

Stop the energy drain



Whether reviewing a process, a building, a plant – or even an entire company – energy audits are an ideal way to identify energy saving opportunities. WME takes you step-by-step through the audit process.

The adoption of readily available technologies could see energy consumption in the manufacturing, commercial and residential sectors reduced by up to 30 per cent, with an average payback of four years. The findings by Sustainable Energy Authority Victoria (SEAV) indicate increased action on energy efficiency could yield substantial economic and environmental dividends.

An ideal way of identifying energy saving opportunities in a business is through an energy audit. It provides the baseline of current energy use (and equivalent greenhouse gas emissions) and makes recommendations for energy efficiency improvements.

Australian Energy Audits Standard AS/NZ 3598:2000 defines three levels of energy audit: a basic overview, a survey and detailed analysis.

Level 1: Consumption benchmark. A

Level 1 audit evaluates the overall energy consumption of a site to determine whether energy use is reasonable or excessive, and provides initial benchmarks so the effect of energy measures can be tracked and evaluated. It may be in the form of a desktop study, but needs to have sufficient information to determine the site's overall level of efficiency.

It is expected to give an overview providing rough orders of savings and costs, with accuracy of figures generally within ± 40 per cent.

Level 2: Preliminary assessment. A Level 2 audit identifies the sources of energy, the amount of energy supplied and what it is used for. It also identifies areas where savings may be made, recommends measures, and provides a statement of costs and potential savings. This energy use survey is expected to provide a preliminary assessment of costs

and savings, with accuracy generally within 20 per cent.

Level 3: Economic analysis. This top level audit provides a detailed analysis of energy usage, the savings that can be made and the cost of achieving those savings. It may cover the whole site or may concentrate on an individual item, such as a single industrial process or one of the services.

The report often forms the justification for substantial investment by the owner or an energy performance contractor and is expected to provide a firm estimate of savings and costs. Detailed economic analysis is required, with accuracy within +10 per cent for costs and -10 per cent for benefits.

An audit can be conducted by an energy manager trained in the task or by an external energy-auditing consultant. Regardless, the basic steps outlined on the following pages should be understood. ■

Inside the energy audit

An energy audit is one of a series of steps designed to produce the best results in reducing a company's energy bills and increasing productivity. Ideally, the journey starts with senior management committing to establish or update an energy management strategy (either stand alone or integrated into other management systems such as quality or environment) and allocating appropriate financial and staff resources, including an energy manager to coordinate the project.

Before diving into the job, the manager's first task should be developing an energy management policy to establish an overall sense of direction, set targets and timetables, allocate resources and assign responsibilities.

To ensure broad support for the project, consult widely all the way through. Seek staff input, discuss the project in team and management meetings, and launch the energy management action plan internally.

PREPARING THE WAY

Before starting an audit, it is best to compile a comprehensive set of existing site and energy data. This must include:

- site plan and building drawings, and an inventory of major plant and equipment;
- 24 months of electricity, gas and fuel accounts; and
- activity and/or production levels (for example, the number of widgets per month, kg of product per day or product volume in litres per week).

Once complete, the assessment will provide a greater insight into the organisation's energy use and help decide whether further studies or an external auditor are required.

PERFORMING THE AUDIT

Tracking and monitoring systems provide the basic information. Tracking records bulk energy use information, such as from billing records, to give an overview of energy use patterns. Monitoring implies closer measuring of energy use, which can include the whole site, particular areas or just a single item of the plant. Results of monitoring inform the energy manager and



ENERGY TRACKING TOOLKIT

The Sustainable Energy Authority Victoria (SEAV) has developed the Energy Smart Tracker to help businesses record and monitor energy consumption and greenhouse gases, and to minimise energy costs. The software program produces basic benchmarks that will help set targets for consumption and scope of total energy use. It displays graphs on seasonal trends, production peaks, energy consumption, energy costs and greenhouse gas emissions for each type of energy. The free toolkit contains a CD with the program (www.seav.vic.gov.au) but there are more sophisticated packages on the market.

others of problems and possible solutions to wayward energy use.

The work undertaken during an audit may include:

- investigating the usage of all types of energy using equipment within the building, complex or plant and energy consumed;
- identifying the energy usage of all major heating and cooling applications and its percentage against total energy use;
- identifying cost-effective measures to improve the efficiency of energy use;
- estimating the potential energy savings, indicative budget costs and payback periods for each recommended action; and
- reviewing energy management strategies, including monitoring systems and evaluation process.

PRESENTING THE RESULTS

The results of an energy audit must be compiled into a clear and concise energy report. A detailed report structure is outlined in AS/NZ 3598:2000. Some of the key elements include:

- executive summary with recommendations in a priority order and estimates of implementation costs and payback periods;
- relevant plant and process data;



technologies, especially when there are opportunities for an upgrade, maintenance or other changes to plant and equipment. It will list the best opportunities and identify resources, budgets and financial returns for each activity. It will also have a timeline.

