

Portfolio Investment Strategies and Planning for \$1M in Annual Energy Cost Savings for an Australian Chain of Hotels

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ABSTRACT

Delivering bankable financial returns from energy efficiency investments requires a multidisciplinary approach. In this case, a detailed investment model was developed for a portfolio of hotel sites in Australia with a focus on developing a practical implementation pathway that will deliver material reductions in energy cost while also managing key investment risks.

The investment management framework included several key elements: a sensitivity analysis of future electricity price paths; the need for diversification of key technologies and suppliers; an exploration on how tactical site selection can improve measurement and verification (M&V) of cost savings; and, of high strategic value, the holistic management of heating, ventilation and air-conditioning (HVAC) and building envelope issues. Other risks also emerged around how initial project establishment costs would be managed, with an energy audit performance guarantee included in the planning process so that professional service fees were linked to a client nominated \$1M annual cost saving target.

The development of this process demanded considerable time and patience, with 12-months of stakeholder engagement required to align finance and engineering representatives through a basis-of-advice model that translated engineering analysis into financial metrics.

Once consensus was achieved, energy audits only then progressed once stakeholders had signed off on the anticipated scale of capital expenditure (CapEx) and linked financial metrics in a custom discounted cashflow model developed for the project that including agreed payback period, internal rate of return (IRR), and net present value (NPV) metrics.

While time intensive at the start, this upfront financial modeling of the project was an asset to the project given the implementation budget (CapEx) and measures of success IRR and NPV were clear. This

alignment sent a strong organizational signal that the energy efficiency recommendations would be implemented following on from the audits. This case study presents the results of this process with initial audit financial results forecasting \$980,000 in annual energy savings from a CapEx spend of \$1.92M.

INTRODUCTION

While many organizations are early adopters with over a decade of engagement on energy efficiency, there has been an increased focus on climate change with the more recent introduction of 2050 net zero targets for many organizations in Australia, following the Federal Governments bipartisan commitment to such targets [1]. This has also logically been accompanied by an increase in near term implementation targets for 2030.

When these interim targets are translated into the context of site-level upgrades and energy-efficiency improvements, the timeline to 2030 could be seen as quite narrow. With only 225 weeks remaining at the time of writing and several hundred sites in the portfolio in this case study, the available window equates to less than one week per site, highlighting the scale and urgency of the transformation challenge.

As organizations come to grips with interim targets and the genuine work that exists in the next 150 to 200 weeks to decarbonize an entire portfolio of sites (using an offsets last or later policy), a natural tension arises, especially where greenwash has increasingly been linked to overreliance on offset heavy approaches, with commentary in the mainstream media highlighting certain organizations moving away from Federal Government carbon neutral schemes that use carbon offsets, such as Climate Active, given the low perceived transparency and financial burden of carbon offsets [2].

With 2030 targets now an urgent priority for those that understand the practical aspects of delivery, the need for energy efficiency projects to financially perform is now critical given these projects need to scale in a short period of time, often with additional savings needed to also fund required headcount increases in internal sustainability teams to deliver at this pace.

This case shares strategies around how this urgency was considered while also balancing investment risks, and the practicalities of how to

incrementally prove investment returns to the business, so that further projects could proceed.

CLIENT DRIVERS OF SUCCESS

During a 12-month exploration phase, these prior points around carbon reduction targets and achievability by 2030 were raised with a variety of other business drivers observed around how the project would need to perform, so it was aligned with the organizations core objectives. While the organization had a stated 2050 carbon reduction target, interim targets were being debated internally, with this project seen as a key input into the “how much will this cost” question expected from executive management and the board of directors. To balance sustainability and business drivers, the financial returns of the project were also a core focus, given energy wastage emerged as a business risk and investment opportunity through consultations. These key organizational drivers from a financial perspective are included in Table 1.

