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GREENHOUSE
CHALLENGE PLUS

ENERGY AUDIT TOOL
LIGHTING CONTROL

02

Australian Government
Department of the
Environment and Heritage
Australian Greenhouse Office

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01

OVERVIEW

Effective management of your organisation's energy usage is good business sense. It can produce both environmental and economic benefits – and importantly reduce your greenhouse gas emissions.

The Greenhouse Challenge Plus Energy Audit Tool has been developed to assist non-technical or semi-technical energy managers in small to medium organisations:

→ identify actions to improve energy efficiency through the use of a simple but detailed audit checklist; and

→ develop plans for implementing energy efficiency actions.

The checklist contains notes supplying the auditor with further explanation or hints on how to compete the tasks. It should be possible to complete the majority of tasks through simple observation.

The energy efficiency action plan – can also be utilised in the preparation of or alternatively form part of your organisation's annual progress report to the Greenhouse Challenge Plus programme—which details abatement actions.

The energy audit tool has been designed as a modular system. This means that you can utilise each of the volumes as stand-alone independent units or in combination with the other units.

This is *Volume 02 — Lighting control* of the Greenhouse Challenge Plus Energy Audit Tool, which includes the following 11 volumes:

Volume 01 — Lighting (indoor and outdoor)
Volume 02 — Lighting control
Volume 03 — Chillers
Volume 04 — Boilers and steam systems
Volume 05 — Ventilation systems
Volume 06 — Airconditioning systems
Volume 07 — Office equipment
Volume 08 — Domestic hot water
Volume 09 — Building insulation
Volume 10 — Infiltration (air leakage into buildings)
Volume 11 — Compressed air

Your challenge to reduce energy consumption and greenhouse gas emissions starts now!

Need more information?

If you require additional information about the Greenhouse Challenge Plus Energy Audit Tool, contact your Industry Adviser on 02 6274-1229 or at email greenhouse@greenhouse.gov.au. Additional copies of the Greenhouse Challenge Plus Audit tool can also be downloaded from www.greenhouse.gov.au/challenge

A:
BACKGROUND INFORMATION

The cost of lighting is quite high for many organisations involved in manufacturing, warehousing and industry. In offices it often represents about 50% of the energy bill. However, simple and cost effective changes to lighting systems can be made that will result in long-term savings.

Volume 1 — Lighting (indoor and outdoor) and *Volume 2 — Lighting control*, allow you to identify relevant changes that can be made to the design, maintenance and operation of your existing lighting system to reduce energy consumption and costs. The measures range from switching off lights when not needed and maximising the use of natural light, to installing energy efficient lights and light controllers.

All personnel should be aware and reminded of their role and the relevant methods to reduce energy consumption of lighting systems. Involve personnel in decision making processes and consult them for energy saving ideas. **Remember these are the people who use the lighting every day.**

Each question in the energy audit checklist which follows has a space where you can write your energy efficiency improvement ideas. You should refer to the explanatory notes when considering what can be done to improve energy efficiency. You may need to take additional notes and attach them to the checklist, or attach other relevant documentation (such as instruction sheets and site plans) in order to support your improvement ideas and completely document your audit.

Remember these are ideas, not decisions. When you have completed the energy audit checklist, select the energy efficiency improvements that are viable and enter them into the energy efficiency action plan in section C of this volume.

B: ENERGY AUDIT CHECKLIST

03

OPERATION AND USE

QUESTION 1: Does your organisation have programmable lighting control?

☐ Yes ☐ No

Improvement ideas and notes:.....

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→ Lighting control can be programmed with seven-day schedules allowing you to set requirements for various needs. An approximate cost is $3000, which will quickly repay itself in savings.

MAKE SURE YOU: Consult maintenance or engineering personnel or the lighting system operating manual.

QUESTION 2: Are time switches used to control any indoor or outdoor lighting?

☐ Yes ☐ No

If yes, where are they used: .....

Improvement ideas and notes:.....

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→ Time switches allow lights to be turned on for a set period only. They are simple to install and relatively cheap. They should be installed in areas that are used for fixed duration activities. They can be push buttons or time delay switches.

MAKE SURE YOU: Consult maintenance or engineering personnel or the lighting system operating manual.

QUESTION 3: Are key switches used to control any indoor and/or outdoor lighting?

☐ Yes ☐ No

If yes, where are they used: .....

Improvement ideas and notes:.....

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→ Key switches require a physical or an electronic key to operate. They can limit the use of lights to authorised personnel and be a form of occupancy sensor (if key is required to remain in switch for lighting to be on).

