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Energy audits

An energy audit is an important step in developing an energy efficiency program. This information sheet explains what an energy audit involves and how to maximise the benefits.

An energy audit may be applied to an individual facility, a group of facilities or all facilities. Audits may also be carried out early in the development of an energy management program, or at critical times during development and operation of the program. Over time, further audits may be appropriate, as the functions of a facility may change and the range of cost-effective energy technologies available will continue to expand.

What should an energy audit include?

Whether an energy audit is conducted using in-house or external resources, it should include the following steps:

1. **Agree on the broad aims of the audit.** The auditor needs to understand the aims of the audit in the context of what you want to achieve through your energy efficiency program.

Reducing energy-related greenhouse gas emissions and reducing costs are obvious aims, but there could be others, such as:

- reducing peak demand for electricity or other energy services (e.g. compressed air, steam);
- securing energy supply (especially in the case of essential community services);
- demonstrating energy efficiency or a particular energy-saving method,
- using or demonstrating renewable energy;
- reducing visible waste of energy (e.g. lights being left on when not needed), which can undermine ratepayers' and staff's confidence in the Council's commitment to energy efficiency.

2. **Understand any recent changes your Council' or facility has undergone.** This will help the auditor make sense of recent energy consumption trends.

3. **Understand any changes you expect your Council' or facility to undergo within the next 5–10 years.** This will ensure the energy auditor's recommendations are consistent with your broader plans, and the effect of planned changes is included in financial evaluations (for example, it's much more cost-effective to upgrade lighting during a planned building refurbishment than as a separate project). Relevant plans could include:

- building or plant additions or alterations;
- changes to operations (for example, operating hours, services provided, staff numbers);
- relocation, combination with other facilities, etc.

4. **Collect energy consumption data for the last two years** (electricity, gas, liquid fuels, etc.) and graph the average daily energy use for each energy source. Also collect data on

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which to base **energy consumption indicators** (e.g. floor area, number of staff, pool area).

5. **Monitor and record the hourly pattern** of electricity (and other significant energy sources) for at least one week. Where a ‘smart meter’ is installed, your electricity retailer can supply a load profile. Other electricity meters can usually be monitored using a device that senses rotation of the spinning disc and records the number of revolutions, for example, per half hour.

6. **Survey energy-using equipment**, including:

- power ratings and loadings including real power measurement;
- operating times, and controls including time switches, thermostats, etc;
- condition;
- the benefits or services which the equipment is used to produce.

7. **Estimate the site energy consumption for each activity**, based on the total operating hours and average power of each piece of equipment.

Temporary monitoring equipment can be installed to ascertain the load profile of the larger electrical loads, such as airconditioning plant, individual floors, or buildings on a multibuilding site. Examples of temporary monitoring include:

- clamp-on electrical current monitoring;
- air temperature monitoring and logging (ambient air and in airconditioned buildings);
- run-time monitors, which detect the magnetic field of a running motor without accessing the power cable. Where temporary metering requires access to electrical switchboards it must be installed **by a licensed electrician** or suitably qualified person.

8. **Reconcile the calculated energy usage** with:

- the known total annual energy consumption;
- seasonal variation in energy consumption and peak power;
- energy consumption in each of the tariff periods (for example, peak, off-peak, shoulder, etc);
- the weekly electrical demand profile (and gas profile if available).

9. **Identify opportunities** to reduce energy consumption and costs while maintaining or improving the quality of services (for example, lighting, airconditioning) and achieving your organisation’s other goals. These opportunities arise from improved efficiency of procedures, equipment, controls and using the most appropriate energy source.

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The audit investigation must include:

- analysis of *all* energy sources purchased by Council, including electricity, natural gas, LPG and oil;
- evaluation of real energy-saving and greenhouse gas emission-saving measures (i.e. it must not be simply a tariff or pricing check);
- sufficient initial engineering design to ensure that the estimates of savings and investment are reasonable.

The audit report must include:

- a concise, action-oriented executive summary of no more than two pages;
- a practical implementation plan which accommodates any special requirements of your Council, such as timing, cash flow, premises changes, etc.
- recommended indicators of energy efficiency, benchmarks, targets and a timetable to meet those targets, and ongoing monitoring of progress toward achieving those targets.

Costs and savings

An energy audit conducted by an energy audit consultant will require an investment of between 3 and 5 per cent of a year's energy costs.

The audit can be expected to identify economically achievable measures which can save between 20 and 40 per cent of your energy costs. You should be able to implement some (at least half) of the recommendations immediately, while others may require further investigation.

Who can help?

Standards Australia has standards which can help you prepare briefs for energy auditors.

Shock Therapy Pty Ltd are EcoSmart Accredited Energy Management Specialists who can provide services in consultancy, design & implementation of energy management plans.

For information see: www.shocktherapy.com.au

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Case study: Meter readings reveal savings potential

The City of Monash in Melbourne's east has a site with a library building and a civic offices building. There is a common electricity supply and account for the whole site, which until mid-1999 was split according to a fixed library to office ratio of 30:70. However, analysing data from an electricity submeter on the library supply has revealed that the ratio is actually about 15:85. The sub-meter has also made it possible to produce a load profile for the library (see Energy sheet E4 *Using an electricity meter*) giving useful clues about how energy is used and revealing savings opportunities.

The load profile was subtracted from the load profile for the site (obtained from the electricity retailer's 'smart meter') to produce a load profile for the office building alone, revealing further savings.

The library meter is now read monthly, and consumption data collated with data from the bill for the site. A brief report and cost summary is then sent to the library manager and the office building manager.

For further information on this study: Ms Carly Platfuss, Environmental Manager, City of Monash, ph 03 9518 3716.