

ENERGY UPGRADES

FOR SUSTAINABILITY PROFESSIONALS

Lessons learnt delivering and maintaining energy
and emission savings.

Part 1 - The Foundations

As a sustainability expert, you've led from the front in setting organisational targets for reducing greenhouse gas emissions. Perhaps you've even developed a sustainability plan that details what the organisation is going to do to deliver those emission reductions. **But, how do you ensure that the energy savings and emission reductions are delivered and maintained?**

The key to delivering energy savings is understanding the following topics:

Energy Audits
Energy Performance Contracts
Measurement & Verification
Operation & Maintenance.

Rather than explain the in-depth theory of what each of these topics are, this guide will tell you how to use them to deliver & maintain real energy savings.

HAPPY ENERGY SAVINGS!

First, some hard questions

Are energy audits a waste of money/time/effort?

Is an energy performance contract right for your organisation?
(and what is it?)

How to verify your investment?
(What is Measurement & Verification?)

We use these basics to identify what to look for throughout your energy efficiency upgrade.



Are Energy Audits a Waste of Money?

This is a blunt question, and perhaps controversial, for someone from the energy efficiency industry to be posing. However, the question wouldn't be worth asking if energy audits had an unblemished history. Unfortunately, the usefulness of energy audits has historically been poor, resulting in a lot of them being used as paper weights.

There has been major improvement to the Australian and New Zealand Energy Audit Standard (AS/NZS 3598:2014) which promotes higher quality reports. The greatest feature of the standard is the useability. It's an easy reading document (as far as standards go) and its very clear on what should be included within the final audit report. For the end user, it is much easier to 'tick off' the standard requirements against the audit report.

Additionally, the standard has a very practical focus with more attention to the delivery of energy savings, rather than a focus on producing a report. This positions an energy audit as the first practical step in achieving energy efficiency improvements, instead of an exercise in theoretical futility with no correlation to real energy savings.

There are three audit types described in the standard, Type 1 (Basic), Type 2 (Detailed), and Type 3 (Precision Subsystem).

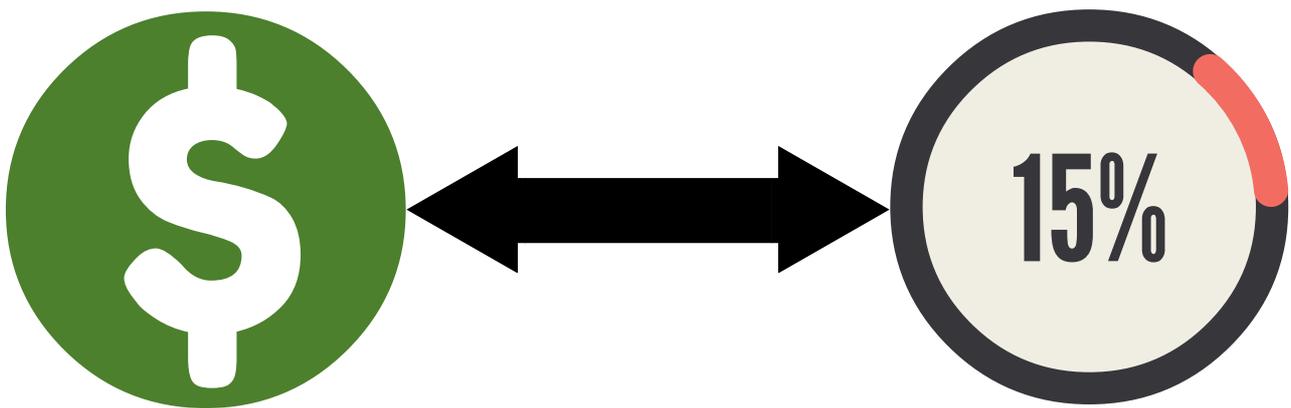
Each audit type details the suitable application for the audit, anticipated business outcomes and what should be included within the audit report. Understanding what you want the business outcome to be, allows for easy selection of the appropriate audit type.

So, to answer the question; **No, energy audits are not a waste of money** – they are an effective first step in achieving energy efficiency improvements. To get the best results from your audit, ensure the audit type aligns with your facility and desired business outcome, and both you and the auditor are familiar with the Australian standard.

