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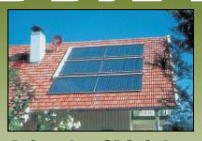

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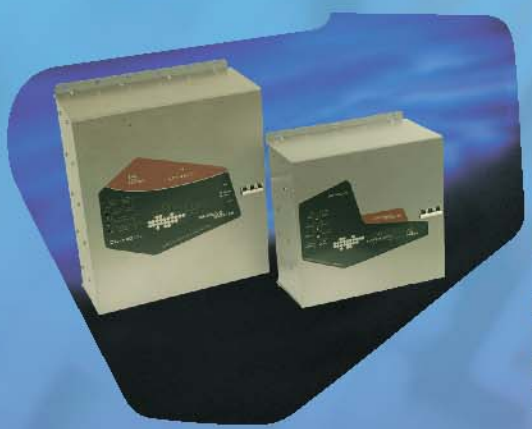

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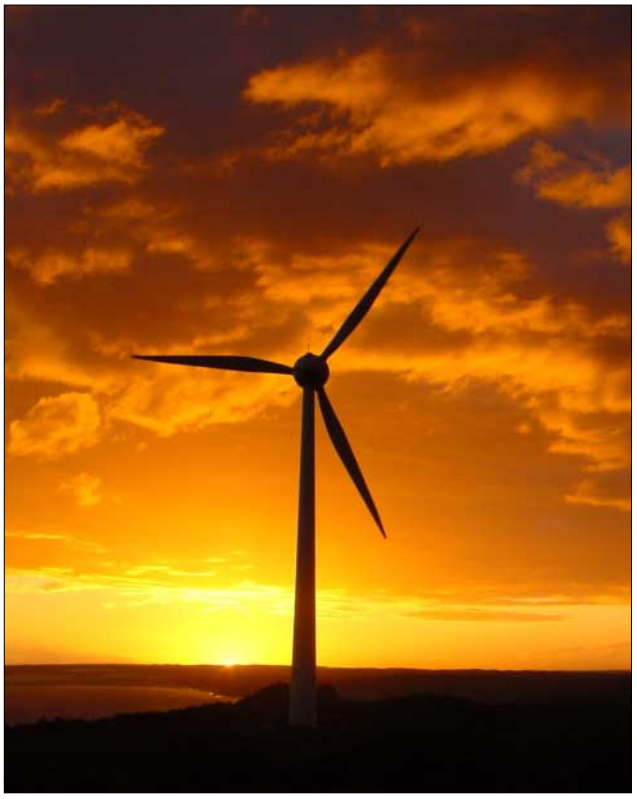

A landmark report looks for a solution to the impact of wind farms on the landscape. Page 32.

The Food Forest produces a bounty of organic foods. Page 28.

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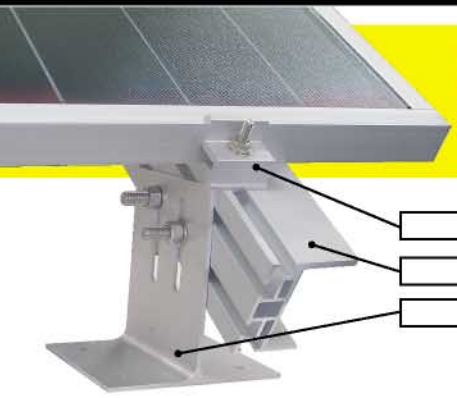

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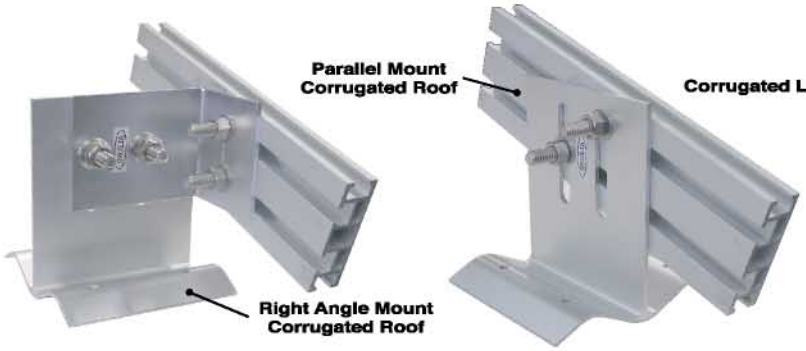

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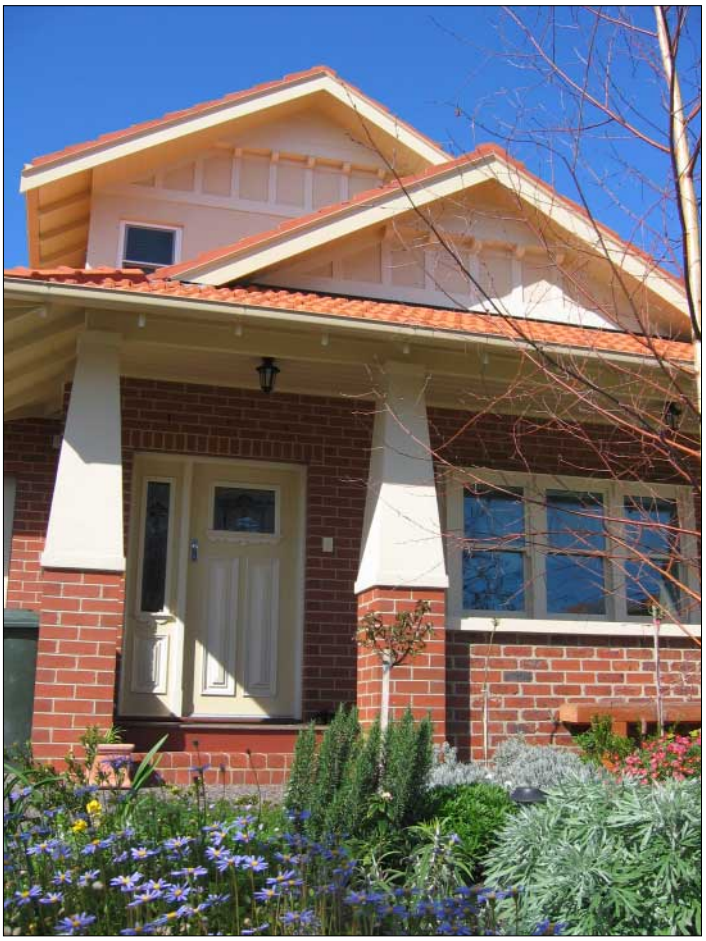

A 1910s style Californian bungalow that on the inside performs like a modern eight-star home. Page 53.

regulars

Towels made from bamboo? If you think this sounds silly, check them out in Products, starting on page 79.

Oops! We forgot to thank Wiley Lewis for the beautiful cover photo for *ReNew 92*.

From the Editor

About ReNew

ReNew is published by the ATA (Alternative Technology Association), a non-profit community group concerned with the promotion and use of appropriate technology. *ReNew* features solar, wind, micro-hydro and other renewable energy sources. It provides practical information for people who already use these energy sources and demonstrates real-life applications for those who would like to.

ReNew also covers sustainable transportation and housing issues, the conservation of resources, recycling and broader environmental issues. *ReNew* is available from newsagencies, by subscription and as part of ATA membership. ATA membership costs $65 per year, and offers a range of other benefits.

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Advertising manager: Olivia Neville-Smith

Editorial and production assistance:

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Next advertising booking deadlines: Booking 3 October, copy due 14 October 2005. Next editorial copy deadline: 21 October 2005.