Energy saving opportunities usually fall into three broad categories: reduction of obvious waste, improvements to equipment, and new processes or equipment (including waste heat recovery systems).

Low cost/no cost activities that minimise waste (such as plugging steam and compressed air leaks, stopping equipment that is running for no purpose and unnecessary or excessive heating, cooling and lighting levels), should be implemented along with major projects.

Equipment changes to reduce energy consumption could include better control equipment, more energy efficient burners, high efficiency motors, variable speed drives, improved insulation and more efficient lighting.

New capital may yield both spectacular energy savings and productivity gains, but almost always require high levels of investment. They can be more difficult to evaluate than obvious waste and may require outside assistance to quantify the costs and benefits.

REVISE AND REVIEW

Energy management is a process of continuous improvement and is more effective when its policies and procedures are reviewed, at least annually.

As the implementation process proceeds, the action plan may

need to be revised and updated. Regular reporting to line managers will help monitoring and revision of the progress. Resource requirements will also need to be reviewed periodically to ensure they are adequate. Make sure reporting is included in your action plan.

Evaluation of activities and annual reviews is

essential for ongoing success and is an integral part of the continuous improvement process. An annual review should be included in your action plan and results built into the plan for the following year. An annual review of the energy management system will require:

- a review and evaluation of progress achieved during the past 12 months;
- note any changes in the strategic plans for your company;
- evaluate any new projects and ideas from staff or external experts; and
- develop a new action plan for the next 12 months after considering the above.

This overview is based on the comprehensive energy and greenhouse management toolkit developed by the Sustainable Energy Authority Victoria (SEAV) and EPA Victoria. Find it at www.seav.vic.gov.au ■

COST OF AN ENERGY AUDIT

Indicative costs of the various levels of energy audit for small, medium and large companies.

Company size	Level 1 energy audit	Level 2 energy audit	Level 3 energy audit
* Small company (under 200 MWh p.a. electricity consumption)	\$500-\$1,000	\$1,000-\$3,000	\$3,000-\$10,000
Medium company (200 - 3,000 MWh p.a. electricity consumption)	\$1,000-\$2,000	\$2,000-\$5,000	\$5,000-\$25,000
Large company (over 3,000 MWh p.a. electricity consumption)	\$2,000-\$5,000	\$5,000-\$25,000	>\$10,000

- equipment data with measurements or estimates of the energy consumption for individual plant items;
- actual energy consumption records;
- energy use analysis in graphical form;
- details of energy efficiency improvements;
- comparison of actual consumption with analysis of estimated results from recommended actions; and
- recommendations on energy management strategies, such as monitoring systems and review process.

ACT ON RECOMMENDATIONS

To make an energy audit worthwhile, the recommendations from the audit report must be incorporated into the energy management action plan. Its scope and detail will depend upon the resources available.

The plan should focus on energy saving practices and new

Energy-Smart Tips

- 1 Enable the Energy Star power management feature on office equipment to send it into a "sleep" mode when not in use. This reduces emissions by over 75 per cent and saves around \$36 per computer each year. See www.energystar.gov.au
 - 2 Portable computers use less energy than desktop models and generally ink jet printers use far less energy per page than laser models.
 - 3 Install energy-efficient lighting. Lower wattage globes reduce greenhouse gases by 30-80 per cent.
 - 4 Install timer controls or daylight or movement sensors, which switch off lights automatically.
 - 5 Modern dimmer controls reduce greenhouse gas emissions as they reduce light output. They also extend lamp life.
 - 6 Install ceiling fans or use portable fans, which improve comfort levels, even in air-conditioned rooms, and generate less than a kilogram of greenhouse gas every 10 hours.
 - 7 Paint rooms light colours. Dark coloured walls absorb light, increasing the amount of lighting needed.
 - 8 Don't over-cool: a 1°C difference in temperature between indoors and outdoors adds 10 per cent to your bill and increases greenhouse gas emissions by the same amount.
 - 9 Fluorescent lights, including compact fluoros generate only 1/5 as much greenhouse gas as ordinary globes but produce the same amount of light.
 - 10 Only cool what you need to. The smaller the area cooled, the less greenhouse gas generated and the lower the bills.
 - 11 Use less hot water. Every 15 litres of hot water used from an electric water heater generates about a kilogram of greenhouse gas. Turn the hot water system off if not needed for extended periods of time.
 - 12 Fix dripping hot taps and save up to 100kg of harmful greenhouse gas emissions each year per tap.
 - 13 If the hot water thermostat is adjustable, turn it down to 55°C – this can save up to 250 kg of CO₂ each year.
- More at www.greenpower.com.au/business.shtml

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