Take advantage of the Energy Audit

Australian Standard

Is an Energy Performance Contract Right for Your Business? (And, what is it?)



What is an Energy Performance Contract?

An Energy Performance Contract (EPC) is the exchange of guaranteed energy savings for financial consideration (money).

EPCs are delivered by Energy Services Companies (ESCOs) who are experts in delivering energy efficiency upgrades. For the customer, EPCs can pass technical and financial risk to the ESCO courtesy of the guaranteed savings and turnkey project delivery. However, distributing this risk outside of the your organisation means there is a complex contract that needs to be managed.

EPCs are popular for Government bodies and medium-large businesses as they can handle the contractual complexity and prefer to distribute risk to the party more qualified to handle it (the ESCO). If done properly, EPCs are a highly effective way to deliver guaranteed energy savings. If done poorly, EPCs can become contractually cumbersome and costly, delivering only a small portion of the guaranteed energy savings with limited recourse to the customer.

What are the elements of an EPC?

During the procurement phase, there is typically an Expression of Interest , Request for Proposal and a Detailed Feasibility/Facility Study. Following the submission of the Detailed Facility Study, the customer selects whether to sign an EPC or not. Typically, only three ESCOs are invited to participate in the Request For Proposal phase and a single ESCO is selected to deliver the Detailed Facility Study and EPC.

Industry standard forms of EPCs are publicly available to assist in delivering these types of projects. There are two critical components that are custom for every EPC. The Detailed Facility Study, which outlines the efficiency measures that are going to be installed and the savings they will achieve, and the Measurement & Verification (M&V) Plan, which details how the ESCO will prove that the energy savings are achieved.

To Performance Contract or Not To Performance Contract?

Why *wouldn't* you want a performance guarantee for your energy efficiency project?

That's a fair question but there are times when a performance contract is not the best option.

It may sound like common sense: EPCs should be used when the ***primary*** purpose of the contract is to deliver energy performance.

For small, simple projects, using EPCs adds a layer of administrative burden and complexity that isn't necessary. On the other end of the spectrum, don't try to use an EPC for a type of project that isn't focused on energy performance. Contracts that aren't fit for purpose cause projects to take longer, be more complex and result in poor outcomes for both you and the contractor.

Here are some project examples:

My organisation is installing a single proven technology requiring a small-medium investment.

Is an EPC suitable?

No – additional EPC cost/complexity is to the detriment of project

My organisation is trying to achieve energy savings involving a mix of technologies and large investment.

Is an EPC suitable?

Yes – there is an energy performance focus. An EPC will give certainty to your investment.

My organisation is trying to achieve energy savings but also do a major building redevelopment unrelated to energy savings.

Is an EPC suitable?

No – an EPC is not fit-for-purpose for major redevelopments unrelated to energy savings.

Organisations that don't have the in-house expertise in delivering complex contracts may find EPCs overwhelming. So how do you get certainty of energy savings in this case?

Option 1: Employ an expert who has experience delivering these style of contracts.

Option 2: Use the same components of an EPC, without the guarantee, with a well regarded ESCO.

The details in this guide apply equally whether executing an EPC or not.

Only enter an EPC if it is fit-for-purpose

If an EPC is not suitable for your business, there are alternatives to achieving energy savings

Proving You Made a Good Investment - Measurement & Verification

If your organisation is undertaking an energy efficiency project and hasn't been given a plan for how energy savings will be measured, consider this; **would the project go ahead if there were no energy savings associated with it?**

When investing in energy efficiency, a Measurement & Verification (M&V) Plan outlines the method for proving the performance of the investment.

However, there is a fundamental difference between investing in energy efficiency and typical investing, even in renewable energy. When investing in solar we measure how much electricity is produced, which is then converted into a dollar amount. For energy efficiency, energy savings are measured. An energy saving is the absence of energy being used. So, how do you measure how much energy is absent?

Comparing Utility Bills

The simplest consideration is looking at two utility bills, one from before and one from after implementing an energy efficiency project. Compare how much electricity or gas was used in each case, the difference is the savings achieved. Easy!