Time to act now!

With the official go-ahead by the Victorian Government for the expansion of Hazelwood power plant, the developed world's dirtiest power station, it is easy to lose faith in our prospects of stopping Australia's increase in greenhouse gas emissions. The expansion has been on the cards for a few years and has only been stalled thanks to the efforts of Australian environment groups, who were calling the government and the Hazelwood owners International Power to account. Still, it saddens me to think that after all the rhetoric, Australian governments are still not taking the threat of climate change seriously. We need to start making the hard decisions now and switch to greenhouse friendly forms of electricity generation and enforce energy-efficiency measures. Otherwise we are just holding off on the inevitable.

It makes our work here at the ATA even more vital as it is going to be the innovators and early adopters of sustainable technologies that pave the way for future generations. The experimentation being conducted in peoples' sheds, gardens and homes is assisting in the development of better ways to live, so we can all be energy and water efficient.

So divine, food and wine

It seems that farm fresh produce and old-style cooking is going through something of a revival in Australia at the moment. No need to look further than the growth and success in farmers markets. People are craving quality, locally-produced food and perhaps the community and social connection that comes with talking directly with the person who produced it. The farmer can also give you all the best tips on how to store produce and maybe even a good recipe or two.

Many shoppers at farmers markets may not be aware that it is also a more environmentally-sustainable form of shopping. By cutting down on the amount of transactions that the food goes through from producer to shopper, it reduces the amount of greenhouse gases emitted in its transport.

So you get to have your cake—or tomatoes, cheese or bread—and eat it too!

Donna Luckman

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in the ReNew/Sunplus CPC Solar subscriber competition

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Take out an ATA membership, become a supporter, subscribe to *ReNew*, or renew your current membership or subscription before 18 November 2005 and you could win a Sunplus CPC Solar evacuated tube retrofit kit valued at $2995 including GST. Australian entries only. See the conditions below, and get your membership or subscription in today!

Conditions and how to enter

(1) The competition is open to anyone in Australia who subscribes to *ReNew* or joins the Alternative Technology Association (ATA) during the competition period, including existing subscribers and ATA members who renew their subscription/membership during the competition period, and to *ATA Supporters*.

(2) The prize is not redeemable for cash. Price includes GST.

(3) Sunplus CPC Solar reserve the right to change specifications without notice.

(4) Product must be installed by a licensed plumber and must comply with the relevant standards.

(5) Paid ATA staff, members of the ATA executive committee and members of their immediate families are ineligible to enter.

(6) The competition runs from 20 May to 18 November 2005. Subscriptions/memberships must be paid by 5pm on Friday 18 November 2005 to be eligible.

(7) The competition is open to individuals only. Corporate entities, collectives and organisations are ineligible.

(8) To subscribe or join the ATA, use the subscription form in this issue (or a copy of it), visit our webshop, or call the ATA on (03) 9419 2440 to pay by credit card.

(9) The competition is only open to Australian entries and includes delivery to the nearest GPO. This competition is not open to New Zealand or other overseas residents.

The *ReNew*/Sunplus CPC Solar subscriber competition is proudly sponsored by Sunplus CPC Solar, Factory 24/7 Dunstans Crt, Reservoir VIC 3083, ph:(03) 9462 1427, email: info@sunpluscpc.com.au, www.sunpluscpc.com.au

Don't recycle, reuse!

I was interested in Lance Turner's comments in the latest issue of *ReNew* suggesting that both farming and industry, our largest water users, should be doing a lot more to conserve water.

Courtesy of climate change, Western Australia's rainfall has declined by one third, and much of the country has been in severe drought conditions for several years. So is it sustainable to continue to grow very high water demand crops such as cotton and rice in Australia?

With regards to industry, there is a great deal of coyness about promoting the obvious 'front end' method of saving massive amounts of water used to manufacture products we choose to buy. We can save huge quantities of water by buying products that are reusable, durable, reliable and repairable, rather than single-use disposables suited to a throw-away world.

It's certainly not high-tech, more a case of reuse and renew. Future generations will find it bizarre that in Australia, a glass bottle that lasted, undamaged, for thousands of years was used only once and then perhaps recycled into a brand new bottle. If we were really serious about conserving water and stopping climate change, we would wash and reuse that bottle again and again for its original purpose.

Reusable bottles are obviously the way to go. Once we shake off our slavish mimicry of the American way of life, we will bring back the reusable container with compulsory deposit legislation for containers designed to last.

Incidently, your great magazine was brought to me by a volunteer at our school community waste minimisation centre which enables unemployed people or retirees to make a valued contribution to their local community. This is a great example of genuine energy efficiency, which, of course, hardly rates a mention by economic rationalists.

Harry Johnson,
Aspley QLD

Write to us!

We welcome letters on any subject, whether it be something you have read in ReNew, a problem you have experienced, or a great idea you have had. Please limit letters to 350 words.
Send letters to: ReNew, PO Box 2919 Fitzroy VIC 3065,
email: renew@ata.org.au

Solar in the snow

I read with interest Mark Loveridge's article *A shelter from the cold* (*ReNew 92*) which commences with the words 'We were told solar wouldn't work in Tasmania'.

I have recently spent several years living in St Paul, Minnesota, USA, which gets bitter winters, far colder than Tasmania. Friends there have a passive solar house. I have been amazed how warm it is without the need for additional heating, even on overcast days with plenty of snow on the ground.

To me, the home looks conventional. It is a typical-looking American home, built on a slope so that the south side of the basement is level with ground level so you can 'walk out' from the basement into the garden.

The basement floor is dark, perhaps quarry tiles on a concrete slab and the southern wall of the home is floor to ceiling windows on both levels, pulling in the sun. The lounge is set back from the southern wall of windows with only a half wall on the southern side. Between the southern border of the lounge and the southern edge of the house there is an internal deck, over the front of the basement. The planks of the deck are set about ¼ to ½ inch apart. The warm air from the basement then rises up through this decking into the house, warming all the rooms. The air then flows northwards through the rooms and enters the space between the northern walls of the house from where it falls back to the basement to be warmed again. Obviously the home is also well insulated.

It is curious to hear so often from people who 'know' that solar systems do not work very well in Canberra due to the cold winters and low angle of the sun when solar systems are proving effective in places such as the UK and Minnesota.

Barrie Ridgway,
Barrie-Esther@bigpond.com

Simple watering system

Here's a small, simple DIY project which has been useful for us and might be useful for others.

The problem: we needed to drip water groups of plants on our farm very slowly to avoid run-off. Some are within reach of our water pipes, some are not. We can't easily go back to turn off taps to all the areas, and we can't risk a malfunction in a timer—I once had a timer which came off a mains tap in hot weather, and flooded the back yard. We are now rainwater dependent, and can't run the risk of draining our tanks.

The solution: buy 200 litre pickle barrels from disposal shops (around $20 each). Drill a hole at the base, fit a hose tail connection and run poly pipe to the plants, with drippers.

The advantages of this system are:

- We can fill the barrel fast at high pressure from the rainwater tank, bore pipes, or our trailer-tank (the fire fighting unit)
- The drippers work over an hour or so, without any supervision. Nothing has to be turned off
- There's no risk to our water supply.
- We can tell if the drippers are blocked—the water level doesn't drop in the barrel
- We know exactly how much water the plants have had

Tony McKenzie,
tonymck@senet.com.au

[Letters]

Open channel irrigation

Thank you for a wonderful resource. I find myself reading *ReNew* from cover to cover. Even the letters.

