution of Building Services Engineers

The Chartered Institution of Building Services Engineers (CIBSE) is the primary professional body for the engineers who design, install and operate the energy using systems, both mechanical and electrical, which are used in buildings. Our members therefore have a pervasive involvement in the use of electricity (and other energy carriers) in buildings in the UK.

CIBSE is one of the leading global professional organisations for building performance related knowledge and a pioneer in responding to the threat of climate change. It publishes numerous Professional Guides and other titles setting out best practice in support of the industry.

The Institution is the primary source of professional guidance for the building services sector on the design and installation of energy efficient building services systems to deliver healthy and effective building performance. CIBSE publishes Guidance and Codes which provide best practice advice and are internationally recognised as authoritative. The CIBSE Knowledge Portal, which makes our Guidance available online to all CIBSE members globally, is the leading systematic engineering resource for the building services sector. Over the last year it has been accessed over 100,000 times, and is used regularly by our members to access the latest guidance material for the profession. Currently we have users in over 160 countries worldwide, demonstrating the world leading position of UK engineering expertise in this field.

CIBSE began to develop codes specifically intended to reduce energy consumption in the early 1980s, in response to the energy crises of that time. CIBSE is now at the forefront of efforts to reduce carbon emissions from our building stock.

In addition to the production of technical standards and guidance CIBSE provides professional development training for system designers and installers, covering design, installation, commissioning and system maintenance. CIBSE is also actively engaged in the gathering of performance data to help inform good practice and compliance with existing requirements.