MAKE SURE YOU: Consult maintenance or engineering personnel or the lighting system operating manual.

B:
ENERGY AUDIT CHECKLIST

QUESTION 4: Are there any photo sensor devices used to control indoor or outdoor lighting?

☐ Yes ☐ No

If yes, where are they used: .....

Improvement ideas and notes:.....

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→ Photo sensor devices measure light levels. They are used to automatically turn lighting on and off and control dimming. These devices should be used near windows or in areas that receive high levels of natural light.

MAKE SURE YOU: Consult maintenance or engineering personnel or the lighting system operating manual.

QUESTION 5: Do you have occupancy or motion sensors to control any indoor or outdoor lighting?

☐ Yes ☐ No

If yes, where are they used: .....

Improvement ideas and notes:.....

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→ Occupancy sensors will automatically turn lights on for as long as there is movement in a room. The costs of sensor devices vary. Expect to pay $150 to $200 for a room of 100m^2. Occupancy sensors should not be used where unexpected switching off of lights could jeopardise safety.

→ There are three types of occupancy sensors:
  - → Passive infrared sensors — used for small areas that are occupied infrequently such as storerooms and bathrooms; they are also useful for security purposes.
  - → Ultrasonic sensors — useful for office areas.
  - → Microwave sensors — used for external or large internal areas that are occupied infrequently such as conference rooms, meeting rooms, and tearooms.

MAKE SURE YOU: Consult maintenance or engineering personnel or conduct an inspection.

QUESTION 6: Are there any dimming devices used to control lighting levels?

☐ Yes ☐ No

If yes, indicate the type of lighting the devices are associated with.

☐ Fluorescent

☐ Incandescent

☐ Low voltage (12V) or halogen

☐ Other.....

Improvement ideas and notes:.....

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→ Dimming devices allow light levels to be adjusted to the required level, either automatically or manually. Dimming lights increases energy efficiency except when used with incandescent or halogen lights. Dimming systems are available for retrofitting into existing installations; this is particularly applicable to fluorescent lighting systems.

MAKE SURE YOU: Consult your maintenance or engineering personnel if necessary.

QUESTION 7: Do your fluorescent lights have energy reducing devices?

■ Yes ■ No

Improvement ideas and notes:.....

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→ Energy reducing devices reduce the start up voltage supplied to fluorescent lights (240V) to a lower voltage level without a significant reduction in lighting levels. This typically reduces energy consumption by 20 to 30%. They may be suitable for areas that are uniformly over-lit.

MAKE SURE YOU: Consult maintenance or engineering personnel.

QUESTION 8: Are multiple switches used to control numerous lights, where possible, instead of a single switch?

■ Yes ■ No

Improvement ideas and notes:.....

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→ One or only a few switches controlling lights in a large area should be avoided. Switches should be located throughout each area of a building to ensure that people turn lights on only when needed. Switches can be rewired to take into account the usage patterns of work areas, particularly if shift work or overtime is a regular occurrence.

QUESTION 9: Have relevant personnel received training or advice about the use of various lighting controls and switching off lights when they are not needed?

■ Yes ■ No

Improvement ideas and notes:.....

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B:
ENERGY AUDIT CHECKLIST

→ All personnel including cleaners, security guards and other contractors should be aware of how to use lighting systems. They should be informed and reminded about switching off lights when not needed.

MAKE SURE YOU: Consult training coordinator or training records, or environmental or induction training.

QUESTION 10: Is there appropriate signage near light switches to remind users to turn off lights when they are not needed?

☐ Yes ☐ No

Improvement ideas and notes:.....

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→ Easy to read and eye catching signs should be placed near all light switches.

QUESTION 11: Is there appropriate signage that clearly shows the purpose of each light switch to avoid lights being turned on unnecessarily?

☐ Yes ☐ No

Improvement ideas and notes:.....

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→ To avoid misuse of lights, light switches should be **clearly labelled** to indicate the areas they cover and their specific purpose.

MAINTENANCE

QUESTION 12: Are lighting control devices and systems maintained in accordance with manufacturer's instructions? Please tick the appropriate box below.

☐ Daily
☐ Weekly
☐ Fortnightly
☐ Monthly
☐ Other.....
☐ Not applicable

Improvement ideas and notes:.....

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→ Light switches and various lighting control systems should be maintained regularly by a suitably qualified person to ensure they are working efficiently.

QUESTION 13: In what time frame are repairs of light switches and lighting control devices and systems undertaken? Please tick the appropriate box below.

- ☐ Within 24 hours
- ☐ Within a week
- ☐ Within a month
- ☐ Greater than a month

Improvement ideas and notes:.....