Regarding the letter from Bruce Gill *'Farming and water use'(ReNew 92)*, it was a well researched and clearly written response to Lance Turner's comment on farmers using open channel irrigation.

As a country dweller and ex farmer, I am repeatedly shocked at the supercilious ignorance of farming reality exhibited by city based environmentalists. When you pay $33 per kilo for beef, remember that the farmer gets $3 per kilo for his product. Farming is not profitable for the ordinary man. Thousands of acres have to be cleared, graded, plowed, fertilised, fenced, planted and harvested for the soy and wheat products in your shops. The channels which make farming possible are often the product of 19th century engineering feats, the longevity of which defines them as extremely efficient. The return on embedded energy invested in new products is often negative.

Water evaporated from these channels would be nothing compared with the evaporation from the trees we have realised we need to replace the areas cleared for crops to feed our urban population.

Paul Morrow,
paulmoro@esat.net.au

Electricity billing madness

According to *Refocus* magazine, the European Commission states that the EU needs to 'start a discussion on how to save energy' in order to meet Kyoto commitments while keeping EU industry viable and saving 20% on energy overall by 2020. In Europe, discussion seems to revolve around real issues such as 'improving energy pricing and taxation to ensure that the polluter really pays'. In Australia, we snore on. It appears that government and energy providers are conspiring to do exactly the reverse while making vaguely green noises.

How is this so? Because Australian energy providers are quietly shifting cost of your electricity away from 'paying for electricity' to 'paying for connection'!

In the time that charges for electricity have barely moved (2001-2005), the charge for connection (the so-called 'System Access Charge') has soared. This means that everybody who's connected pays more for 'just being connected' so the costs are shared everywhere, but quietly. No one pays a lot more unless they are trying to save electricity. Here's the detail to demonstrate.

Since 2001, the System Access Charge has gone from 16 cents per day (on domestic tariff only but off-peak was free) to 19 cents, to 23 cents, to 26 cents. Then, a big jump to 20 cents on off-peak (a new imposition) and 30 cents on domestic tariff, a total of 50 cents per day—well over treble the original charge. Now it's up to 30 cents off-peak and 35 cents domestic tariff. That's 65 cents per day, more than quadruple the original charge!

In that time, charges for actual electricity have gone from 10.5 cents per unit to just 11.9 cents, a tiny increase. My usage over that period went down, but my bill more than doubled!

What is the effect of this over a whole population? It is to induce a feeling of not giving a hoot about electricity usage.

Is this trend a sensible one in view of greenhouse gas and global warming? No. it's irrational and it's been devised by people who don't have a handle on economics, let alone 'ecologics'.

Is it good for people manufacturing alternative energy products? No. Why would you bother with PV? They're expensive and the electricity companies still get you. And not for electricity but for wires dangling off your house.

Is it good for insulation or shade manufacturers? No. Again, why bother? I've already come across people who don't insulate but simply buy a mega air-conditioner. And I've already been laughed at because I didn't do that. Insulation is so complicated and air-conditioning is so quick and easy!

And so in summer, when peak load occurs across the grid because of huge airconditioning loads, the whole system threatens to come unstuck. Irrational. And all because people haven't been insulated from the heat and cold but have been from the cost of electricity!

This is a billing system that needs to be unwound and the charges for access transferred gradually to domestic and off-peak tariffs. There needs to be a strong psychological connection between electricity use and money lost!

Currently, it is useless having information about greenhouse gas per kWh on your bill when it's all undone by billing policy. Imagine having a system access charge at your petrol station. You would get charged whether you go for a drive or not.

If this irrational billing system continues in this way, then we're heading for a flat fee system unlinked to usage.

Alan Baird,
Appin NSW

Affordable Housing

I am a boilermaker by trade, a dying breed, and I have used my trade skills over the years to build a 13 metre Flybridge Cruiser (to 1C Charter vessel code), my own 'log cabin' and other numerous projects.

I have progressed over the years (through going to the University of Technology Brisbane) to teaching/educating adults, predominantly the unemployed and disadvantaged.

To cut a long story short, it was during one of my sessions training unemployed indigenous men in 'concreting and steel-fixing' that I informed the group that they could use the skills they were learning to build themselves their own 'affordable home'. They laughed of course, suggesting that the system was not geared that way.

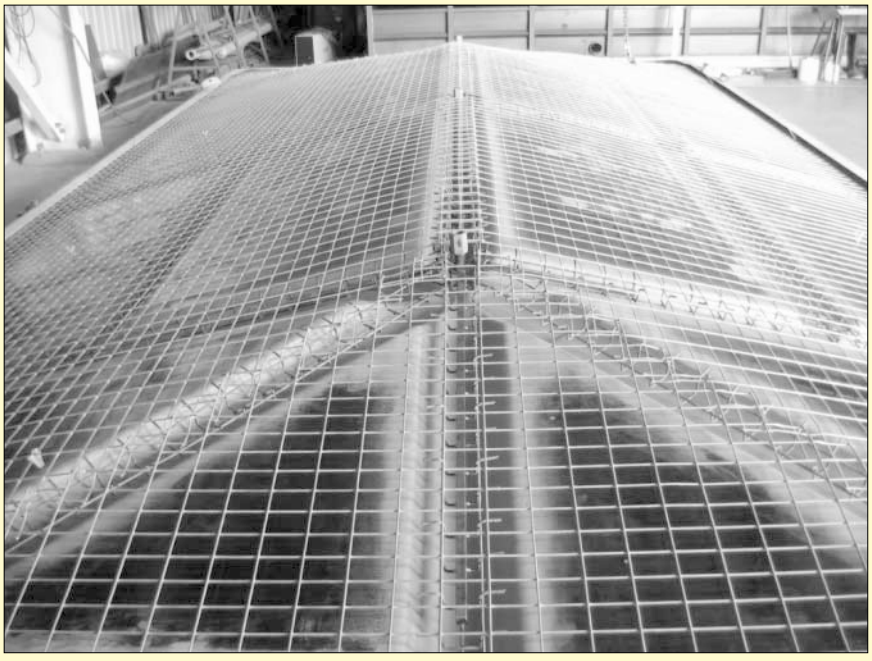
I went home and thought over the next month about how we could build a modular concrete home, using current and cutting-edge technology and my experience building concrete water storage tanks in New Zealand.

I have worked out how to do it using 'moulds' in a workshop environment and transporting the finished parts to the site for erection.

It has taken me fourteen months to fabricate the 'innovative' reusable 8 x 4 metre roof mould.

We poured our prototype roof using a polystyrene bead in the matrix of the concrete. This reduced the weight of the finished roof to 2.8 tonnes, about the same as Monier tile for the same roof area. It also improves the thermal rating of the concrete.

I have drawn up the plans for the fabrication of the 'Y' shaped wall moulds (to suit the lock-over configuration of the roof) but have run out of money to continue at this stage.



I have worked out that by using reusable concrete moulds, which you can modify to deliver several aesthetically pleasing features, it is possible to build a three bedroom home to 'lock-up', on a concrete slab, for around $40,000 (does not include kitchen or bathroom fitout).

These same reusable moulds could be copied and sent overseas to underprivileged areas so that semi-skilled people could build their own homes using materials which are fairly commonly available (it would save cutting down more trees which is what they are doing in Indonesia after the tidal wave).

Concrete houses have finite applications, probably not suitable for Victoria for example, but because of their resource use, limited skills component requirement and low cost they have enormous potential in poorer countries and for poor people.