Table 1. Client Financial Drivers of Success

Key Organizational Drivers	Links to Program Development
Need for venue gross profitability above a certain percentage	The added benefit to gross profit from energy efficiency retrofits varied by venue although was seen as a positive strategy to help meet venue key performance metrics (KPIs).
Careful management of capital expenditure	A stage-based approach was included in planning so that initial results could undergo measurement and verification (M&V) prior to additional capital allocation in later stages.
Transparency around forward projections	Extensive work was undertaken to create a basis of advice model in Excel, with all calculations derived from first principles so the client “understood how the savings were calculated”.
High annual savings	A project of this scale was seen as a strategic way to address FY26 & FY27 budget targets. For this reason, a \$1M annual cost saving target from energy efficiency was established.



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Sites received type 2 energy audits in line with the Australian standard for energy auditing (AS/NZS 3598.1:2014). Given differences in each venue such as building age, location, geographical aspect and building fabric, there were unique challenges associated with each site. This presented “hard to solve problems” that often related to the original design of the building. Despite these differences, across these audits, various themes and common opportunities emerged.

Walk-in Cold Rooms (Commercial Kitchens)

Every site had refrigeration and freezer walk-in cold rooms associated with commercial kitchens. The condition of plant and equipment, quality of door seals, suitability of defrost cycles and the presence of cold room door curtain strips were all investigated with common issues and opportunities identified.

Energy efficiency maintenance or having immediate repair of items such as faulty curtain strips was seen as key (see example of faulty curtain strips in Figure 1). Automatic budget availability for such work was proposed with all refrigeration contractors, so this is automatically actioned as a maintenance requirement.

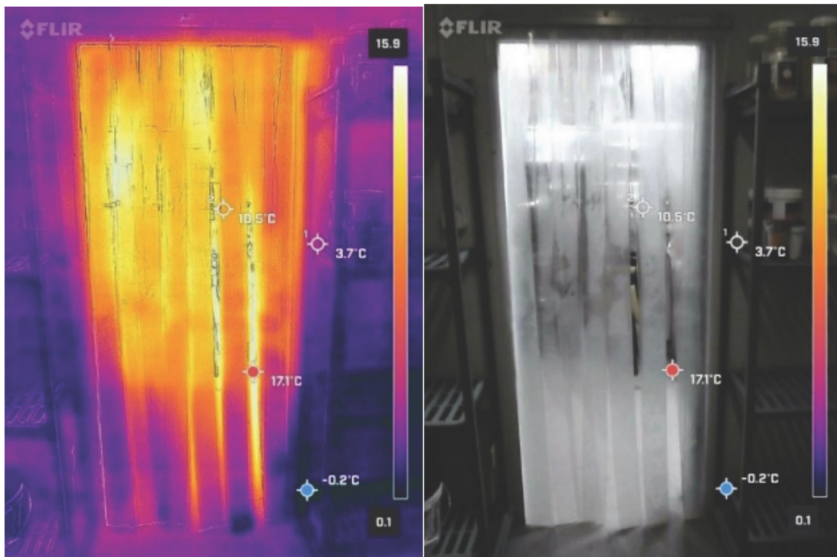


Figure 1. Faulty Curtain Strips with Gaps

The thermal image in Figure 2 shows a cold room evaporator in a defrost cycle. Defrost cycles in small, high traffic cold rooms can account for between 10% and 25% of electrical energy use. Quite often, not all meltwater is removed, meaning the defrost adds additional heat load to the room. How this defrost cycle is scheduled is also important given it contributes to heat load variability (peak demand, hourly refrigeration performance, system sizing). Curtain strips also manage air changes when the door is open, assisting in reducing infiltrating air/humidity, meaning less ice buildup and fewer potential defrost cycles.

Door Sensors

In the example shown in Figure 3, the main entrance door activates 50% of the time when customers walk past the door sensor from an adjacent area. This contribution to heat load from this door opening for no reason given the sensor layout was calculated and a new door sensor budgeted to avoid energy wastage.

