

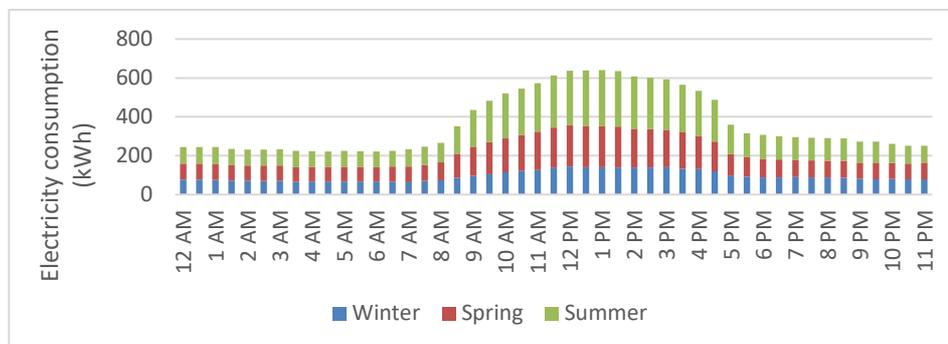
# Save by switching off

Findings from the study: Comfort and electricity use in remote Australian buildings



## Electricity that does nothing useful: how to save it and save money

Enterprise buildings in remote Australia are generally occupied for 8 hours a day, and for the other 16 they are locked up, vacant and with appliances unused. Yet up to half of the electricity for these buildings may be used outside working hours. The figure below shows how much electricity was used over nine months at different times of the day in our study of an art centre in Far North Queensland. It shows that over 24 hours, as much is being used outside working hours as during the working day. Some of this electricity is for useful purposes but much of it is being wasted and reducing this waste can save from hundreds to thousands of dollars.



**Electricity that is essential outside working hours:** This might include maintaining fire alarms and security systems, or running low power controllers to manage lighting, air conditioning and ventilation.

**Electricity that is wasted because the equipment is old:** Older technology may need to use electricity after hours, for example, fax machines to take messages, or high powered on site servers to keep a website running, or air conditioners that need to run on standby power overnight so that they can start safely the next day, or security/safety lighting that uses incandescent lights. The electricity used by these appliances could probably be saved by using newer more efficient appliances or different approaches.

**Electricity used for no good reason and without anyone knowing:** This could include computers, printers and copiers that are not switched to sleep mode or switched off completely overnight, catering equipment that runs continuously during the day or air conditioners that run all day, every day of the year.

**Managing appliances that waste electricity:** These measures generally involve either replacing an appliance with a more efficient one or switching an appliance off completely by switching it off at the wall power outlet.

## Saving money in our study of art centres

**Cheaper websites:** Many art centres run a website to display their art to the world. If that web is run from a computer inside the building, then it is probably on all day, every day, using a lot of electricity. The costs include the electricity both for the computer and for the air conditioning that carries away heat from the computer. Costs can easily be as high as \$1000 a year.

→ See if it's possible for the internet service provider to host the web instead.

*To avoid power surges damaging your equipment when switching off, first switch off the equipment at the appliance and then at the wall power outlet. When switching on do the reverse – switch on at the wall power outlet and then on at the appliance.*

**Cheaper phone calls:** The cost of the phone system could include the cost of electricity used in the PABX (which looks after the way your phones are connected). Overnight, this can cost \$30–\$100 or more a year.

→ Use telephones without screens to save energy.

→ Ask the telephone company if you can switch the PABX to ‘sleep’ or ‘standby’ mode at night and use the telephone company’s answering service as an alternative.

**Making tea and coffee:** The older style of tea urn can waste a lot of electricity. If when it’s left on it feels hot to the touch, then it could be costing hundreds of dollars a year. A large tea urn running off a wall power outlet could also trip the circuit breakers in the switch board, shutting down the power for other appliances.

→ Use two small urns instead of one large one, and make sure they have a double steel skin for insulation.

→ Buy units with timers, or add a timer so the urn switches on and off before and after a tea break instead of running continuously throughout the day.