If you know of anybody interested in this type of housing or even prepared to help me advance the idea further, I would be happy to hear from them, anything at all, I am keen and will respond to all proposals.

Geoff Clarke,
Rockhampton QLD,
clarkegj@ozemail.com.au

Australia joins US in new climate pact

Australia has joined with the United States, China, India, Japan and South Korea in a new climate change agreement. According to the pact partners, who collectively account for over 45% of the world's greenhouse gas emissions, the Asia-Pacific Partnership on Clean Development is not meant to replace the Kyoto protocol but complement it, by sharing information on new clean technologies.

Australia and the US are the only two developed nations that have not signed onto the Kyoto protocol, citing fears it may cause economic hardship, and that it is ineffective in not setting targets for developing countries such as China.

'It [Asia-Pacific Partnership] demonstrates the very strong commitment of Australia to reducing greenhouse gas emissions according to an understanding that it's fair in Australia and not something that will destroy Australian jobs and unfairly penalise Australian industries,' said Australian Prime Minister John Howard.

While welcoming the partnership, Klaus Toepfer, Executive Director of the United Nations Environment Programme, said real and meaningful reductions in greenhouse gases are needed. 'It is important to mention that this new initiative is not a substitute for the Kyoto Protocol, it's legally binding emission reductions and it's various flexible mechanisms including emission trading and the Clean Development Mechanism,' said Mr Toepfer.

The federal government has been criticised for not doing enough to develop cleaner technologies. According to Dominique La Fontaine, Chief Executive Officer of the Australian Wind Energy Association (AusWEA), once the Mandatory Renewable Energy Target (MRET) is met in 2007, growth in the renewable energy industry in Australia will stall.

'The Australian Government could be doing much more to support the development of clean technologies which are proven and available today', said Ms La Fontaine.

The inaugural ministerial meeting of the Asia-Pacific Partnership on Clean Development will be held in Adelaide in November.

Australian communities at risk

Australia will face more heatwaves, a rise in sea levels and more extreme cyclones due to climate change, according to a report released by the federal government in July 2005. By 2030, the national average temperature will rise between 0.4 and 2°C with significantly larger changes in some regions.

Produced by the Allen Consulting Group for the Australian Greenhouse Office, *Climate Change: Risk and Vulnerability*, claims there is little doubt Australia will face some degree of climate change irrespective of global or local efforts to reduce greenhouse emissions. This could have a major impact on tourism and agricultural industries in some areas. Cairns and the Great Barrier Reef, the Murray Darling Basin and southwest Western Australia are particularly at risk. Australia's major cities will also feel the brunt with further pressure being placed on dwindling water supplies.

Launching the report, federal environment minister, Senator Ian Campbell, acknowledged the risk of climate change and the need to do more to stop greenhouse emissions. 'Australia will need to do more and more dramatically and internationally to look at how we produce greenhouse gases in the future', he said.

A week later, Senator Campbell outraged environmental groups by denying that the burning of coal to generate electricity results in the emission of greenhouse gases that contribute to global warming.

The denial was made in Federal Court documents lodged by the government in response to a challenge by the Wildlife Preservation Society that the minister's approval of the Isaac Plains and Sonoma Coal projects without assessment contravened the Environmental Protection and Biodiversity Conservation (EPBC) Act.

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You don't have to be a tech-head, just have a project—simple or complex, electrical or mechanical—that has appeal to do-it-yourselfers and involves renewable energy or appropriate technology in some form. Entries must describe completed working projects.

Send your ideas to: *ReNew*, PO Box 2919, Fitzroy VIC 3065, email: renew@ata.org.au
Competition closes Friday 4 November 2005.

'This is a government that is a mass of contradictions on climate change. On the one hand they're saying it's a critical issue, and on the other making submissions to a court case denying that global warming exists', said the opposition environment spokesperson Anthony Albanese.

Siberia's thaw could cause dramatic change

The melting of the world's largest peat bog in Siberia could drastically speed up the rate of global warming. Scientists returning from the field have told *New Scientist* magazine that an area stretching a million square kilometres across the permafrost of western Siberia is turning into lakes. The melting of the bogs, formed around 11,000 years ago at the end of the last ice age, could release billions of tonnes of methane, one of the most dangerous of the greenhouse gases.

Sergei Kirpotin from Tomsk State University in Russia told the magazine that the melting is 'an ecological landslide that is probably irreversible and is undoubtedly connected to climatic warming'. The average temperature in Western Siberia has increased three degrees celsius in the last 40 years, faster than any other part of the world.

The news is of great concern to scientists who see the release of the methane as a potential tipping point that

Photo credit: ACF

Environment groups delivered a giant inflatable smoke stack to the steps of Treasury Place where cabinet was meeting to sign-off on the expansion.

Hazelwood world's dirtiest power station

Victoria's outdated Hazelwood power station is the most polluting of all power stations operating in the world's major industrialised countries according to a study by the World Wide Fund for Nature (WWF). The 40 year old power station produces 1.58 million tonnes of carbon dioxide every month.

The Victorian government has approved the expansion of the power plant to at least 2030, which will result in nearly 445 million tonnes of greenhouse pollution—the equivalent pollution from more than 105 million cars. Under the agreement the company will be subject to a cap on its greenhouse emissions, which the government claims will achieve greenhouse savings of 34 million tonnes.

'This is a gutless, tragic decision by Steve Bracks. Hazelwood was the Premier's number one environmental test. He has now failed. Mr Bracks has sold out the Victorian public, the environment, new jobs and new industries to bend over backwards to one foreign company', said Environment Victoria's Executive Director, Marcus Godinho.

would dramatically snowball global warming. 'This is a big deal because you can't put the permafrost back once it's gone. The causal effect is human activity and it will ramp up temperatures even more than our emissions are doing', said David Viner from the University of East Anglia.

More destructive storms to come?

In the wake of the devastating Hurricane Katrina that hit the southern US states killing thousands, scientists are asking, is it a result of climate change? While the jury is still out on whether climate change has increased the number of cyclones, one study reports that the warming of oceans is making cyclones more severe.

In a letter published in *Nature* August 2005, Professor Kerry Emanuel from Massachusetts Institute of Technology, warned that warming may increase the destructive potential of storms, especially when considering increases in coastal populations. His studies show that over the past 50 years cyclones in the Atlantic and Pacific have increased in duration and intensity.

A copy of the letter can be found at www.nature.com.au/nature

NZ climate policy review

The New Zealand Government has announced a review of its climate change policy as it struggles to meet its Kyoto target and emissions grow faster than expected.

The review, set up by the Ministry of Environment, will investigate whether New Zealand's current goal of significantly reducing total gross emissions by 2012 needs to be updated.

The review will report back to cabinet by the end of October 2005, and will inform the views of the New Zealand delegation to the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Montreal in November.

Food miles cost the earth

If you thought that supermarket food tastes like it has gone around the block and back again, you'd be right. A study carried out in the United Kingdom showed that the ingredients of a traditional meal could have travelled up to 38,400 kilometres.

The UK Department of Environment Food and Rural Affairs estimated that transporting food to and around the UK produced 19 million tonnes of carbon dioxide in 2002, of which 10 million tonnes were emitted in the UK—1.8% of total UK carbon dioxide emissions.

The report estimates the overall social and environmental cost of food transport at around 9 billion pounds (approximately 21 billion Australian dollars), impacting on road congestion, accidents, climate change, noise and air pollution.

