Use Electricity Wisely

A very high quality and precious resource
But isn't electricity cheap, and don't we have 300 years of coal supply in the Latrobe Valley? Yes, it does come relatively cheaply to the householder, while the digging up and infrastructure maintenance to transmit it around the state is still being subsidised by cheap oil. As the coal resource becomes deeper and more difficult to extract, and extraction costs increase with fuel costs, we can expect electricity to become substantially more expensive. Electricity production from brown coal already creates enormous environmental cost with CO2 emissions and sulphur contamination over

Gippsland.

Yallourn and Hazelwood power stations photo: Brian Yap

Solar panels, wind farms, and hydro in Victoria will never replace the quantity of power that the Latrobe Valley produces. We will simply have to do better with less.

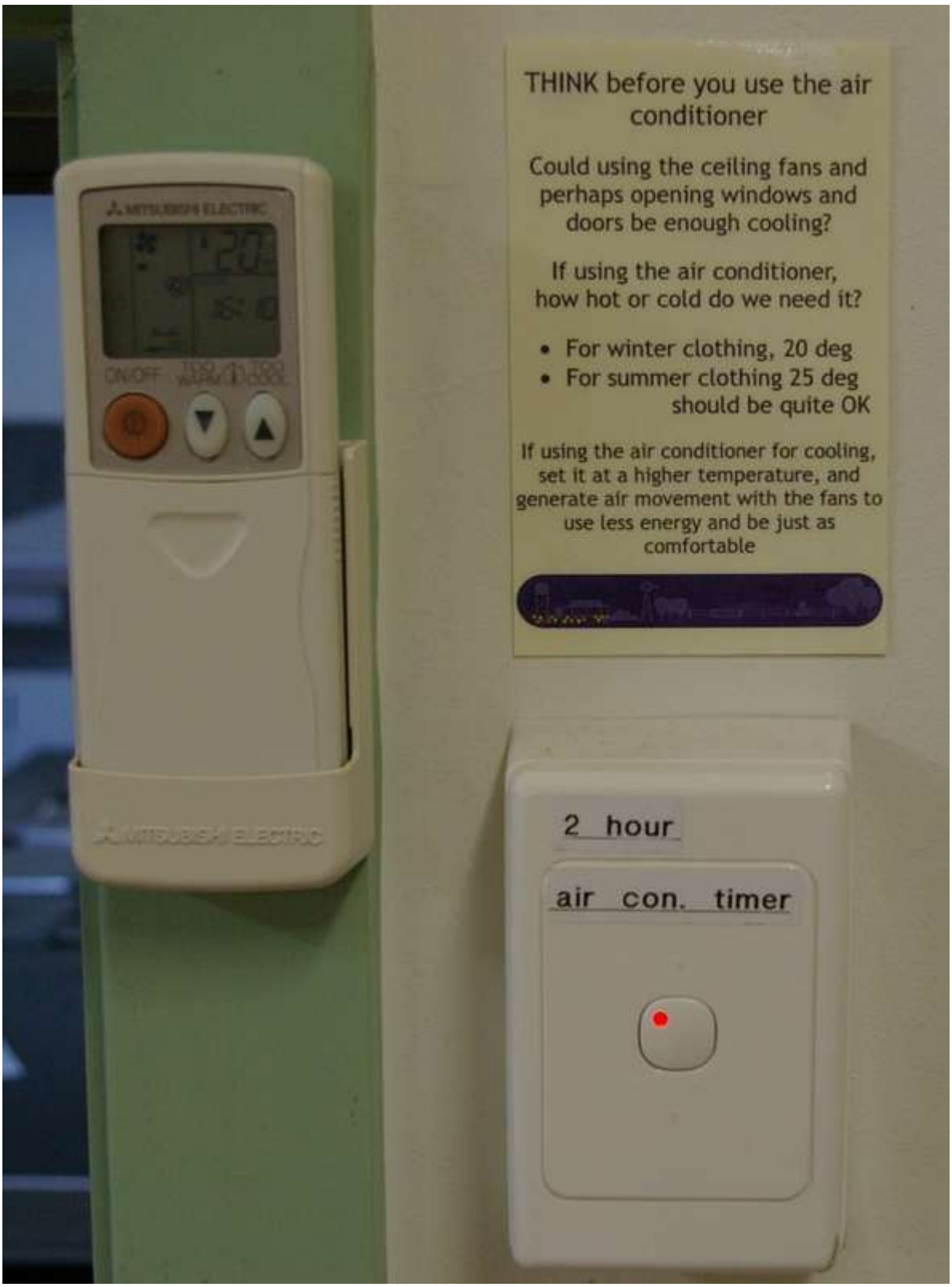
For these buildings electricity operates the computers, internet, telephone, data projector for presentations and movies, photovoltaic display monitor, small fan and electronic controller for the roof mounted solar collector, ceiling fans, lighting, and power tools for maintenance and the retrofit. All of these are 'small and clever' uses of electricity, where relatively small amounts of this high quality energy are used to produce great benefit.

