Which way forward for DECs?

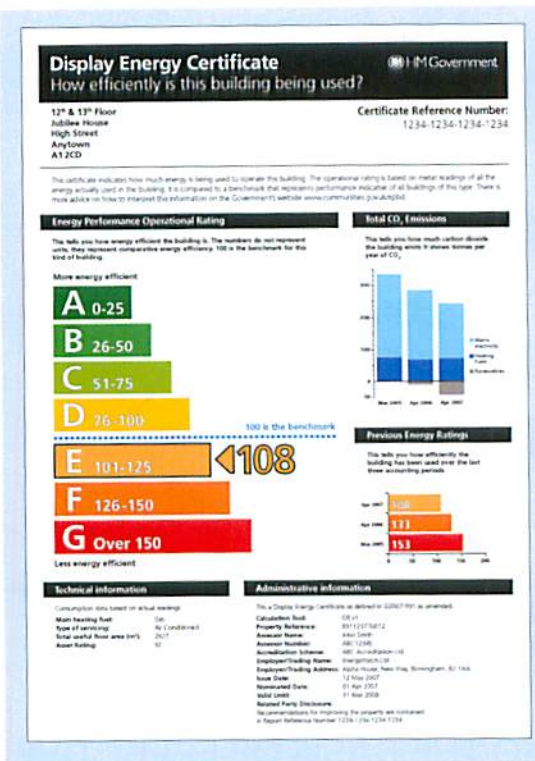
The 1st October 2008 deadline for the completion of Display Energy Certificates came and went rather quietly. Paul Martin of TEAM reviews their impact

The EU Energy Performance of Buildings Directive (EPBD) came into force on 4th January 2003. The intention behind the legislation was to address the issue of improving the energy efficiency of buildings by using a method that has been successful in the white goods sector (fridges and washing machines etc.) and new vehicles – namely energy labelling. This provides information to the purchaser on the energy efficiency (more theoretical than actual) of the item they are buying in the hope that this will influence their purchasing decision, and by doing so, use the public to demand higher performance standards. Energy Performance Certificates (EPCs) provide this for the sale, lease, rent and modification of buildings.

Buildings already occupied

But what about the 95 per cent of the UK building stock that is not in the process of being sold, leased, rented or modified? This is where the Display Energy Certificates (DECs) come in. These are a similar energy labelling system but covering buildings that are already occupied and are based on a buildings actual energy performance. Energy Managers feel that these are much more useful.

The EU directive was interpreted into law for England and Wales on 29th March 2007, and Northern Ireland on April 10 2008. The Scottish authorities believe they can discharge their obligations in a different way. As the guidance for the DECs was only circulated by the Department of Communities and Local Government (or CLG as they like to be known) in late Spring 2008, it was always going to be impossible to have all the required DECs in place by October 1 2008, due to the lack of time and lack of assessors. On October 1 there were 265 Accredited DEC Assessors, 3,200 DECs completed, 5 accredited software systems (including CLG's own software) and 12 "approved accredited schemes".



DECS are providing the opportunity to target poorly performing buildings

The original impact assessment by government suggested that 42,316 buildings would require DECs. In the summer of 2008 CLG announced that the "campus" type sites i.e. hospitals, universities and large schools could produce for the first year only, a single DEC for the whole site rather than a DEC for each building. This would reduce the number of DECs required in year one but to what is not clear. This was a rather puzzling announcement as the legislation is clearly aimed at "buildings" and not "sites" or "campuses". This change is believed to have been due to heavy lobbying from the Department of Health. Although the relaxation is for a year, it is worth noting that the guidance document referring to the transitional arrangements does not confirm time scales. One wonders whether this is significant or not!

Teething problems

It is fair to say that all organisations that were providing DEC Accredited Assessor services or DEC software were stretched by the "start" date, including CLG's own software and lodgement systems. Software suffered the inevitable bugs, accredited schemes were struggling to set up systems and accreditation procedures which caused many people frustrating delays. Lodgement prices from some schemes fluctuated between £30 and £50 and then back to below £30. As of December 5 the Chartered Institution of Building Services Engineers had the largest share of the registered Accredited Assessor market with 52 per cent of the total of 624. This does not necessarily mean that they have the same share of lodgements and this is likely to vary as organisations compete for this business.

So what about enforcement? As of the end of November approximately 9,000 DECs have been completed, and it is likely that these will still be produced well into next year. Indeed, some large organisations have still not decided whether to carry these out internally or outsource. CLG are taking a pragmatic view in the circumstances and have indicated to Trading Standards departments that a "soft start" is appropriate. Although some authorities suggest this will be progressed enthusiastically the Trading Standards Officer of one borough council informed us that they were allocated £17,000 from central Government for enforcement and when they applied internally for their "own" money they were unsuccessful in getting it!

So what about the future? EPBD-2 is currently being proposed by the EU and a draft "re-cast" is being reviewed by member states. The intention is to reign in member states that have poorly interpreted or implemented the legislation, ensure that both public and private sector are covered and reducing the floor area of buildings requiring a DEC from 1,000m2 to 250m2. This could become enforceable from December 2010.

Although DECs are currently "work in progress" for many organisations, they are not going to go away and indeed we will see more of them in future as the legislation expands. The challenge now is to use the information provided by the DECs and Advisory Reports to target poorly performing buildings and implement energy saving measures.