Roof Heat Gain

In Figure 4, a new ceiling been built under a prior skylight. While

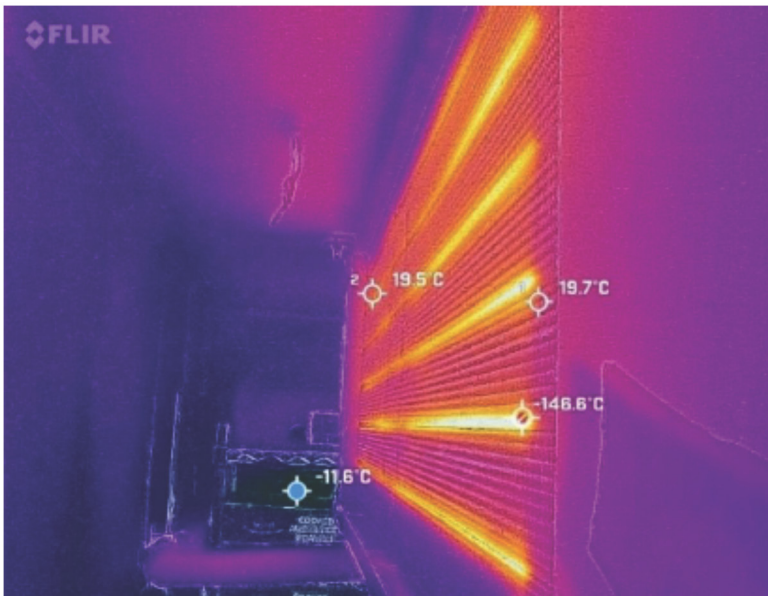


Figure 2. Thermal Image of an Evaporator in a Defrost Cycle

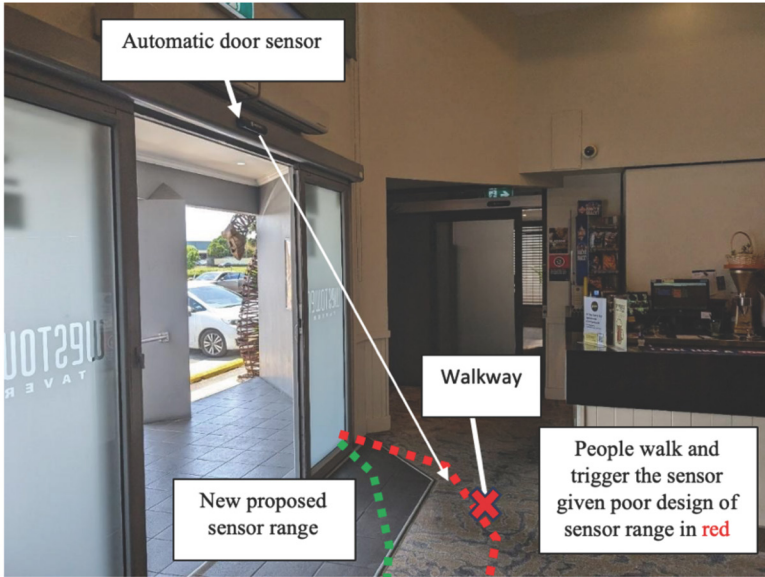


Figure 3. Door Sensor Placement Increasing HVAC Energy Use



Figure 4. Legacy Roof Issues with Insulation

insulation was installed in the ceiling, painting this glass with reflective paint would improve the combined R factor at this section of the roof.

Air Infiltration

Large air gaps were present in many sites given age and design. One example, shown in Figure 5, outlines a fireplace in a function area that is not used and is for decoration only.

Structural Features

The structure and placement of architectural roof beams with vents was artificially increasing HVAC demand at this site (see Figure 6).

Ceiling Insulation

Ceiling insulation was observed as a potential upgrade at many sites. In the example shown in Figure 7, roof insulation was completely absent with roof tin directly heating the ceiling panels. In these instances, HVAC energy use was notably higher.