NZ wind farm potentially world's best

A proposed wind farm near Wellington has the potential to provide 10% of New Zealand's renewable energy target if given the go ahead. Meridian Energy is seeking approval to develop the wind farm—Project West Wind—which is expected to generate enough electricity to power around 110,000 homes. With up to 70 turbines the wind farm will have the capacity to produce 210 megawatts.

Meridian Energy Chief Executive Keith Turner says the site has been identified as one of the best in the world for wind farm development. 'Our Project West Wind proposal makes great use of

Wellington's world-class wind resource. The site has strong, consistent wind conditions because of the funnelling effect of Cook Strait, making it ideal for wind power generation', said Mr Turner.

Project West Wind would operate at full capacity 47% of the time—more than double the international average of 23%, and generate electricity over 90% of the time.

Wind to power salinity plant

Construction will begin later this year on a 48 turbine wind farm that will power Western Australia's $387 million desalination plant. To be built at Emu Downs north of Perth, the 80 megawatt wind farm is a joint venture of Western Australia's Griffin Energy and Queensland-owned Stanwell. The use of wind power will contribute to the Western Australian government's attempts to meet the South West Interconnected System renewable energy target of 6% by 2010.

National plan to reduce salt in detergents

The development of a national strategy to reduce salts and other chemical fillers that provide bulk in many washing detergents is one of the priorities identified at a meeting of state and federal environment ministers in July. The ministers plan to investigate options for a national product standard for detergents that reduces chemicals that are potentially harmful to the environment.

"But ... JB, we didn't even **believe** in global warming till Bob Carr said nuclear power might fix it."

Cartoon: Bill Gresham

The move has been applauded by the Alternative Technology Association (ATA, publishers of *ReNew*). 'The ministers should be congratulated on this initiative which will help Australians to safely recycle wastewater in their homes as well as assisting the development of large-scale water recycling projects', said Robin Merrick, ATA Greywater spokesperson.

There is currently no labelling system identifying salt content of washing powders and liquids, which can damage plant cells and the soil itself. 'Without labelling or a national standard, people who are trying to reduce their water consumption by reusing greywater may potentially be damaging their gardens.

We suggest people only use the recommended dosage of detergents or even less, check the results of Lanfax research into detergent composition and closely monitor the health of their gardens', adds Ms Merrick.

For more information go to the Lanfax Labs wesbite: www.lanfaxlabs.com.au
Or the ATA website: www.ata.org.au

Playground to provide water for rural poor

For people in developing countries the chore of collecting fresh water from bores relies on the operation of arduous hand pumps or expensive diesel, petrol and electric pumps.

However a new South African invention, the Play Pump could simplify the exercise. The Play-Pump is a specifically designed playground roundabout that drives a conventional borehole pump, keeping costs and maintenance to a minimum.

The pump is capable of producing 1400 litres per hour at 16 rotations per minute from a depth of 40 metres, and is effective up to 100 metres. As the children spin, water is pumped into a 2500 litre tank standing seven metres above the ground. A simple tap provides easy access to the water.

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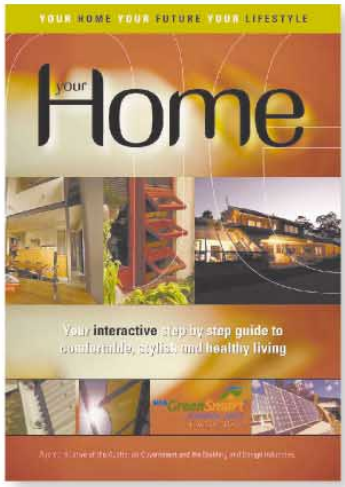

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Cafes go green to cut on waste and costs

Over 50 small businesses involved in the City of Port Phillip recently discovered how saving money on their energy, water and waste bills not only helped to increase their profits, but reduced their environmental impact as well! EcoEdge Project Officer Kerry Archer reports on her experiences and provides some handy hints for small business owners

Small business has long been regarded as one of the most difficult audiences to engage in environmental programs. Unlike large corporations, they don't have triple bottom line reporting, shareholder pressure and government regulations driving them towards improving their environmental performance. This doesn't mean, however, that small business owners aren't concerned about their environmental impact, but many are often time and knowledge poor, with competing priorities and limited financial and human resources to implement change.

Small business big impact

According to the Australian Bureau of Statistics, there were 1,233,200 private sector small businesses employing 3.6 million people (49% of all private sector employment) in the year 2000. Small businesses are therefore extremely important in the bigger sustainability picture and should be involved in any approach to reducing the environmental impact from business.

In recognition of this, many local governments and non-government organisations are now running programs to assist interested small businesses in reducing their environmental impact in a number of ways. The EcoEdge Business program I was recently involved with at the City of Port Phillip was one such initiative.

When I first started work on the project, many co-workers commented on what a difficult bunch small business owners can be. Something that made me initially think that I would be biting off more than I could chew! I was immediately surprised, however, by the responsiveness of most of the businesses I approached to be part of the program. There was a general feeling of concern for the environment and a desire to do something to help.

The program involved me providing a free environmental assessment in the areas of energy, water and waste. The businesses then received a detailed, tailored report that provided helpful and cost-effective ways to reduce their impact. The businesses were really appreciative of receiving information so specific to their businesses, rather than a generic flyer or other information.

First step: recycling

On the whole, most businesses were great at recycling. Spring Foods in Clarendon Street were recycling their cardboard but not their commingled wastes before the program. After being advised that they could get a free wheelie bin from council, they started to separate out their recyclables and were able

to reduce their private rubbish pick up by one bin a week, saving them around $100 over the course of a year!

There were very few cafes and restaurants who were participating in any sort of green waste collection. Through the program, Fresh @ Elwood trialled a couple of different on-site composting methods, with a CERES cafe-sized worm farm (see *ReNew 88*) proving the most successful. According to owner Pat Wilson-Mursec, 'the CERES worm farm has been terrific. We put around a bucket a day of fruit and veg scraps in it and the worm poo can go straight on the herb garden!'

Blessington Street 'pay as you feel' restaurant Lentil as Anything, were taking their scraps to the local Veg Out community garden, but are now sharing the cost with the Spud Bar next door to have them collected. These initiatives mean that less food waste is ending up in landfill where the decomposition leads to production of the potent greenhouse gas, methane. It also helps reduce the number of rubbish pickups required, saving the businesses money and reducing transport emissions.

Above: Monroes restaurant in St Kilda saved $2000 on their water bills.

Right: Pat Wilson-Mursec from Fresh @ Elwood shows off their bin to collect all organic waste for composting and saving it from going to landfill.

Huge water savings

Another great story to come from one of the businesses involved in the program was the water-saving efforts of Fitzroy Street restaurant, Monroes. Owner Steve Paraskeves decided to install rainwater tanks two years ago primarily to conserve this precious resource. 'Be-

The coffee machine epidemic!

While working on the EcoEdge program, I was always surprised to find out what the big energy using appliances were in the businesses. One that really surprised me (and scared me a little) was the humble coffee machine! Generally running at between 1000 to 2000 watts around 20 per cent of the time, 24 hours a day, seven days a week, the average coffee machine usually costs around $1000 a year to run while producing three cars worth of carbon dioxide per year. Coupled with all of the waste generated with the popularity of 'disposable' takeaway coffee cups, the ecological footprint of this brew is likely to be quite high. Not to mention the ecological damage caused by its growth in the rainforests of the developing world. It gives you something to ponder the next time you sit down for a coffee (in a travel mug of course!).

fore the tanks were installed, we were using around six million litres of water a year at a cost of around $4000,' said Steve. 'The two tanks have halved this usage, saving three million litres of water a year and $2000!' The tanks are attached to a high-pressure water cleaner for cleaning the outside area and are also used for toilet flushing.