Verifying your energy savings

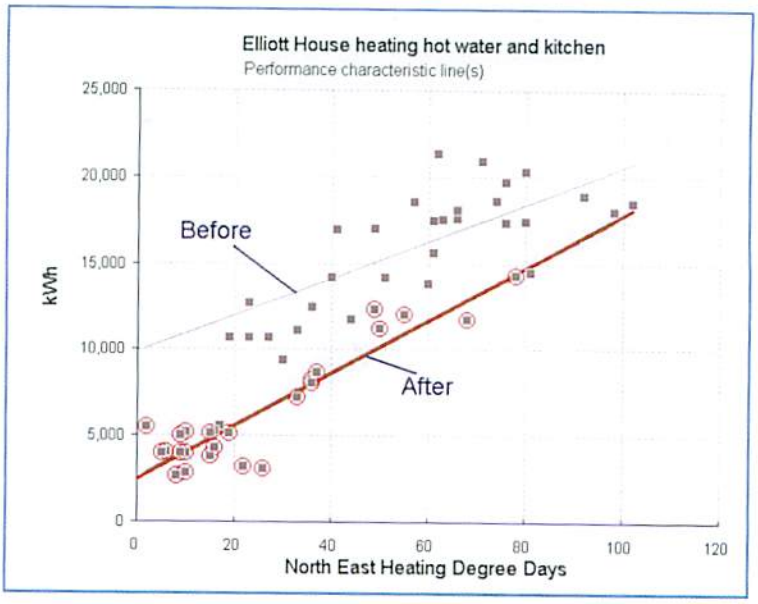
With variables such as production throughput and weather changes to take into account,how do you know if that energy-saving measure has worked? Vilnis Vesma explains how to explain where savings are being made

If you are trying to prove the savings you have achieved through an energy project, the question you have to answer is simply: how much am I now using, compared with what I would have used in the absence of the project? Except, of course, that it is not quite that simple, especially if you need an answer within weeks and the figures are affected by factors like the weather or production throughput which cause consumption to vary.

In energy-intensive manufacturing the default method is to track and report the consumption per unit of output. Unfortunately, in the vast majority of cases, there is an element of constant 'base load' consumption, which means that the ratio of energy to throughput changes with throughput, falling when throughput is high and rising when it is low. These specific energy ratios are therefore fairly useless because you cannot easily disentangle the production-output effect from the energy efficiencies.

'Degree day' figures

When assessing the performance of heating systems in buildings, where the weather is the major factor driving variation, the traditional approach to evaluating savings has been to apply weather adjustment using 'degree-day' figures. These are regional indices of how cold the weather has been: the higher the number, the colder the month was. Weather-adjustment of heating fuel consumption has tended to be a bit more sophisticated than specific energy ratios in manufacturing as the existence of base load consumption is recognised and only the weather-related portion of annual fuel consumption is adjusted. What this method gives you is an estimate of what the building's consumption would have been at standard weather conditions. This is fine for comparing one year with another, and quite valid, but you have to wait a whole year before you can say what the savings have been.



A scatter diagram will immediately show up any improvement in performance regardless of variations in weather or production throughput

'HAVING RELIABLE CONSUMPTION DATA IS ALSO THE BASIS OF EFFECTIVE MONITORING & TARGETING'

There is a better way, which gives an answer without having to wait a year, and which addresses the needs of buildings and processes alike. The clue was in the question I first posed: we need a way of calculating what consumption would have been in the absence of the project.

Analysis of past performance

We start by analysing past performance on a weekly or monthly basis and determining how consumption varied with the relevant driving factor. We might, for example, discover that a bakery oven consumed a constant 1,200kWh a week of gas, plus 200kWh per tonne of bread baked. We could establish this simply by plotting weekly consumption against output on an x-y scatter diagram and finding the best-fit straight line through the points. Once you have such a model of how consumption relates to production, any improvement in performance becomes clearly visible regardless of variations in throughput. Even just one week after your project is completed, you could have both a figure for actual consumption and an estimate of the kWh consumption you would previously have expected for the week (200 times the tonnage produced, plus 1,200 for the fixed weekly element). Going back to my opening paragraph, you will see that was all you needed. As the weeks go by and you collect more data, you can re-evaluate the relationship between consumption and its driving factors to see how the model has changed, and from that you can project your whole-year savings. For example Yassen Roussev at Tyneside Cyrenians (the charity providing accommodation and diverse support for homeless people on Tyneside) initiated a boiler replacement programme in their largest residential hostel, with condensing units controlled by a building management system. Its old heating characteristic was 9,867 kWh per week plus 107 kWh per degree day. Now, thanks to the improvements, it is 2,480kWh per week and 154kWh per degree day. The old and new characteristics are compared in figure 1; not only is consumption generally lower under all weather conditions, the reduction is greater in mild weather thanks to improved part-load control. As the typical annual degree-day count in their region is 2,300 their annual gas saving can readily be predicted from the difference between the old and new characteristics: it is (9,867-2,480) x 52 weeks plus (107-154) x 2,300 degree days = 276,024 kWh.

Meter readings collected

Yassen was fortunate that he had been diligently collecting weekly meter readings before and after. Not everyone does this, and a lack of reliable consumption history makes it very difficult to prove savings, which inhibits energy users from making the investment in the first place.

Having reliable consumption data, associated with relevant 'driving factor' data by means (usually) of a straight-line targeting model, is also the basis of effective energy monitoring and targeting. Just as the method enables you to verify savings, it also enables you to spot unexpected excess consumption caused by hidden random faults. Paradoxically, the more consumption varies with variations in its driving factor, the easier it is to detect adverse changes.