

Air-conditioning (A/C) Presentation March 17th 2010

The presenters this evening are:

Tim Hamer, Antoni Pisa and Laurie Reeves.

Good evening to members and future members!

Nowadays during summer, people will often leave an air-conditioned house, climb into an air-conditioned vehicle and arrive at an air-conditioned workplace or other common destination such as a shopping mall, restaurant or another air-conditioned home. Air-conditioning is ubiquitous to modern living.

During this presentation, we will examine many issues relating to Domestic A/C with some cross-over to the Commercial A/C industry as well.

We will ensure there is plenty of time for questions at the end of the session so could you please hold your questions until then. You might find your question answered by one of the follow-on presenters.

Please also bear in mind that the best way to save energy costs and reduce greenhouse gas production is not to run an air-conditioning system at all. Ways to achieve this outcome include-

Design out the requirement for air-conditioning by utilizing aspects such as suitable site orientation, high levels of ceiling, wall and floor insulation, appropriate window sizing and type (eg Double-glazing, casement, double hung), appropriate levels of thermal mass, stringent draft control and adequate cross-ventilation wherever possible. Room zoning is useful too.

Most importantly, whether in a new or existing house, get the sun off external glass (even double glazing) during the hot periods of the day. External blinds, vegetation including deciduous trees, shrubs and vines, and other elements including shutters and screens can be most effective in this role.

SLIDE 1.

If air-cooling measures are still required at least you have a head start in lowering the levels of electricity needed to run whichever air-cooling system is purchased. And if you still need to run an air-conditioner then one solution to reduce your Greenhouse gas output is to use 100% Green Power if possible.

Some of you might not know there are grants available from the Federal and state governments for people who are medically deemed to be unable to regulate their body temperature. These grants may be used to subsidise the cost of the supply and installation (and running costs) of heating and cooling systems in their homes. With people living longer and suffering more

complicated chronic and acute illnesses and conditions maybe there will be a greater take-up of these programs in the future. Also, people who have mild to severe disabilities whether living in a hostel, group home or at home, generally pay more for their energy costs because they are at home more often and therefore need to utilize heating and cooling more than others.

-Regarding heat toleration-

Thermostats should be set to a range 23°C to 26°C for summer cooling. This should give a comfortable temperature without overdoing it. Ref RENEW ARTICLE: ISSUE 98.

-Fans-

Wall and ceiling fans, pedestal fans and table fans can be used for spot and small area cooling. One tip is place a bowl of ice in front of a table fan for personal cooling. DOMAIN ARTICLE JAN 30 2010. Ceiling fans can be used in conjunction with an air-conditioner to enable a higher thermostat setting to be used. "The Save Energy "website advises setting temperatures to 26 degrees because 1 degree less can increase your energy bill by up to 15%." SAVEENERGY.VIC.GOV.AU

-Whole of house ducted air circulating systems-

Includes systems that circulate filtered air throughout the house, often via ceiling ducts. These systems will replace the internal air with filtered external air at night time to take advantage of day/night air temperature differences. Some people achieve a similar result by circulating cooler underfloor air via the heating duct system, with the heating function disabled of course.

Thank you Ian McNicol of Sustainability Victoria for most of the information coming up.

SLIDE 2

There are 2 types of air conditioning devices commonly used in Melbourne.

SLIDE 3 Evaporative air-conditioners.

SLIDE 4

SLIDE 5 Refrigerative air-conditioners.

SLIDES 6, 7 8

There was a significant increase between 1994 and 2008 in % of households with air-conditioning in Australia. From 35% in 1994 to 70% in 2008. Victoria closely followed the national trend.

SLIDE 9

Installed stock of A/Cs, evaporative and refrigerative.

SLIDE 10

Regional distribution of A/C. Note Ballarat.

SLIDE 11

Main type of A/C installed. Evaporative and cooling only refrigerative appear to be declining. Small price difference between cooling only and reverse cycle at this time.

SLIDE 12

Maybe those items listed as “Not Known” could include these:

SLIDES 13, 14.

