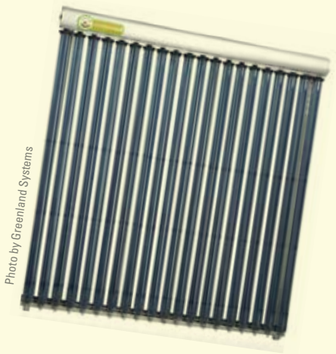


Photo by Greenland Systems

Hot sun, cool house

The future looks bright for solar airconditioning

The sun is beating down on the roof. The garden is wilting and so are you. Wouldn't it be nice to turn some of that heat against itself?

You may be surprised to know, it's actually possible to convert heat on the outside of your house into a cooling breeze inside. Solar airconditioners are coming your way.

The models in development now mostly use evacuated solar thermal tubes, like the ones used in many solar hot water systems. Instead of drawing on mains power on the hottest days, pushing power grid peak loads into the red, these systems would just hum along on solar energy. And the hotter it is, the better they work.

Consensus is that solar aircon for homes could be only a couple of years away. Currently there are several types of system in development.

How will they work?

One of the most promising systems uses evaporation. The system uses a desiccant to remove humidity from the air, which is then re-humidified using wet pads so the air delivered to the building is both cool and not too humid. The desiccant is then solar-heated to remove the moisture it has collected, so it's ready to work again.

These systems are very far down the track in terms of technical development and will probably be among the first to be commercialised for domestic use. They're efficient, robust and easy to maintain. A slight downside with desiccant-evaporative systems, however, is that they use a fair amount of water: CSIRO has estimated 30-50 litres on a hot day for a residential system (that's about as much as a four-minute shower with a low-flow showerhead).

Another exciting technology, though not as far along as evaporative systems, uses ejector jet pumps, which rely on heat energy to circulate a fluid through a cycle of condensation and evaporation. The principle has been known for around 100 years, and Dr Mike Dennis, who heads the Australian National University's solar ejector jet program, believes it has the potential to be more reliable, cheaper and smaller than comparable systems. The ANU is working with commercial partners to develop a prototype.

A winning design

Dr Paul Kohlenbach of Solem Consulting is a former research scientist with CSIRO and an expert in residential-scale solar aircon. Dr Kohlenbach says that to succeed in the residential market, manufacturers "need to develop a plug-and-play solution, pre-packaged and ready to use".

Dr Kohlenbach believes the future for solar aircon is bright. "The CSIRO is currently researching a small solar cooling system which could be market-ready in two to three years. Overseas manufacturers have realised that the Australian market has huge potential and have started to establish themselves here."

Probably the single most exciting thing about solar technology, he says, is that it has the potential to not only offer airconditioning, but heating and hot water as well. "A possible solar cooling kit can therefore provide all the thermal needs of a residential house."

The ANU's Mike Dennis agrees that a system that both cools and heats is the holy grail of solar climate-control technology. "Consider that most of Australia's population live in a temperate climate that hardly requires airconditioning – in fact requiring a lot more heating than cooling," he says.

If we allow climate change to continue, of course, more Australians will be concerned about summer cooling than winter heating. Even so, whichever system prevails, the winning design will almost certainly offer year-round comfort and a hot shower.

How much?

Naturally, the new technology will sell for a premium at first. But as with all new technologies, the cost will reduce over time. Just as solar hot water is now economically viable for ordinary households, solar climate control will be as well.

Another thing in solar's favour, according to Dr Kohlenbach, is the projected rise in the price of non-renewable power. "The widespread use of solar cooling in Australia will always be dependent on the cost of electricity. If power costs increase as forecasted then solar cooling will become cost-effective."

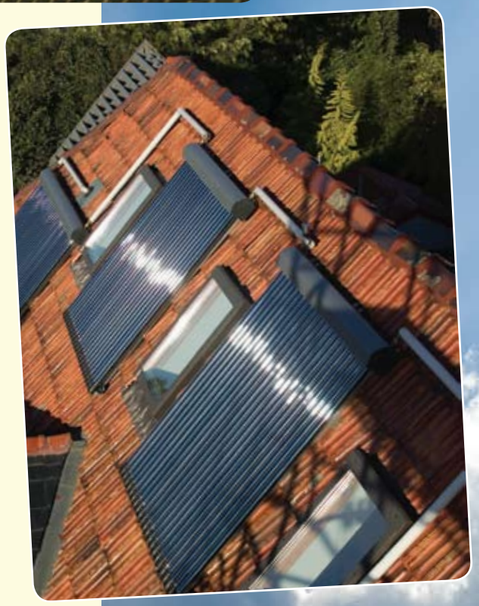
The higher the price of non-renewable power, the more financially attractive a solar system will be. And assuming solar systems are priced competitively with conventional systems, when you factor cooling, heating and hot water costs into your sums, says Dr Kohlenbach, "the lifecycle cost (over 20 years' lifetime) will be much lower than conventional systems".

Sounds well worth the wait.

These evacuated solar thermal tubes powered the airconditioning at the Beijing Athlete's Village

Photo by Greenland Systems

The winning design will almost certainly offer year-round comfort and a hot shower



But I'm hot now!

Adjunct Professor Alan Pears of Melbourne's RMIT is a regular columnist with the Alternative Technology Association's *ReNew* magazine. To people in the market for an airconditioner, Alan advises to look for an Energy Efficiency Rating of 5.5 (5.5 units of cooling for each unit of electricity) or better.

"Of course," he says, "the key to all this is to ensure the building is super-efficient, to minimise the size of the airconditioner needed. The Australian Institute of Refrigeration Air Conditioning and Heating has a good calculator (www.fairair.com.au) that allows you to estimate the required size of an airconditioner."

The most energy-efficient domestic airconditioners on the market today are evaporative airconditioners. The best "evap" coolers are efficient enough to be run with photovoltaic panels. Unfortunately the current crop of evap coolers don't work efficiently in humid climates, limiting their effective range to south and central Australia: Adelaide, Perth, Melbourne and Canberra, and to a lesser extent Sydney. Dr Kohlenbach, however, is hopeful that desiccant-based systems can overcome this limitation: "A material that can absorb more water out of the air will make desiccant systems suitable for humid climates as well."

For more information:

www.energyrating.gov.au
energy ratings for all major makes of aircon

www.yourhome.gov.au
guide to reducing energy costs and information on cooling systems for the home

www.solarcooled.com
free report by Solem Consulting on current solar aircon technologies

www.coolmax.com.au
good calculators and information about current evap aircon models