Electricity is not so well used for space heating, 'climate control' cooling, or hot water. These 'big and dumb' tasks can be better done by simpler energy sources such as sunlight (solar), firewood, solid shade, and the transpiring green leaf for cooling.

Reverse cycle heat pump air conditioners
Thoughtful use of the existing reverse cycle air conditioners in the smaller public rooms, for public events, with many people benefiting, is reasonably energy efficient. See below about combining these with the ceiling fans.

Visiting TAFE sustainability assessors group in the Supper Room, June 2010. Reverse cycle heat pump air conditioning for space heating is supplemented by warm sunlight through the roof windows, and the warmth is gently circulated by the ceiling fans. Moderate amounts of electricity for space heating is reasonably efficient when there are many people using the space.

There are twelve existing reverse cycle air conditioners across the Community Complex and Early Childhood Centre. To make sure these are at least turned off when the building is empty, we installed 2hr timer switches on all of them., and also on a very occasionally used little electric hot water unit in the meeting room kitchenette.



Timer switch on Supper Room air conditioner, with note encouraging users to think before using.

Air conditioner compressors on the WNW facing wall of the Early Childhood Centre. Placement of the compressors in a hot exposed position can increase power usage by 20%. We need these trees to grow, and more trees planted, to shade them. These air conditioners can use 18.4kW, while the maximum power that the $20 000 worth of photovoltaic panels on the roof can produce is 4.86kW.

The allure of 'climate control' with indoor air conditioning is understandable, but unfortunate as domestic energy use for heating and cooling generates massive CO2 emissions which are thought to be de-stabilising our climate. The more we seek 'climate control' the more our planet's climate goes out of control!

The permaculture principle of apply self-regulation and accept feedback is relevant here, as is the ethic of fair share .

General principles of natural cooling

Our skin is a natural evaporative cooler. Studies have shown that gentle air flow over our skin can make us feel 5 degrees cooler, even though there there has been no actual change in temperature. This does not require obvious sweating. In our often hot dry climate in NE Victoria we can be constantly evaporating moisture from our skin, and helping to cool ourselves, without ever actually feeling sweaty.

This kind of temperature regulation is what human skin has evolved to do. Being 'acclimatised' refers partly to our skin's fitness at regulating temperature. Unfortunately with common use of air conditioning many of us are acclimatised only to temperatures between about 21 and 28 deg C. We need to regain our capacity to cope with a greater range of temperature.

Ceiling fans

We can use breezes, draughts, and ceiling fans to generate air movement. Even if an air conditioner is used, it is more energy efficient and just as comfortable to set the unit to a slightly higher temperature, so it doesn't have to work so hard, and run ceiling fans to move the air over your body. The relatively big ceiling fans generate air movement more efficiently and quietly than the fan in the air conditioner.

Ceiling fan installed in the kitchen. This can also be used in winter, on low, to move heat down, and to push excess heat from the kitchen out into the supper room. Warm beam of winter sunlight from the roof window can be seen on wall behind.

The big fan

Just as domestic ceiling fans can move more air more efficiently than the smaller air conditioner fans, for big spaces one big fan can be much more efficient than lots of smaller ceiling fans.

Macro-Air 6m diameter fan in the Hall. This operates on 250W, turns slowly, and moves more air with less noisy turbulence than 9 x 90W domestic ceiling fans. The controller, mounted in the foyer switchboard cupboard, creates three phase power to operate it. The fan was described as 'silent' or as noise not being a problem, but there is a high frequency background noise emitted by the controller and fan when in use. Many people do not notice or are not bothered by this noise, but some are. At a busy event with background noise no-one would hear it. Mostly this fan has been very well received and appreciated.

The big fridge

The big 2 door fridge in the kitchen draws between 580 and 830W, and runs hard and noisily. It is a terrific asset when catering for occasional events of 100, or even 30, people. In 2008 it used about 2.4MW/hrs of power, creating 3.2 tonnes of greenhouse gas production, costing about $230 on the power bill, and for most of that time was either empty or had one carton of milk in it for most of that time.

The big fridge is now only turned on when needed. The little bar fridge runs all the time, and uses 204 kW/hrs per year, less than 1/10th of the power that the big fridge was using! The $309 spent on this new little fridge was cost effective.

David Arnold