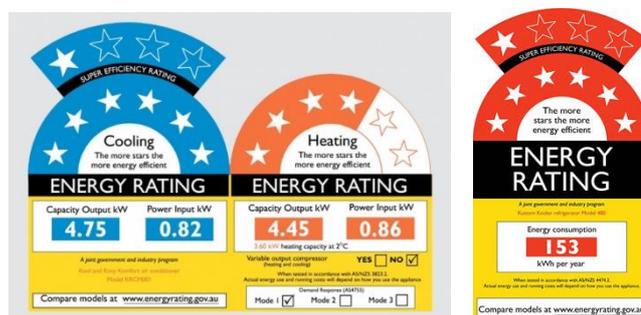
→ Use an instant hot water heater to save even more money, as these are available with timers

→ For just two or three people, use an electric kettle because it uses much less electricity.

**Cheaper air conditioning:** Over 24 hours, some air conditioners use almost as much electricity switched off as when they are running. This ‘standby power’ helps the air conditioner start up after a long shutdown, and it can easily cost \$200 each year per air conditioner. The best modern air conditioners don’t suffer from this problem.

→ Switch off standby power by switching the air conditioner off at the wall power outlet. You may need to switch on the wall power outlet for an hour or two before the air conditioner starts up again. You can find out how long the power needs to be switched on before using the air conditioner by reading the operating manual or asking the company that installed the unit.

→ Buy a new air conditioner with a good star rating (see the figure). The stars on the blue show how well the air conditioner cools, and the stars on the red shows how well it heats. As an example, replacing a 3-star wall-mounted air conditioner with a 7-star unit can save \$170 a year. Look up how much standby power it consumes as well as checking the star rating. The standby power should be just a few watts. If it’s as much as 100 watts then it could easily add about \$200 to your bill each year.



Images source <http://www.energyrating.gov.au/>  
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**Fixing electricity that leaks away when general appliances are switched off:** A lot of small items don’t consume much by themselves, but together they can be responsible for \$100–\$200 of electricity each year. There are two ways in which electricity can be wasted by such appliances around the office.

*Inefficient appliances that have to run 8–24 hours a day, including:*

- Fridges and freezers (24 hours a day)
- Chargers (if they get warm when not charging then they may not be very efficient)
- Safety lights and exit lights (24 hours a day)
- General lighting (8 hours a day)
- Clocks and automatic timers and switches (24 hours a day)
- Video/DVD recording equipment (16 to 24 hours a day).

→ Buy more efficient equipment when the time comes to replace the appliance. Replacing a 1-star 100 L fridge-freezer with a 6-star unit would save \$135 a year. Replacing a 50 watt halogen downlight with an LED equivalent could save up to \$40 a year for each light replaced and even more if you count the cost of removing the waste heat from the inefficient downlight.

*Appliances that are left on for convenience but which don't use electricity usefully:*

- Battery chargers, phone chargers and appliance chargers
- Computers, displays, printers, copiers, modems
- Lights that could be switched off, e.g. in bathrooms, storage areas and unused office rooms or rooms with good natural light
- Clocks such as those found on cookers or microwave ovens
- Dishwashers.

→ Switch off these appliances at the wall when they are not being used (or outside working hours)

→ Where appropriate, and without overloading a circuit, cluster these appliances in groups supplied from a power board so that multiple units can be switched off together. For example, the computer equipment might be supplied by one power board per computer desk plus another board for the printers, copiers and modems. Battery and appliance chargers could be supplied from one or two power boards and charged overnight using a timer to switch the board on and off.

### **Summary**

The table on the next page can help you plan to reduce your electricity bills. Big actions are in green and small actions that add up to make a difference are in yellow. In essence, the strategy is:

- If possible, switch off at the wall power outlet after hours.
- When purchasing equipment replace inefficient units with more efficient ones go for high star ratings.

\* Note: the savings in this note don't include the additional savings that come from reducing the heat generated by appliances; see the information sheet *Waste Heat*.

\* Note also that the savings are a very approximate estimate of the savings that could be made in a building where no energy savings measures have already been made. They also do not take into account the cost of replacing appliances, which are assumed to be replaced at the end of their useful life.

