

Physical vs. Virtual Energy Audits: Pros and Cons

As a consequence of the measures introduced to tackle the pandemic, the virtual energy audits have been considered more frequently. In this opinion piece, four experts explore the definition of virtual audits and their effectiveness with respect to the audits undertaken on sites.

James Sharman, Senior Energy Manager, Hospitality Energy Saving



As an energy manager working extensively within the hospitality sector, I have witnessed at first-hand the challenges faced by businesses due to the Covid-19 pandemic. The additional pressures on resources and the need for social distancing have made physical visits impractical and put a halt to normal energy auditing activity. Are virtual energy audits the answer?

The first step of an energy audit would normally involve carrying out a desktop assessment to identify opportunities and establish the ground for a physical visit. The visit itself would involve inspection of the building and equipment along with observation of on-site practices to develop an understanding of the impact of behaviours on

usage. The findings of the desktop assessment and physical visit would then be combined into a report to summarise cost saving opportunities back to the client. A 'virtual' energy audit involves smarter use of data and the absence of a physical visit. So, no site visit and no face-to-face interaction with operators. But how effective can a virtual energy audit be in the absence of a physical component?

Here are my opinions on the pros and cons of each type of audit.

Physical audits pros & cons:

- Physical visits open up the possibility of making changes whilst on site. This might involve adjusting controls to optimise performance, resetting a time clock or simply turning something off that shouldn't be running. This has the potential to remove reliance on contractors and

deliver immediate savings.

- Face to face interaction with front line teams can be incredibly insightful. Within hospitality, kitchens can be responsible for around two thirds of total energy costs. Discussing practices with chefs who may not ordinarily be exposed to the principles of good energy management can be key to unlocking savings.
- Physical audit costs are likely to be higher due to the logistics of carrying out a site visit. However, the potential to make changes whilst onsite and liaise with front line teams means this is likely to be accompanied by bigger savings.

Virtual audits pros & cons:

- Virtual energy audits rely on good quality data. If data is poor or incomplete, then the ability to carry out a virtual

“ A 'virtual' energy audit involves smarter use of data and the absence of a physical visit. So, no site visit and no face-to-face interaction with operators. But how effective can a virtual energy audit be in the absence of a physical component? ”



audit is compromised. In contrast, physical audits are not reliant on data to deliver savings, albeit an absence of data might make savings harder to quantify!

- The value of a physical visit can be hard to replicate virtually. Experience has shown that a virtual review can be improved significantly if you're able to talk to someone who knows the site and can help understand what you're seeing in the data.
- Virtual audit costs are likely to be lower due to the absence of a physical visit. However, the lack of physical checks and interaction with front line teams is also likely to mean that identified savings are lower. Furthermore, delivery of savings will rely more heavily on action by the energy user. Mitigation may include additional communications with site and further monitoring of performance, but these steps will add cost back in.

In conclusion, I believe that virtual energy audits have the potential to be an extremely valuable tool,

certainly in the short term whilst the ability to carry out physical visits remains difficult. The move to new remote working practices and continuing developments in data provision, retrieval and analysis can only be a good thing for the longer-term integrity of energy audits and assessment of cost saving opportunities in a post pandemic world.

Ashley Whichelow, Utilities Manager, Bourne Leisure Ltd



With many thanks to Rhea Campbell-Smith and Jonathan Waldie who also contributed some thoughts included in this piece.

Working from home presents many challenges for us all, and as a Sustainability professional one of these is effective, remote energy auditing. It can certainly

be a lot warmer, comfier (and less expensive for the business) to carry out an energy audit from the office chair, with all the data presented in front of us, but there are plenty of benefits we are missing as well.

Going to site may take longer and incur expenses, be tiring (especially the night walk) and take us away from our family for the night. But we also get to see the operational side of the site; how the team members interact with the equipment, fixtures and fittings in their daily roles gives us an insight into some of the efficiency measures we can recommend; we can use our eyes and ears to hone in on the source of consumption in a way numbers and graphs could never help us.

The opportunity to speak with the facilities manager and the general manager of the property yields great insight into the challenges they face, and spending dedicated time with them to explain and actually show them some of the measures that will save them energy is something that cannot be replicated when we are physically separated.

A physical audit gives us the opportunity to gather and provide photographic evidence to support our findings, which can in turn be used to promote behaviour change and engagement with energy users we might not meet, supporting our facilities managers. Being present also gives us a chance to become immersed in the culture and understand the methods of communication that will help to deliver such changes.