Figure 5. Unused Fireplace Creating Unnecessary Air Exchange



Figure 6. Roof Beams Influencing Air Movement and HVAC Performance

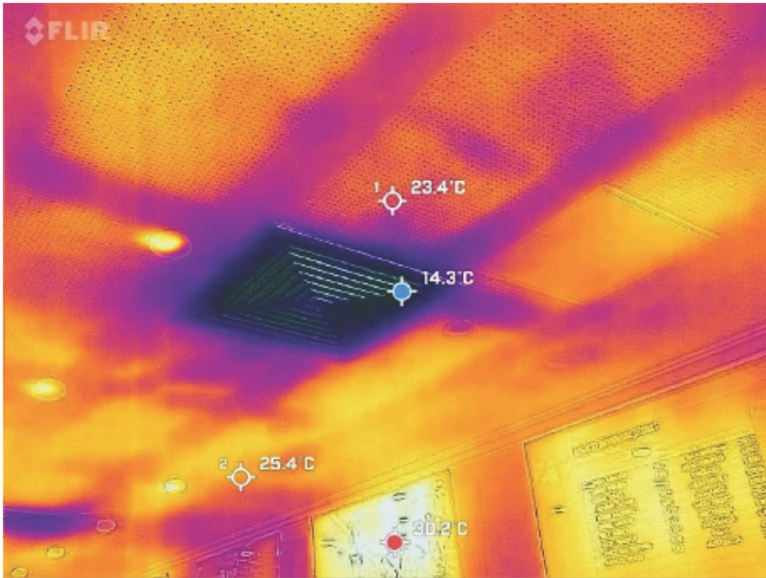


Figure 7. Roof Beams Influencing Air Movement and HVAC Performance

Effective End of Asset Life Management of HVAC

A recurrent theme in the portfolio that was uncovered during audits, was building envelope issues being a core issue linked to high HVAC electricity consumption. While this was a known driver of high energy use, this issue was often ignored and further compounded with like-for-like replacement of unnecessarily high HVAC capacity being the norm when assets failed. Essentially, these legacy building envelope issues were being overlooked and put in the too hard category, where original HVAC systems that were often oversized to compensate for building envelope issues were simply being replaced like-for-like, locking the issue in for another 10 to 15 years.

To assist in breaking this cycle and quantify the impact of a more strategic approach, time and effort was spent in understanding energy savings from a combined approach, where sites undergo modeling to determine the financial returns from fixing more capital expensive building envelope issues, and then implement more suitably sized and more energy efficient HVAC systems.

Solar PV Maintenance

In addition to significant HVAC issues, across the portfolio there was a significant volume of installed rooftop solar capacity that was simply neglected. With systems installed as long as 10 years ago that never received a single maintenance visit, a high level of savings was linked to sites that were either underperforming or simply not running. In one example, \$15,000 in annual savings were identified given a single isolation switch had been turned off to the embarrassment of the original installer, whom when notified promised next day rectification.

INVESTMENT PRINCIPLES

While payback, IRR and NPV were key performance metrics, other investment aspects relating to risk were included in the design process.

Principle 1: Align energy efficiency investments with forward energy pricing

The forward price of electricity was known in advance, given the existence of multiyear contracts. Once this price path was examined, the key finding was that the financial model used for forecasting savings was more sensitive to initial years electricity costs given time value of money. For this reason, the length of the contract in individual states, certainty of pricing and future increases locked in under the set of several different electricity contracts were all used as inputs, so the project aligned to where pricing and therefore return on investment was more certain.

Principle 2: Diversification of upgrade measures

Where significant capital is deployed on a single energy conservation measure (ECM) across tens of sites, there can be the potential for a systematic failure or black swan event.