Energy savings too!

After participating in the EcoEdge Business Program, Steve also discovered that energy was being wasted at Monroes, with a reduction of 26% possible, mostly through removing some energy hungry lighting and replacing other light bulbs with more energy efficient ones. In fact, energy was the area where most businesses had the largest environmental impact.

One of the best examples of saving energy was at Alafia Gallery in Elwood, where lighting is very important for show casing the beautiful objects on display. Owner Lorna Mauritzen and myself were shocked to discover that a 65% reduction in energy use was possible at Alafia through changing to compact fluorescent globes and energy saving halogens! This was equivalent to taking three cars off the road!

On average, a 25% reduction in energy use and greenhouse gas emissions was possible in the businesses involved in the program by doing simple things with short payback periods. Initiatives like putting timers on soft drinks fridges so they are off overnight or replacing electric hot water services with gas or solar had the potential to save a lot of money for the businesses. However one major problem with implementing these recommendations, even when the businesses would see fairly short returns, was the initial outlay.

Small businesses need support

According to the '*Energy Efficiency in Small and Medium Sized Enterprises*' report, prepared by the Moreland Energy Foundation (MEFL), the initial investment in energy saving capital can be prohibitive for small business. While some measures can have reasonable payback periods of less than three years, small business are subject to cash flow issues surrounding initial outlay. On top of this, measures which are cost effective do not generally deliver significant energy reductions. Conversely, upgrading or replacing refrigeration and air-conditioning systems can deliver energy efficiency increases but incur significant costs. In recognition of this, the EcoEdge program provided subsidies on items such as light bulbs and timers, which the business owners were extremely happy with.

All in all, as evidenced by the number of businesses involved in the EcoEdge Business program, the motivation to reduce their impact on the environment is definitely there within the small business community. They do, however, require assistance in the form of knowledge, skills and resources to do something about reducing their impact because, unlike big business, they don't have the time or resources to do it alone.

Case studies from the businesses involved in the EcoEdge Business Program can now be found at www.portphillip.vic.gov.au/greenpages.html

Coles goes 'green'

Even large retail chains are starting to see what a difference to profits improving their environmental impact can make. Earlier this year, Coles opened its showcase Gisborne store that was designed with the environment in mind.

The building shell is comprised of insulated concrete panels on the east and west to reduce heating and cooling requirements, natural light streams through the roof, and the roof itself is lower to reduce the amount of air volume requiring temperature control.

Systems inside the store are also more energy efficient, with the use of low-transmission glass in fridge doors reducing heat ingress, high efficiency supply and exhaust fan motors, and air locks on doors to reduce the loss of climate controlled air.

For more information see the case study at www.industry.gov.au/energybestpractice

The top 10 ways to help your business get the EcoEdge!

1. Lighting

If you have a lot of halogen downlights they are probably costing you a lot of money! Each halogen downlight on for eight hours a day will cost around $25 a year to run. They may be low voltage but this DOES NOT mean low energy.

Talk to your lighting retailer about switching over to energy saving halogen downlights—Philips and Osram produce these. They use 30 to 35 watts each instead of 50 watts. If you are thinking of installing halogens in your business, install electronic transformers instead of regular ones—they waste far less energy.

Change 'normal' incandescent light bulbs over to compact fluorescent globes. They last longer and use around 80% less energy. Although they cost a bit more to buy, you'll still end up saving money! And they now come in lots of shapes and sizes including round, candle and floodlight.

If you have tube fluorescent lighting, consider switching to tri or quad phosphor tubes. They emit more light for the same amount of energy and you should be able to remove some tubes completely.

2. Fridges

Place timers on any fridges that contain non-perishable items (for example soft drink fridges) so that they are off at night. This can save you up to $200 per year! Make sure your fridge doors are sealing properly and that the coils are cleaned regularly. Ensure that there is around 10cm between the fridge coils and the wall to provide adequate ventilation. When buying new fridges or freezers, look for the appliances's energy star rating (www.energyrating.com.au) and try to buy chest freezers instead of upright ones.

3. Hot water

Consider replacing your electric hot water service with a gas or solar unit. Heating water may be the largest user of energy in your business if you are using electricity. It will cost you a lot less to run a gas system and will produce fewer greenhouse gas emissions.

4. Dish and glass washers

Always make sure your dish and glass washers are full before you use them. These commercial appliances use huge amounts of energy, so the less you use them the more you will save. If you can get away with a domestic system in your business do so—they use a lot less energy.

5. Heating and cooling

Try to use natural ventilation or ceiling/upright fans. If you do need to use an air-conditioner or heater, make sure doors are closed and the thermostat is set appropriately. When the air conditioner is on, ensure the thermostat is set at around 25 degrees. For every degree you set the system under that temperature, the energy costs rise by up to 20%. The same is true for a heater set above 18 degrees. With heating, try to buy gas heaters where possible. Avoid small fan heaters and column heaters—they are cheap to buy but expensive to run! Panel radiant heaters are a good alternative.

6. Gas appliances

Always buy gas appliances instead of electric ones whenever possible (for example deep fryers, salamanders and pasta boilers). Although they may cost a bit more to buy, they will cost less to run and produce fewer greenhouse gas emissions than electrically powered appliances. With gas, always make sure appliances and stove tops are off when not in use. This will reduce greenhouse gas emissions and heat in the kitchen, as well as being a lot safer.

7. Water

Install tap aerators, which can reduce the flow by around half, helping to save water. When you're using hot water, tap aerators also help you save money on your energy bill.

Consider installing a rainwater or greywater tank for flushing the toilets and watering the garden (if you have one!). Contact the Green Plumbers to see if it's possible in your business. (www.greenplumbers.com.au).

8. Waste

Reduce, reuse, recycle! Buy products in bulk, reuse packaging or return it to your supplier, eliminate plastic bags from your store, encourage people to bring in their own coffee cups and recycle whatever is left over! You may also want to consider getting a compost bin or worm farm for your food scraps—CERES Environment Park in Brunswick make a fantastic cafe-sized worm farm!

9. Transport

Walk, ride or catch public transport to work. Consider encouraging staff to do the same by holding car-free days, providing showering/changing facilities or public transport tickets and places to store bikes securely. If you absolutely must use a car, plan your trips so that you can do it all in one go and try to avoid lots of short trips. Consider offsetting any vehicle greenhouse gas emissions with tree planting through the Greenfleet program.

10. Greenpower

Consider running your business off renewable energy. You may want to investigate solar panels. If that's too hard or too expensive, consider purchasing Green Power from your electricity retailer. For a small amount of money per unit of energy (that gets invested in the renewables industry), your electricity can be supplied from renewable sources like wind or solar power. As a business, you can then use the Green Power logo to market your business.

Grow know—sustainable food

Frith Kennedy looks at ways you can purchase food by considering the economic, environmental and social costs

With a commitment to sustainable living comes the kind of thoughtful consumption that touches on every element of our life. And what's more elemental than what we eat?

The simplest way to make the most sustainable food shopping choices are to know as much as possible about the food's origins. That's hopefully becoming easier, as this year there has been a new wave of mainstream interest in exactly where our food comes from.