Style of A/C installed. Includes Split system, Ducted, Window/wall and portable. Note declining sales of window wall, while ducted and portable appear to have plateaued. Cost relativities?

SLIDE 15.

The Mandatory Energy Performance Scheme (MEPS) as it applies to air-conditioners can be illustrated by the following labels.

SLIDES 16,17,18,19,20,21.

Estimated installed load of residential Evaporative and Refrigerative A/C in Victoria from 1995-2010.

SLIDE 22.

Estimated peak load of residential A/C in Victoria 1995-2010.

SLIDE 23.

Impact of temperature sensitive loads- VIC Summer 2009-2010.
11th Jan (42.5°C) and 23rd Feb (23.6°C). Demand over time.

SLIDE 24.

Explanation- note some people would still have been on holidays.

SLIDE 25.

Impact of demand on wholesale electricity price.

SLIDE 26.

Impact of demand on wholesale electricity price from 2-3 cents per kWh to \$10 per kWh

SLIDE 27.

New Air-conditioning system hits market-

Brand Name: “Coolarado”.

- This is a different type of evaporative air-conditioner that is claimed to use much less electricity to run and can even be run on PV systems.
- Suitable for cooling only (except for one larger model)

- Outside air is taken into the system, filtered then put through a “patented maisotsenko cycle” (Brochure) process which splits and cools the air stream whilst also saturating it. Some of the resulting airstream is then released at a lower temperature and can be used for secondary cooling despite being saturated.
- One novel usage seen on the Coolarado website is to cool the underside of the solar panels used to provide the power to run the system. This claws back some of the losses (up to 30%) encountered over 35°C.
- The remaining air flow is distributed via standard ducting in either the ceiling or floor of the house.
- A significant part of the claimed power savings rely on the use of a- “High efficiency, variable speed, electronically commutated motorized (EC M) Impeller.” (Brochure)
- This fan is driven by a 750W motor.
- Water use is the bugbear of evaporative systems.
- Can use non-potable water eg bore water, tank water etc. Uses about 10 litres an hour but can be recirculated.
- Unit weighs about 150Kgs so not suitable for roof mounting unless reinforced.
- The Coolarado website is www.coolarado.com .
- The local distributor is www.clearsolar.com

Being a trusting ATA member who always believes what salespeople tell him I asked Mark Wilson at Clear Solar for details of installations to date, performance and cost.

He said they’d launched the product in December but only commenced installations in February and had done 20 installations to date. He told me about the first installation at the “Eco Pod” display home in Bendigo and said the people there were very happy with the “M50” unit they had installed. He reiterated the substantial savings that could be made with the Coolarado system and pointed out that features included ease of servicing, standard filter parts availability, ease of installation, and the fact that the unit circulated 100% fresh air rather than recirculated air. I then asked how much?

The price is similar to the installed cost of a whole of house ducted refrigerated air-conditioning system. This means a price of \$12-20000 depending on the ease of installation. A separate heating system/circuit would be required on top of this price.

I then contacted Bryce Tonkin at the Ecopod Display Home (61 Collins St Kangaroo Flat Bendigo bryce@ecovill.com.au) for some feedback on his M50 Coolarado cooling system and was told

“We love it, outside it is 32°C and inside it is 19°C, and it’s running off our 1000W Solar system and drawing 700W at this time.”

SLIDE 28.

Bryce said they might replace the current unit with an M30 unit to suit their small floor area of about 100 square metres. The M50 unit was the only one available at the time of purchase. They would retain the bigger unit for a training area when it was built. The Ecopod is covered with data loggers as part of a LaTrobe Uni project examining the performance of the building and the Coolarado is incorporated into that project.

SLIDES 29, 30.

He felt that when the humidity levels were over 90% performance fell off “slightly”.

Clear Solar feels the move into this technology was a natural fit given their market presence in other area of sustainability including PV systems and solar hot water. They offer 3 models –

M30, M50, C60 to suit different market segments including the larger residential and commercial sector.

A larger model the H80 heats as well as cools.

Specifications for all these products can be found on these websites-
SLIDE 32.