Technology Risk: where an individual ECM is deployed at scale, the underpinning technology can experience a systematic or unforeseen failure point. Water efficiency upgrades linked to instantaneous gas hot water systems and are a relevant example of this, given instant gas hot water function can fail at lower flows after a water efficiency upgrade, where hot water is not delivered given the flow is too low. If

these measures are scaled across multiple commercial kitchens without understanding this common design issue, key failures can occur across all sites where the same hot water system and efficiency upgrade occur.

Supplier Default Risk: Consider the recent insolvency of premium solar module manufacturers and impact on stated 25-year solar panel warranties. If these individual suppliers had been used for the entire rooftop solar rollout across an entire portfolio, this supplier default may impact an entire portfolio of sites, leaving all systems without warranty, a lack of service or even future technical advice given the company is out of business. Diversifying suppliers and the supply chain associated with larger projects is a natural hedge against such default risks, with this being especially important where annual savings are heavily linked to any one supplier.

Accuracy Risks: Within an energy audit process, an auditor often relies on specification sheets, on-site measurements and advice from vendors as inputs into the assessment of savings associated with upgrades. Given these are often custom engineering calculations that only the auditor may understand, it is important to recognize risks associated with reliance on energy audit estimates and what happens if the energy auditor gets it wrong.

Principle 3: Holistic management of HVAC and the building envelope

In the prior section, varied building envelope elements are observed to impact HVAC load calculations. Resolving building envelope aspects in certain cases also allowed for reduced HVAC system sizing, with higher overall energy savings. Significant reductions in total cost of ownership are possible and should be the focus.

Principle 4: Multiple measures implemented per site to improve M&V quality

Based on statistical analysis, Option C of the International Performance Measurement and Verification Protocol (IPMVP) was seen as a viable option for a moderate number of sites.

Undertaking deep retrofits at sites with good measurement and verification (M&V) characteristics was seen to assist the finance team

in accounting for benefits realized, given on bill savings would be more evident statistically.

Principle 5: Development of an upfront energy efficiency maintenance program

Energy savings in the long term are not automatically guaranteed. Initial project savings are often the highest with savings reducing over time given project oversight fades, maintenance and commissioning issues occur, all with compounding negative impacts on savings.

To address this issue, level of service agreements, energy efficiency maintenance policies, supplier training and engagement, internal manuals and effective handover documentation are all relevant and important aspects to consider. When starting out on the project, keep in mind the 5-to-10-year project savings forecast may exceed the average tenure of the original stakeholders that formed the project. This is not a negative aspect; it is simply a reality of working in organizations and a mindset all parties need to bring into the project given these are long term investments that need to be carefully planned.

After reviewing Figure 8 and the common lifecycle of poorly managed energy efficiency investments, ask yourself this question. In 5, 6, or 7 years, how do we ensure the savings are ongoing?

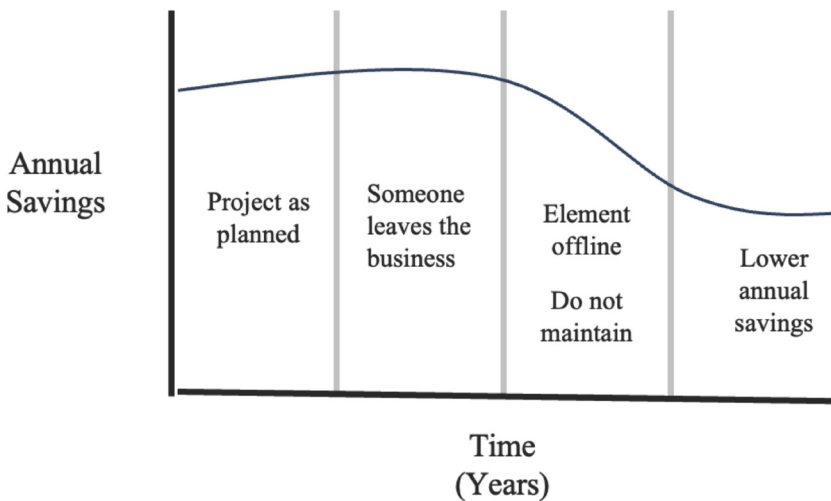


Figure 8. Example of an Unproductive Investment Lifecycle

AUDT FINANCIAL RESULTS

Cost savings from these audits have been grouped into categories and included in Table 2. Based on the initial audits of a selection of sites and a subsequent review of portfolio data from across all sites, a “best estimate” approach was used where a percentage has been allocated to indicate how many sites in the portfolio have similar measures i.e., 80% means four out of five sites.