In fact, better food labelling has become the goal of so many shoppers that supermarket chains are now featuring 'Australian-grown' flags on top of their produce!

This rapid change has come about in the wake of the Tasmanian farmers' tractor rally. Promoting the use of locally-produced food, the campaign has brought about a groundswell of support from consumers around the country.

The crusade has even caught the attention of the Federal Agriculture Minister, Peter Mc Gauran, who has hopped on board the food labelling bandwagon. Speaking to the ABC's *Landline*, he has committed to calling an emergency meeting of the ministerial council responsible for labelling laws. 'The vegetable industry is at the crossroads. What we need is better country-of-origin labelling. That's the first thing.' he said, during the farmers rally's spin through Ballarat.

Eat better for less

The thoughtful purchaser can go beyond this excellent starting point simply by considering food shopping as a kind of triple-bottom-line accounting scheme. Consider the true cost of food—economic, environmental and social—and take steps to enjoy eating better at lower costs all round!

Photo credit: Bellamy's Organic Farms

Eating with the seasons and from your region are the two simplest ways to cut food costs and get the tastiest produce at the same time.

Farmers supermarkets

A fun way to follow the foodchain is to visit local farmers markets. A cornerstone of regional shopping, they are becoming so popular that there are now regular markets in every state and capital city, as well as numerous regional venues. Farmers markets are excellent sources of fresh produce, not only keeping transaction costs low, but limiting handling, reducing fuel and transport costs and cutting down packaging requirements.

Not only do interesting varieties of fruit and vegetables abound, you can also track down products like goats cheese, real hens eggs (as well as those of duck, goose and quail), honey harvested from local flower-fed bees, and specialised smallgoods such as preserved and fresh organic olives, stone-ground pasta and other delicacies.

In many cases, you can buy the animals as well. All my household laying hens originated from one of the four local farmers markets near my central Victorian home.

Organic gains

Higher in sweat and compost, but lower in manufactured chemicals, organic food is grown without artificial fertilisers, herbicides or pesticides.

However, this does not automatically mean all certified organic food is sustainably or ethically produced; just as all conventional growers can't be pigeonholed as poor managers of the resources at their fingertips. But it's fair

to say it's easier to track the lifecycle of food certified as organic by the Biological Farmers of Australia (BFA) or the National Association for Sustainable Agriculture, Australia (NASAA).

One barrier for consumers is that certified organic produce is often more expensive than conventionally-produced goods, but this can be seen as another gatekeeping mechanism for the true price of food.

'The higher price is the real price of real food, paid now, not later in environmental and health care costs externalised by industrial agriculture,' says BFA nutritionist Shane Heaton.

The BFA and NASAA are the most high-profile organic labelling bodies in Australia. However, there have been recent moves to promote the Organic Federation of Australia (OFA) as the peak industry organisation. Hopefully this unified approach will help make organic food look even tastier to more consumers!

A matter of taste

There are other, more selfish reasons to buy locally and seasonally. Originating in Italy, the concept of slow food was—as obvious by the name—a reaction to fast food. Founded in 1986, it is dedicated to 'the growing, preparation and cooking of food using traditional methods.' Not just for the social and environmental impact but because it's a matter of taste!

The idea is to preserve the methods of growing and cooking that can become lost in a global culture, as well as the indigenous varieties of produce and foodstuffs.

It's effects have been mirrored in the bush food movement of Australia. A decade ago it was hard to believe how easy it would be to buy bush tomato relish, quandong jam or wattleseeds from an ordinary supermarket! Today it may be quite difficult to arrange an entire diet of bush foods but we can make our local produce an integral part of our diet.

Heritage Foods

Another concept is the preservation of old-fashioned varieties and species of fruit, vegetables and livestock, championed by one of Australia's most established heritage producers, Clive Winmill from *Badgers Keep*. Since the late 1960s he and his partner Margaret Winmill have been selecting, preserving and growing a variety of plants seldom seen outside very old gardens.

But unlike many advocates of old-fashioned plant varieties, he doesn't think it's simply a matter of genetic diversity. 'The usual argument is that it preserves the gene pool. My argument is that all those old-fashioned apples were chosen for domestic growing situations, not with an eye to commerce. These are fruit selected for ordinary backyard growers for their flavour, texture, not apples that are hard and cool-store well.'

'Everyone should grow their own food, so they can grasp a greater range of flavour, with real character, not just the McDonalds-isation of taste. Instead of two or three varieties of apple at the greengrocer, you have hundreds to choose from, with real character,' says Clive.

Really know the grower

Of course, there's really nothing more sustainable and rewarding than growing your own food, although complete self-sufficiency is only practical for a very few. There's nothing to prevent even the most committed urban high-rise dweller potting up a few herbs, greens or, most succulently of all, tomatoes and strawberries that truly taste home-grown.

The variety of seeds and plants available across Australia is staggering, so even if you don't want to be bothered growing staples, try a few interesting crops like chocolate capsicums, tiny wild tomatoes, alpine strawberries or even the traditional passionfruit vine over the back door!

This is also an ideal opportunity to reuse various containers. Old tins and jars, food containers, buckets, anything safe and clean looks better when stuffed with tiny white eggplants or freckled and speckled lettuce like enormous roses. One garden I regularly visit features the bottom of an old BBQ full of salad crops that looks stunning year-round.

So try something new and give yourself—and your planet—a treat.

Biodynamic Agriculture Australia
www.biodynamics.net.au
Ph: (02) 6655 0566

Biological Farmers of Australia
www.bfa.org.au
Ph: (07) 3350 5716

Australian Farmers' Markets Association
www.farmersmarkets.org.au
Ph: (02) 9360 9380

National Association for Sustainable Agriculture Australia
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www.ofa.org.au
Ph: 1300 657 435

Seed Savers Network
www.seedsavers.net
Ph: (02) 6685 6624

Slow Food Movement
www.slowfood.com
Ph: 1800 009684

Sustainable Gardening Australia
www.sgaonline.org.au
Ph: (03) 9850 8165

Homemade downpipe diverter

With a whole house between his downpipe and rainwater tank and no room for another tank, Grant Nicholson came up with a simple diverter to solve the problem

Here's my problem. I had a downpipe on one side of my house, but my rainwater tank was on the other side. No problem you say! Put in another tank. But I couldn't, because that side of the house is mostly windows, with a small strip of brickwork against which the down pipe is attached. There simply wasn't enough room to install a tank without it being a major eyesore.

As this downpipe probably drained about 20% of the roof area, an appreciable amount of water was being lost.

The solution was to divert the downpipe to the other tank. Unfortunately, gravity alone could not do the trick, no matter where I ran the pipes, as the top of the tank was at a similar height to the downpipe in question.

Thankfully I already had a sump with a pump that pumped rainwater into the tank from the other side of the house. This was necessary because the fall direction of most of the roof went opposite to the only practical place to site the tank. Most of the downpipes on that side of the house lead into the sump, with only one small downpipe leading directly into the tank.