However, this approach is far too simple. If the first bill was for summer and the second for winter, then this may not be a fair comparison. Likewise, if in the first period a building was only half occupied and in the second period fully occupied.

So, there's a need to understand what influences energy use in the first place. Weather, occupancy and production levels, among other factors, can all impact usage. The trick is to find which of these factors has a relationship with energy consumption and determine how statistically significant this relationship is.

Unfortunately, the 'simplicity' of comparing utility bills has well and truly departed and we are now into some heavy, specialised, statistical analysis. But fear not, there is good news ahead.

Industry Protocol and Certification

Understanding that M&V is a specialist skill, the energy efficiency industry has developed a 'protocol' and professional certification to help create uniformity and certainty in measuring energy savings. The tongue-twisting International Performance Measurement and Verification Protocol (IPMVP) and the more pleasantly named Certified Measurement & Verification Professional (CMVP). Experts with the CMVP accreditation have undertaken an examination and certification process to validate their knowledge and experience in M&V.

There are four IPMVP options for verifying energy savings, here are the first two:



Option A

Retrofit Isolation (Single Parameter):

A Single, Key Parameter is measured, either short-term or continuously

Example: Measuring instantaneous lighting power draw pre & post upgrade but stipulating (not measuring) the hours of operation



Option B

Retrofit Isolation (All Parameters):

All Parameters are measured, either short-term or continuously

Example: Measuring the consumption of an air conditioning unit pre & post upgrade

The final two IPMVP options are:



Option C

Whole Facility:

Entire facility consumption is measured pre & post an upgrade.
May be short-term or continuous measurement.

Example: For a major building upgrade, its easier to measure the whole building consumption rather than individual systems.
Accounts for interaction between efficiency measures.



Option D

Calibrated Simulation

Savings are simulated via an energy model which is validated against actual performance. Requires significant experience and skill.

Example: New construction with energy efficient enhancements.

Your energy efficiency provider should be well versed in IPMVP and will be able to justify the selection of M&V option. Ensure that a Certified Measurement & Verification Professional develops your M&V plan, the industry has accredited these professionals to accurately measure energy savings.

Another key concept to understand is Baseline Adjustments.

Baseline adjustments are applied to savings calculations to account for variations outside of the energy efficiency providers' control. They come in two flavours, routine and non-routine.

A routine adjustment accounts for variations that are highly likely to occur, and a 'routine', or method, is in place to incorporate them into the energy savings.

For example, if your energy consumption is highly dependent on the weather, which is highly variable, the energy efficiency provider should have a routine for adjusting the savings calculations within the M&V plan to account for weather.

Non-routine baseline adjustments may occur due to unforeseen changes to a facility.

For example, if a building is extended or an office is converted into a data centre. Energy efficiency provider's are within their rights to adjust the baseline to account for such variations which are beyond their control.

When reviewing M&V plans, at a minimum, ensure they comply with IPMVP. A **note** of caution, IPMVP is *not* a standard, it provides general, not prescriptive, guidelines to follow. For a thorough review, consult an independent CMVP prior to engaging your energy efficiency supplier.

Remember, no M&V plan =

**No return
on investment**

Final Word

Congratulations on making it this far!

We've covered:

Energy Audits aren't a waste of money
Only use an EPC if it suits your business
Measurement & Verification is critical

In theory energy audits, EPCs, and M&V are all straightforward, and will contribute to saving energy for your business. However, if you want a quality result from your energy efficiency upgrade, each of these aspects of your project must be delivered to a high standard.

In Part 2 of this guide, I'll up-skill you on some of the common quality gaps from my experience in developing, delivering and reviewing energy efficiency upgrades.

About the Author

Kieran has delivered energy efficiency upgrades and energy performance contracts across Australia. He has been involved in the entire energy efficiency process chain including:

developing business cases,
engineering,
commissioning,
project management &
measurement & verification.

Kieran is a Certified Energy Manager (CEM) and a Certified Measurement & Verification Professional (CMVP) accredited by the Association of Energy Engineers.

I'm confident this guide will help you deliver the sustainability targets you've set for your business. If you have any questions about the guide, or your energy efficiency project, please get in touch.

Kieran McLean

Director

kieran@eqesco.com