While these initial audited sites may not be representative of the full portfolio, it provides an indication of the volume of savings and the aggregate project payback period across the portfolio for strategic planning and evaluation of future potential projects. Based on these inferred results, a more conservative model was used with a smaller portion of costs savings planned so there was higher certainty in the planning process. From this process, \$980,000 in annual savings are forecast from a capital expenditure of \$1.92M, with 43 to 47 sites flagged for deep retrofits.

CONCLUSION

After a 12-month consultation period with detailed analysis of portfolio data and site audits across multiple Australian states, an organizational energy efficiency investment approach was developed. It incorporated organizational drivers from the client, provided tactical audit performance guarantees and addressed change management, alongside site implementation and scalability issues.

M&V considerations were included alongside the diversification of technology and suppliers to address other risks. The reliance of energy balance models and engineering calculations was also diversified so deep retrofits, using multiple measures at key sites were used as the basis for recommendations. Inferred results from audits were presented with 43 to 47 sites proposed for deep retrofits, to meet the \$1M per year savings target.

While the forecast results from projects identified were impressive, an emphasis was placed on getting the foundations correct so this was not a simple one-off project. Initial planning started with the national engineering manager and progressed to financial and optimization teams

Table 2. Annual Range of Savings Across the Portfolio

Opportunity	Percentage of Sites (Lower)	Percentage of Sites (Upper)	Estimated Costs (Lower)	Estimated Costs (Upper)	Annualized Benefits (Lower)	Annualized Benefits (Upper)
HVAC controls upgrades	40%	60%	\$414,416	\$621,624	\$1,166,029	\$1,749,043
Solar maintenance	20%	40%	\$56,280	\$112,560	\$93,519	\$187,037
Air curtains (main doors)	20%	40%	\$88,146	\$176,292	\$65,384	\$130,768
Cold room curtain strips	60%	100%	\$446,040	\$743,400	\$156,879	\$261,464
Energy efficiency maintenance	10%	20%	\$12,390	\$24,780	\$4,213	\$8,425
Power factor correction	10%	20%	\$557,904	\$1,115,808	\$166,380	\$332,760
TOTALS			\$1,575,176	\$2,794,464	\$1,718,702	\$2,669,498

as key stakeholders.

A detailed business plan was developed including a basis of advice model in Excel, to assist in educating the finance team on how savings are calculated from first principles. The auditor through this project concluded that, the best interests of the client are often served by educating stakeholders first and taking the time to get to know the organization and the key organizational drivers, so the chosen strategy works.

While the strategy took 12-months to build, if you plan to achieve lasting change, what is lost by taking your time to get it right?

Resources

- [1] Climate Works net zero momentum tracker, accessed online August 28, 2025, from <https://www.climateworksaustralia.org/resource/net-zero-momentum-tracker-online/>
- [2] Climate Governance Study: Risk and opportunity insights from Australian directors, accessed online August 28, 2025, from <https://aicd.companydirectors.com.au/resources/climate-change/climate-governance-study-risk-and-opportunity-insights-from-australian-directors>
- [3] ABC News article: Logan City Council to pull out of federal government Climate Active program due to financial pressure, transparency concerns, accessed online August 28, 2025, from <https://www.abc.net.au/news/2025-06-18/queensland-logan-council-pulls-out-of-carbon-neutral-program/105429060>



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