



MAKING ENERGY AUDITS WORK FOR A RESILIENT BUILDING PORTFOLIO

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Overview

This white paper report was put together to summarise the CBx breakfast briefing "Making Energy Audits work for a resilient building portfolio", held at UCL Energy Institute, London on 03 April 2014.

An open discussion around the values of the current energy audit process, validation of data and industry best practice from a client, real estate and consultant perspective.

With special thanks to our fantastic panel of industry experts; Ed Horgan, Partner at Briar Associates; Mitchell Layng, Energy Manager at M&G Real Estate and Ian Shaw, Portfolio Energy Manager at Norland Management services.

AN INTRODUCTION TO ENERGY AUDITS

The term energy audit can be used to describe a broad range of investigations from a quick walk-through to a comprehensive analysis of the energy consumption of an occupied building or facility.

These could include:

- Tariff & purchasing infrastructure
- Seasonal, daily & hourly profiles
- Operational management
- Technical opportunities
- BMS & controls
- Low carbon infrastructure
- Renewables

Typically energy audits that are carried out in parallel with occupant satisfaction surveys and thermal comfort and fabric analysis leading to much more informed and holistic recommendations for improvement. Generally known as Post Occupancy Evaluations (POEs) or Building Performance Evaluations (BPEs), these activities have become much more commonplace in the last 5 years particularly since the Technology Strategy Board's £8 million BPE funding programme.

Energy audits can be very powerful tools when used to their full potential. Firstly, they establish a baseline

for the building against which any deviations can be measured. Consumption profiles can be used for high-level diagnostics. A comparison to previous profiles will highlight any increases or decreases in end use loads, which can inform the areas for further investigation; this may lead to uncovering related issues around occupant comfort, air quality and day lighting levels. In some cases it is very difficult to establish a baseline which can indicate other issues such as poor interfacing between systems, commissioning problems or maintenance issues.

Energy audits also facilitate benchmarking which provides an understanding of how the building is performing against best practice, typical practice and against other buildings in the same sector. Portfolio holders may wish to benchmark a building against the rest of their portfolio in order to establish highest and lowest consumers and where to concentrate their money and resources for energy efficiency measures.

At design stage, energy audits also have an important role to play; they provide robust data which can contribute to making more accurate operational predictions. Lessons learned from a previous building can drive the design of the next; what worked and what didn't in terms of ventilation and thermal comfort, how the absence of a draft lobby contributed to high energy consumption, CO2 set points against heating and ventilation requirements, controls for systems and many other factors. These benefits are felt most by landlord-developers who are involved in the whole

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lifecycle of a building and are therefore able to measure occupied buildings as well as influence the design of future projects. In order to make full use of the information generated and promote change in the industry, all protagonists need to have access to the data so that they are able to influence the process at their respective stages.

DRIVERS

Drivers for energy audits are fast outweighing any barriers and as more and more are being performed, the repository of evidence of the benefits is becoming increasingly robust. Recommendations are provided alongside predicted energy reductions and payback periods providing direct financial savings and profit. These can also provide the information to assist in planning works and settling budgets. Furthermore, a client can expect an energy audit to identify energy reductions that could amount to around 9 or 10 times the cost of the audit, delivering value-for-money. Implementing recommended energy efficiency measures reduces an organisation's legislative exposure and risk of being affected by volatile energy prices. It can also lead to an improved working environment and enhance a company's sustainable branding.

As well as a multitude of carrots, there are an increasing set of regulatory carbon saving and compliance sticks including; the Carbon Reduction Commitment (CRC) and Air-Conditioning Inspection Reports. The most recent of these, the Energy Savings Opportunity Scheme (ESOS) has just completed its consultation period with feedback expected by June 2014.

'A poor energy audit is one that costs more than 10% of identified energy savings'

Ed Horgan, Partner at Briar Associates

ENERGY SAVINGS OPPORTUNITY SCHEME (ESOS)

The Energy Efficiency Directive sets out a requirement for an energy auditing programme which will be implemented in the UK through the Energy Savings Opportunity Scheme (ESOS). This legislation is anticipated to begin in 2015 and to require large companies to perform energy audits every 4 years. Proactive businesses will see this as an opportunity to improve performance and reduce costs, seeing a positive return on investment.

ESOS will target energy use across each organisation as a whole, including buildings, transport, and industrial processes; differing from existing energy efficiency instruments, which focus either on particular buildings, or on specific industrial processes or installations (e.g. DECs, CCAs and EU ETS). In addition, the ESOS will require a set of cost-effective energy efficiency opportunities to be identified providing a real opportunity for those affected by the legislative to make real and positive changes in their energy consumption. The Government have been clear that there is a strong drive to align the ESOS with existing legislation to minimise red tape to affected parties.

Department of Energy and Climate Change (DECC) analysis suggests that up to 6,400 large enterprises are already measuring and reporting on their energy consumption under existing policies such as the Carbon Reduction Commitment (CRC). The consultation Impact Assessment also estimates that around 7,300 enterprises are likely to fall within the scope of the policy and are estimated to currently occupy around 180, 000 buildings. This accounts for around 35% of the UK's energy consumption.

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MOTIVATIONS

Norland Management Services specialise in hard services-led facilities maintenance. With clients such as London South Bank, Jones Lang Lasalle, and NHS Blood and Transplant, they report that energy audits are now an expectation from many of their clients and that, increasingly, energy reduction forms part of their KPIs. It is encouraging to know that parts of the client base are becoming better versed in energy consumption but is the industry doing enough to understand the client?