### **FOR MORE INFORMATION ABOUT THIS RESEARCH, CONTACT:**

**Dr Peter Osman**

P: +(61) 2 9490 5526      M: +(61) 411 440 339

E: [peter.osman@csiro.au](mailto:peter.osman@csiro.au)

Visit: <http://crc-rep.com/research/regional-economies/climate-change-adaptation-and-energy-futures>

This pamphlet is one of a set of four that aims to reduce electricity bills and improve thermal comfort in community and enterprise buildings in remote regions of Australia. The findings are based on applying CSIRO's knowledge base and research capacity in designing thermally efficient buildings to address enterprise needs in the hot arid and hot humid climate zones of remote Australia. CSIRO partnered with Charles Darwin University and the University of South Australia as part of the Cooperative Research Centre for Remote Economic Participation to conduct a research project in which the physical properties of eight community buildings (art centres) were studied to provide a realistic assessment of where design improvements could be made and operating practices enhanced. It was clear from the study that managers were already very careful in their use of electricity. However, we found substantial technical changes could be made in the building design and appliance selection and operation that could lead to substantial reductions in cost and improvements in thermal comfort. This pamphlet focuses on ways to reduce electricity wasted outside working hours and by doing this reduce the load on air conditioners and/or maintain reduced temperatures in the working environment. The recommendations should be of particular interest to architects, builders and building managers. The full report of the research can be found at Osman P, Havas L, Ambrose M and Clark G. 2017. *Comfort and electricity use in remote Australian buildings*. CRC-REP Research Report CR018. Ninti One Limited. Alice Springs.

[http://www.crc-rep.com.au/resource/CR018\\_ComfortElectricityUseRemoteAustralianBuildings.pdf](http://www.crc-rep.com.au/resource/CR018_ComfortElectricityUseRemoteAustralianBuildings.pdf).

## How to save electricity in an art centre or office building

Appliance	Number of appliances	Energy saving (kWh)	Annual cost saving	Savings action
Web server/telecomm. system (PABX, VOIP)	1 system	3,061	\$826	Upgrade to energy saving equipment, use energy saving mode after hours, or use alternative facilities from a telephone or internet service provider
A/C running 8 hours - high standby 16 hours	6 to 7	3,400	\$918	A/C switched off at wall power outlet outside working hours
A/C running 8 hours - high standby 16 hours	6 to 7	2,267	\$612	A/C replaced with low standby power units
A/C running 24 hours	1	1,880	\$508	A/C switched off at wall power outlet outside working hours
A/C running 24 hours	1	1,567	\$423	A/C switched to low standby power outside working hours
A/C running 8 hours - low standby 16 hours	6 to 7	1,133	\$306	A/C switched off at wall power outlet outside working hours
A/C running 24 hours	1	940	\$254	A/C switched to high standby power outside working hours
Tea urn uninsulated continuous running	1	1,753	\$473	Switch to insulated timed tea urn
1-star fridge, two-door 200 L fridge, 100 L freezer	1	500	\$135	Replace with 6-star energy rated fridge-freezer
Computer, desktop switched to standby mode	2	319	\$86	Switch off at wall power outlet when not in use for an hour or more
Computer, desktop switched to sleep mode	2	42	\$11	Switch off at wall power outlet when not in use for an hour or more
Fax, laser	1	47	\$13	Change appliance to fax free or high efficiency
Multifunction device, laser	1	23	\$6	Switch off at wall power outlet outside working hours
Modem, cable	1	22	\$6	Switch off at wall power outlet outside working hours
Modem, DSL	1	8	\$2	Switch off at wall power outlet outside working hours
Speakers, computer	2	21	\$6	Switch off at wall power outlet outside working hours
Computer display, LCD	2	14	\$4	If possible, switch off at wall power outlet when not in use for an hour or more
Scanner, flatbed	1	14	\$4	Switch off at wall power outlet outside working hours
Printer, laser	1	9	\$2	Switch off at wall power outlet outside working hours
Copier	1	9	\$2	Switch off at wall power outlet outside working hours
Power tool, cordless	3	69	\$19	Switch off charger when fully charged or not in use
Microwave ovens	1	18	\$5	Switch off at wall power outlet outside working hours
Phone, cordless	1	6	\$2	Switch off outside working hours
Charger, mobile phone	2	9	\$2	Switch off charger when not in use
Coffee maker	1	7	\$2	Switch off outside working hours