In contrast, whilst these benefits are absent during home working, a virtual audit presents other opportunities. Without the burden of travel and expenses, virtual audits can be undertaken with far more regularity. If one is able to combine frequent virtual audits and regular catch ups with general managers and facilities managers, this maintains

“ **The opportunity to speak with the facilities manager and the general manager of the property yields great insight into the challenges they face, and spending dedicated time with them to explain and actually show them some of the measures that will save them energy is something that cannot be replicated when we are physically separated.**

focus much more easily, shortening the feedback loop and making marginal gains easier to obtain. The added benefit is that leaders in the business become used to looking at data as that is all we are able to present to them. As a result, we are now taking less time to explain the meaning of graphs and tables to them, and spending more time discussing the actions and results.

We have even found that operations

directors attend some of our group calls and we have gained a more direct line to asking for any additional funding or support to meet challenges experienced by several sites.

With the data having gained such a high profile, we are finding also that there is a greater appetite to expand the number of submeters (and keep on top of any faults) on our sites to obtain greater visibility, at a more granular level, to facilitate targeted action. Improving the accuracy and analytics will help draw us closer to the level of detail we can expect from a physical audit as we narrow down the areas being metered.

Taking all of this into consideration, I believe there is now more momentum behind energy auditing, and more engagement at a higher

level, as a result of how we've had to adapt and improve the techniques and reports used for virtual audits. I believe these processes are here to stay, but I also have no doubt that as soon as we are able, we will be back out at sites again to conduct physical audits so we can really see the usage, engage with the team on the front line of energy use, collect alternative forms of evidence for our reports and build relationships with the site managers and help them visualise the solutions in the

actual space that we are identifying the opportunities. Energy audits won't fundamentally change in the long-term, but we will have gained more tools and processes to carry them out more effectively, and with better results.

**Eur Ing John Mulholland
BScTech (Hons) CEng CSci
MlChemE FEI, Director,
Mulholland Energy**



Words are important as they convey meaning. Therefore, before comparing Virtual and Physical Energy Audits, it is helpful to define different types of energy audits and surveys.

CIBSE's *Energy Efficiency in Buildings Guide F* sheds some light. Their definitions and goals are summarised in Table 1.

What is the overall goal? To significantly reduce energy consumption by implementing cost effective energy saving opportunities identified in the energy survey. But there is a logical order in Table 1.

There are three steps:

1. Preliminary Energy Audit
2. Full Energy Audit
3. Energy Survey

Step 1 needs to take place to enable Step 2, which, in turn, enables Step 3.

Type	What?	How?	Who?
1. Preliminary Energy Audit	Analysis of energy invoices, sub-meter data and half hourly data.	Desktop analysis remote from site.	Data Analyst
2. Full Energy Audit	Assessing detailed energy use breakdown by calculation, sub-meter data and additional metering, attributing energy to end use such as heating, chillers, ventilation, lighting, catering etc., balancing incoming energy over the audit period.	Combination of desk top analysis and on-site investigation.	Energy Specialist
3. Energy Survey	Detailed technical investigation which identifies specific cost-effective energy saving opportunities.	On-site investigation.	Energy Specialist

Table 1 Definition of Energy Audits and Surveys

The European Standard on Energy Audits is EN 16247 and it defines an “energy audit” as:

“Systematic inspection and analysis of energy use and energy consumption of a site, building, system or organisation with the objective of identifying energy flows and the potential for energy efficiency improvements and reporting them.”

Slightly confusingly this definition encompasses Steps 1, 2 and 3 in Table 1. This same is true of the definition of an “energy audit” in the ESOS guidance document issued by the Environment Agency. In both cases the definition of “energy audit” encompasses CIBSE’s definitions of Preliminary Energy Audit, Full Energy Audit and Energy Survey.

Is it therefore possible to conduct an “energy audit” compliant with EN 16247 or with ESOS minimum audit requirements without conducting a site visit **and** specifying detailed cost-effective energy efficiency measures? The answer is an emphatic, “No”.

Moving focus on to “Virtual Energy Audits”, often offered by data analytics companies, who usually also offer energy procurement

services, here is a typical offering: *“Energy audits take time, can disrupt your business and can cost more than they save. Our virtual energy audits take the pain out of understanding where you use your energy.”*

The statement implies Virtual Energy Audits are cheaper, easier and faster than conventional energy audits, partly because ‘Virtual’ means a desk top study with no site visit required. But what are the typical inputs/outputs of a Virtual Energy Audit?