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→ Repairs to light switches and lighting control systems should be undertaken as soon as possible.

MAKE SURE YOU: Consult maintenance or engineering personnel, or review an asset management or defect system.

PURCHASING

QUESTION 14: Is energy efficiency taken into account when purchasing lighting control devices?

☐ Yes ☐ No

Improvement ideas and notes:.....

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→ Energy efficiency should always be taken into account when purchasing.

MAKE SURE YOU: Consult existing purchasing procedures, guidelines or policies.

C:
ENERGY EFFICIENCY ACTION PLAN

Note: As an alternative to using this action plan, you can also enter your energy efficiency actions as objectives and targets in an environmental management system, as a work order in your maintenance management system, or in another process that ensures nominated personnel complete the actions.

GOALS AND METHODS FOR ENERGY EFFICIENCY

Your energy efficiency goals

Example: “Reduce the energy use for lighting by 10% compared to last year’s consumption.” Be specific where possible taking into account technical, financial and operational inputs. Goals should be measurable where practicable.

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Your preferred energy efficiency options

Chosen from ‘Improvement ideas and notes’ in section B.

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Target completion date .....

Person responsible .....

Goal(s):.....

ACTION STEPS TO BE TAKEN *Specific steps needed to implement the preferred energy efficiency actions stated under 'goals and methods'.*

No.	Action	Person responsible	Due date	Date completed	Initials

COMPLETION *To be signed by person nominated under 'goals and methods'.*

Signature.....

Print Name .....

Title ..... Completion Date.....

Please photocopy this form if additional action steps are required. Complete the page numbering and action numbering on all forms.

Page:..... of.....

D:
RESOURCES

National Energy Efficiency
A comprehensive guide to the latest Commonwealth, State and Territory regulations, standards and guides on energy efficient appliances
www.energyrating.gov.au

A SELECTION OF OTHER USEFUL LINKS

1. Energy Smart Allies Directory.
Directory of suppliers of energy services and products including information regarding different types of lights and controllers.
www.energysmartallies.com/esa/middlesub.asp

2. Business Information Sheets (Lighting).
Sustainable Energy Authority of Victoria (SEAV).
Contains links to four fact sheets which detail the different types of lights and lighting controls available, energy best practice tips for lighting, and how to evaluate lighting costs.
http://www.seav.vic.gov.au/advice/business/infosheets/lighting.asp

3. Commercial & Factory Lighting Fact Sheet.
Energy South Australia.
Provides some simple measures to reduce your lighting bills.
http://www.sustainable.energy.sa.gov.au/pages/general/pdf/com_factorylighting_web.pdf

4. Energy Smart Commercial Lighting Fact Sheet
Sustainable Energy Development Office of Western Australia.
Describes the different types of lights, light fittings and lighting controls available and provides hints on energy efficiency.
http://www1.sedo.energy.wa.gov.au/uploads/comm_light_26.pdf

5. Energy Saving Manual Section 5: Lighting in Commercial Buildings & Offices.
NSW Department of Energy, Utilities & Sustainability, and WA Sustainable Energy Development Office.
This section of the manual describes simple measures that can be taken to improve the energy efficiency of lighting systems. It also demonstrates how to calculate the energy usage of the lighting system and provides links to two technology tables, which describe different types of lights, fittings and light controls.
www.energysmart.com.au/sedatoolbox/esm5.asp

6. Lighting Fact Sheet — Your Home Technical Manual.
Department of the Environment and Heritage, Australian Greenhouse Office.
Provides information and pictures on the different types of lights, light fittings and lighting controls available.
http://www.greenhouse.gov.au/yourhome/technical/fs45.htm

7. Working Energy Program Toolkit.
Department of the Environment and Heritage, Australian Greenhouse Office.
These web pages provide energy conservation measures for lighting design and lighting controls.
http://www.greenhouse.gov.au/lgmodules/wep/toolkit/lightingsavings/ecm_lightingdes.html http://www.greenhouse.gov.au/lgmodules/wep/toolkit/lightingsavings/ecm_lightingcon.html

8. Energy Smart Housing Manual, Chapter 9: Services, Lighting & Appliances.
Sustainable Energy Authority of Victoria (SEAV).
Pages 98 to 101 of the manual give recommendations about the types of lights to be used in different areas of the home.
http://www.sea.vic.gov.au/buildings/housing_manual.asp#chapter9

9. Standards Australia Customer Service Centre
www.standards.com.au
Phone from within Australia: 1300 65 46 46
From overseas: +61 2 8206 6010

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