



ALCAP EDUCATIONAL DOCUMENT | ENERGY MANAGEMENT

Energy Audits and Efficiency Roadmaps

How to turn bills, measurements, site knowledge, and business priorities into investable energy projects

A useful energy audit does more than list ideas. It establishes where energy and cost go, explains the operational drivers, quantifies opportunities, ranks risk-adjusted projects, and defines how results will be verified.

WHAT YOU WILL LEARN

- How to establish an energy and cost baseline
- Why energy balance and load profiles matter
- How to move from opportunity to credible business case
- How measurement and verification protect savings

PRACTICAL. INDEPENDENT. DECISION-FOCUSED.

Written for South African commercial and industrial energy users. Prepared July 2026 | Version 1.0

01 | THE ESSENTIALS

Build the right mental model

The depth of an audit should match the decision. A screening audit identifies priorities. An investment-grade assessment needs stronger measurement, design definition, cost accuracy, operational review, and risk allocation.

Baseline

Define a representative period and normalise material drivers such as production, occupancy, weather, operating hours, or product mix. A raw year-on-year comparison can misstate savings.

Energy and cost balance

Reconcile purchased energy with major end uses and losses. Separately allocate energy, demand, time-of-use, fixed, and power-quality costs so each opportunity receives the right value.

Opportunity register

For every measure record scope, affected system, baseline, saving mechanism, capex, O&M; interactions, implementation constraint, risk, owner, timing, and verification plan.

SAVINGS EQUATION

Verified saving = Adjusted baseline use - Reporting-period use, valued using the applicable avoided charges.

The baseline adjustment method and data boundary must be agreed before implementation.

A QUICK REFERENCE

Stage	Question	Evidence
Screen	Where are the big uses/costs?	Bills, walk-through, interviews
Measure	What drives them?	Interval and end-use data
Develop	Will the change work?	Design, trial, vendor data
Verify	Did value persist?	M&V; data and operations

02 | PUT IT TO WORK

Turn understanding into action

Build the roadmap as a portfolio: no-cost controls, maintenance fixes, efficiency retrofits, power-quality work, tariff optimisation, onsite generation, storage, and longer-term replacement projects.

1**Set scope and objectives**

Define sites, utilities, systems, business goals, data boundary, decision accuracy, and stakeholders.

2**Assemble and validate data**

Collect bills, interval data, production, schedules, drawings, asset lists, controls, and maintenance history.

3**Measure and reconcile**

Create energy and cost balances; investigate unexplained base load, peaks, losses, and anomalies.

4**Develop business cases**

Quantify realistic savings, capex, O&M, downtime, interactions, risk, incentives, and sensitivity.

5**Implement and verify**

Assign owners, stage procurement, commission changes, measure results, and maintain controls.

ILLUSTRATIVE EXAMPLE: EFFICIENT EQUIPMENT, POOR CONTROL

A high-efficiency compressor still runs unloaded overnight because sequencing and leak control are weak. Replacing it again would not address the dominant waste. The audit must connect equipment performance with how the system is actually operated.

A GOOD DECISION LOOKS LIKE

- The baseline is reproducible and tied to operating drivers.
- Project savings do not overlap without an interaction adjustment.
- Implementation includes commissioning, training, ownership, and persistence checks.

03 | CHECKLIST AND NEXT STEPS

Use this before you proceed

- [] Define scope, boundary, objectives, and required decision accuracy.
- [] Collect at least 12 months of bills and representative interval data.
- [] Validate units, meters, multipliers, timestamps, and data gaps.
- [] Build energy and cost balances tied to operational drivers.
- [] Rank measures by value, risk, dependencies, and implementation window.
- [] Define commissioning and M&V; before approving each project.

RED FLAGS

- A long opportunity list without an energy balance
- Savings based only on nameplate ratings
- Simple payback presented without risk, O&M;, or interaction
- No named owner for controls and savings persistence

PLAIN-LANGUAGE GLOSSARY

Baseline	Reference energy performance before a change.
Normalisation	Adjustment for material operating or external drivers.
M&V;	Measurement and verification of achieved savings.
Energy balance	Reconciliation of energy inputs, end uses, and losses.
Avoided cost	Charge that is actually reduced by the project.

SOURCES AND FURTHER READING

- U.S. DOE - Commercial building performance metrics
- U.S. DOE - Metering in federal buildings
- Eskom - Tariff audit analysis

IMPORTANT NOTE

This document is for general education only. It is not a substitute for a site assessment, electrical design, tariff review, safety study, or professional advice. Use the latest applicable standards, utility rules, municipal requirements, and manufacturer instructions. Work on electrical systems must be performed by suitably qualified and authorised persons.

Learn more at alcap.co.za or contact admin@alcap.co.za.