Inputs: Typically, these are two years of energy invoice data for gas and electricity.

Outputs: From a ‘smart analytics platform’ an energy and carbon dashboard arranges the data showing quantities/cost of energy over time. Bar charts and pie charts are used. Carbon emissions are shown, as well as the heating degree day analysis on gas use to identify the level of heating control response to variations on outside temperature.

How does this relate to the definitions in Table 1? The Virtual Energy Audit is the equivalent of CIBSE’s definition of a Preliminary Audit (Step 1) which can be done

remote from site. But does a Virtual Energy Audit deliver the outputs from a Full Energy Audit and an Energy Survey? The answer is, “No”.

Does a Virtual Energy Audit comply with EN 16247 or ESOS? The answer is also, “No”. This is because no site visit is conducted, there is no analysis of energy use and energy saving measures are not identified.

Is it fair to compare the cost of Virtual Energy Audit (Preliminary Energy Audit) conducted by a data analyst with a Preliminary Energy Audit, Full Energy Audit and Energy Survey conducted by an energy specialist? The answer is, “No”.

The final question to conclude with is, are Virtual Energy Audits worthwhile? The answer is, “Yes”. This is because they are the equivalent of a Preliminary Energy Audit (Stage 1) which is needed **before** a Full Energy Audit (Stage 2) which is needed **before** an Energy Survey (Stage 3) which is needed to save energy.

Rebecca Nunn, Operations Manager, Efficiency Direct Ltd.



The overall objective for carrying out a site energy audit is to understand how, when and where energy is used and identify potential for energy efficiencies. The question is, can this be done equally effectively remotely?

Energy audits, historically and traditionally required a physical site presence/ site visit by a suitably qualified energy auditor. Typically carrying out a walk-about of the premises, whilst taking notes, photographs and gathering as much information as possible to gain understanding as to how, when and where energy is used and identify potential for efficiencies.

By physically attending premises, the auditor can use their honed observational skills as well as other senses (smell, hearing and touch) to pick up on clues to identify what is driving energy use. In my experience, the physical site survey gives an all-important opportunity to meet site staff, build a relationship and have an open conversation about energy. However, it is realised that a physical survey on its own, may not provide sufficient insight as it only offers a brief “snapshot” over one or two days on-site.

Whilst my team and I have always, habitually used a physical site survey approach, I have always emphasised

the importance of coupling a physical site visit along with in-depth off-site energy data analysis, which forms the core basis for a virtual energy audit.

Virtual energy audits aren't a new concept, but are growing in popularity firstly, due to the impact of Covid-19, and the importance to minimise virus spread and keep people safe, and secondly, the drive to be environmentally conscious and minimise non-essential travel.

Besides from the obvious that virtual energy audits, are in themselves, more efficient, (time efficient, resource efficient, cost efficient and energy efficient) virtual energy audits will become more common practice for one main reason. Data. We live in a data driven world – data is king.

Businesses and buildings are becoming smarter and with that comes more data. Data from sub meters, data from BMS points. The more data, the more insight. Data

tells us things that we cannot always physically see. For instance, data can tell us when a piece of equipment within a ceiling void has failed. Data also has the ability to warn us when a piece of plant equipment is getting to end of life and is about to fail. Data allows us to assess the efficiency of things that we can't normally see. The old saying a picture paints a thousand words – well, data paints a thousand more.

“ The old saying a picture paints a thousand words – well, data paints a thousand more.

Certainly, in the short term, virtual audits offer a safer way of working during the pandemic. I have adapted the use of virtual audits, where appropriate as part of ESOS assessments, a methodology which has been supported by the Environment Agency at this time and has gone down well with clients.

The pandemic has taught us to adapt to new ways of doing things and this goes for energy auditing practises too.

PRACTICAL GUIDES FOR ENERGY MANAGEMENT PROFESSIONALS



AVAILABLE ONLINE



EMA SERVICES

PUTTING ENERGY MANAGEMENT AT THE
HEART OF BRITISH BUSINESS

NET ZERO

- We can help you to understand and calculate your carbon footprint
- We can help you to create an action plan and put practical measures in place to meet your targets

SECR COMPLIANCE

- We can help you to prepare your report and meet the compliance requirements
- We can verify your report to assure accuracy, completeness and consistency to ensure compliance

ENERGY MANAGEMENT

- We can help you to deliver energy management and energy efficiency
- We can identify training needs, deliver tailored training & embed the knowledge within your team