Building owner-operators are predominantly motivated by how an energy audit will affect their key performance indicators (KPIs) and energy targets. They will have to balance the books and may be responsible for a portfolio of buildings for which they will have to identify ways to implement continuous improvement to the stock. Energy audit recommendations typically have a value-for-money element. Outcomes may also inform the forward maintenance register and financial planning for capital works opportunities.

Building Controllers manage corporate targets such as Corporate Social Responsibility (CSR) and supervise strategy finance planning. Energy audit outcomes can be considered alongside marginal abatement curves in order to prioritise investment opportunities. For the most part it is seen as a box-ticking exercise and one that should cause as little disruption as possible.

Building users are not necessarily conscious of the purpose of an energy audit. Often, they will be concerned about how it will affect their day-to-day operations for the duration of the exercise. Service disruption, particularly for clients might affect company image. Auditors must consider the building users' corporate identity in their recommendations; in Canary Wharf, the buildings are lit 24 hours a day so that companies are always perceived to be working hard for their clients. Finally, building users will be interested to know if they will be receiving any service

charge reductions as a result of any energy reductions.

OUTPUTS

The next challenge is to produce a report that engages the client so as to avoid the document sitting on a shelf with no recommendations being implemented. An executive summary should be included up-front to include the headline information to avoid clients having to sift through the report for an overview. Outcomes should be aligned with the organisation's strategy and objectives. Every property is unique and, as such, energy audits are bespoke. Ensuring a competent person is available when visiting the property is important; this both facilitates the auditing

'Energy Audits are now an expectation from most of our clients'

Ian Shaw, Energy Manager at Norland

process and nurtures client engagement in the exercise.

The format of the report should be user-friendly, employing graphics in place of industry jargon; for

'It's important to ensure that the format of the reports is user-friendly. Keep the audience in mind.'

Mitchell Layng, Energy Manager at M&G Real Estate

example, a simple time chart illustrating hours of occupation versus hours of equipment operation. Recommendations should clearly set out cost implications, beginning with no-cost options and

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payback periods on any suggested investments. Furthermore, audits could satisfy multiple briefs by including TM44 and ESOS requirements as well as including quotes or costs to take actions forward from third parties e.g. lighting specialists.

CARBONBUZZ

It is important to capture the information from energy audits and to record interventions made. CarbonBuzz is a web-based platform that is able to capture building energy consumption from design through to in-operation and will display the results in simple energy bars by fuel and by end-use (lighting, heating, ventilation etc.) where the information is available. The tool allows a user to upload annual energy consumption year-on-year so that changes in energy consumption profiles are clear, empowering users to investigate further. Notes and explanations can be attached to each end-use in each bar to track interventions and possible reasons for changes in loads.

FURTHER DISCUSSION

One of the major barriers to the efficacy of energy audits is the perception that they are 'snapshots in time' and they are not used as ongoing 'building fitness programmes'. This is further perpetuated by an uncertainty of the future of the building or tenants in the building. Fostering good relationships between supplier and client is a crucial part of the solution; equally this is another example of where an auditor should be mindful of the client and business requirements when making recommendations. Client-side managers should be encouraged to consider compiling a set of energy consumption KPIs for the relevant staff member as this may facilitate ongoing improvement.

Maintenance contracts could be augmented to encompass regular re-commissioning of a building. People are familiar with the concept of fine-tuning or

recalibration for technology and equipment but buildings are not considered in this way. There are many circumstances where Operation and Maintenance (O&Ms) are incomplete at the point of handover and this leads to maintenance teams starting on site without proper documentation on the operating strategies. The consequence is a drift in the operation of the building from design intention. If the maintenance teams were responsible for regular recommissioning when they came on board, there might be a greater and more urgent incentive to complete the O&Ms. Certainly, if this was the case, incomplete would be picked up within the rectification period.

Software could have an important role to play in the streamlining of the auditing process. Indeed, many industries are employing these tools for instant information upload and to avoid any discrepancies occurring from inputting off-site. As every audit must be tailored to client type, organisation strategy and bespoke building, software will need to be very flexible.

FURTHER READING

1. The Probe series of post-occupancy studies. Probe (Post-Occupancy Review of Buildings and their Engineering) was a research project which ran from 1995-2002 under the Partners in Innovation scheme (jointly funded by the UK Government and The Builder Group, publishers of Building Services Journal). It was carried out by Energy for Sustainable Development, William Bordass Associates, Building Use Studies and Target Energy Services. Studies available via: <http://www.usablebuildings.co.uk/>
2. DECC., 2013., "Energy Savings Opportunity Scheme (ESOS): Helping UK enterprises improve profitability through better information on how to save energy"., London., Crown.,

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Available via:
[https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211977/20130708 -
_ESOS Consultation Document FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211977/20130708_-_ESOS_Consultation_Document_FINAL.pdf)

3. CIBSE., 2011., “Guide to Energy Management”., Taylor & Francis., London., Available via:
<http://www.cibse.org/knowledge/taylor-and-francis/guide-to-energy-management>
4. CIBSE., 1997., “Energy Management and Operating Costs in Buildings”., Taylor & Francis., London., Available via:
<http://www.cibse.org/knowledge/taylor-and-francis/energy-management-operating-costs-in-buildings>
5. CarbonBuzz is an RIBA CIBSE platform for benchmarking and tracking energy use from design to operation. It is intended to encourage users to go beyond compliance of mandatory Building Regulations calculations and refine estimates to account for additional energy loads in-use. The platform allows users to compare design energy use with actual energy use side by side to help users close the design and operational energy performance gap in buildings. Available via:
<http://www.carbonbuzz.org/>