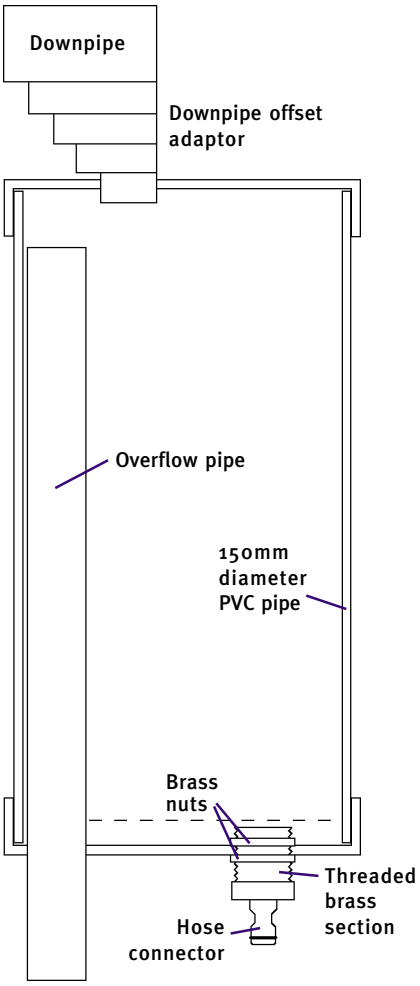
All I needed to do was send the water from one side of the house to the sump on the other. Re-engineering the subterranean storm water pipes would not work as the top of the sump tank is close to ground level, and I was not keen on adding another pump.

There are commercially available downpipe diverters, but their capacity seemed quite limited to me. Judging by their size, they couldn't hold more than two litres of water, and at times of heavy rainfall, most of the water would be lost through the overflow.

My solution was to make my own diverter with sufficient size to handle a decent surge of rain and then run a hose under the house and into the sump. Thankfully I didn't have a concrete slab, but I can tell you it wasn't fun crawling under the house to run the hose.

How to make it

I made the body of the diverter out of 150mm PVC pipe. I only needed a short half-metre piece with two end caps.



Cross section of the diverter, showing how it all fits together.

The end caps were the most expensive part of the project at $13 each.

Attached to the bottom end cap is a standard click-on connector for the hose pipe. I chose to use 19mm fittings and hose to allow for a greater flow. The commercial diverters I had seen all used standard 13mm fittings.

I cut two holes in the bottom end cap, one just large enough for the 19mm brass hose connector and the other a snug fit for the 40mm overflow pipe. A drill with a woodworking hole cutter did the job nicely. I placed a small length of double threaded brass pipe through the smaller hole, fixing it with two plastic washers and two brass nuts. On the protruding end of this I attached the hose connector.

Inside the 150mm pipe I glued a similar length of 40mm pipe, set down about 60mm, as the overflow. This passes through the bottom end cap and al-

The lower end cap has two holes cut into it. One is fitted with a hose connection, while the overflow pipe is glued into the other.

The overflow pipe is placed inside the diverter, the bottom end cap is slipped over it, and the two are glued together.

lows any excess water to go down the original downpipe.

At the top end of the diverter I had to offset the incoming water so that it would not go directly down the overflow pipe. I used a PVC reducer fitting that is really designed to join different diameters of pipe, but due to its asymmetrical design, allowed me to offset the incoming water just enough to (mostly) miss the overflow.

I used PVC glue to join everything together, leaving the top end cap free for maintenance purposes. I placed a circular strainer, cut-out of plastic gutter guard, inside at the bottom in case leaves find their way into the diverter, which has happened despite the gutter guard in the gutter above. It is easier to tip the leaves out of the diverter than trying to flush the hose if they get wedged inside it.

I then cut out a section of my downpipe and inserted the diverter. I relied upon the protruding overflow pipe at the bottom of the diverter to nest inside the original downpipe, and the reducer at the top to hold the whole diverter in place against the wall. It is a snug fit and holds quite well, with no need for straps or other fixings to the wall.

The diverter holds eight litres of water which drain at a rate of 24 litres per minute. I will have to wait and see how well it will handle a major downpour (wishful thinking perhaps!).

All up, the diverter cost me approximately $70, with all the parts purchased at my local hardware store. It can easily be taken off for cleaning purposes and with a coat of paint it looks quite at home on the wall.

These are all of the components of the diverter—not a great deal to it!

Before and after: the diverter simply fits into the downpipe.

Farm fresh and sustainable

Not only does the Brookmans' permaculture farm, *The Food Forest*, produce fresh and healthy food, it also consumes one fifth of the amount of energy needed to produce one kilo of nuts than a commercial farm does

Annemarie and Graham Brookman were driven by the dream of a diverse, sustainable land-use model, adapted to the challenging environment of semi-arid southern Australia. But they had bought a severely degraded property with less than 1% soil carbon content and pitiful biodiversity. Twenty years on, it is a multiple award winning, fertile, functional model of permaculture property planning, incorporating certified organic primary production and successful revegetation of land along the Gawler River.

Trained in agriculture, the Brookmans travelled the world in the 70s looking for a sustainable land-use system that would overcome the problems of salinity and food contamination. They returned with some loose ideas, only to stumble upon the permaculture design system conceived by Bill Mollison and David Holmgrem Permaculture ventured into the domains of ethics, energetics, social and financial structures, and it led the Brookmans on an exhilarating exploration.

Above: Annemarie and Graham Brookman have developed a number of innovative solutions to food production to help reduce its environmental impact.
Below: The Brookmans' farm house equipped with solar hot water and solar electricity.

Small beginnings

The couple were particularly inspired by stories detailing the massive quantities of vegetables and herbs produced by small well-managed gardens, publicised in books by the American organic gardener Elliot Coleman and South Australia's own Peter Bennett. People living in flats would guarantee support for a farm that supplied them with a weekly box of organic fruit and vegetables each week or food cooperatives that buy up good food for their members. The Brookmans imagined they would dip their toes in the water by growing food for just one extra family… perhaps several! They would expand to supply the passionate owners of small organic retail shops and eventually, with a steady supply of products year-round (fresh, dried, fermented or transformed), they would participate seriously in the local Barossa farmers market.

Their first challenge was to rehabilitate the 'thrashed' piece of land they had bought. With the help of gypsum, composted chook manure and the establish-

ment of windbreaks, levels of soil nutrients and organic carbon began to climb. Then came the planting of deep-rooted perennials, plants that hold the key to sustainable land use in a naturally dry, salty, infertile area.

The Brookmans aimed to produce Australian native foods, nuts (particularly pistachios), poultry, honey, carob beans, stone fruits, pears (like the deep-rooted pears that survive around abandoned homesteads), well-adapted apple cultivars, olives, palms, grapes, jojoba, cereals, vegetables and herbs.

The permaculture ecosystem required livestock management, strategic irrigation at flowering and fruit-fill, and fertilising, but promised stable and diverse yields. The use of creatures like birds and predatory wasps helped control pests, and soft-footed grazing animals like geese controlled weeds.

From termites to solar home

The 'block', now known as *The Food Forest*, needed progressively more management and in 1987 the couple moved into the damp, salty, termite infested cottage. The home is now completely damp-proof and has a beautiful, passive-solar designed living area. Solar water heating is complemented by a wet-back in a slow combustion convection heater, fuelled by a woodlot and prunings from the windbreaks.

The grapevine yields grapes and shade in summer and lets sunlight through in winter. The vine outside the house produces 50 litres of very drinkable white wine annually.

A grid connected photovoltaic (PV) system provides the home with almost half its electric power and occasionally runs a catering kitchen and small cool room. The Brookmans chose amorphous silicon panels because of their lower environmental cost (they use less silicon), with the 30 PV panels providing a nominal 1740 watt output. Roof water is collected and reticulated throughout the house.

Strawbale coolroom

By now, the crops were growing and the challenge of storing tonnes of fresh pistachio nuts prior to de-hulling and drying was becoming urgent. Graham had heard of a 'very nice chap who uses strawbales to build' so it was decided that Lance Kairl would be contracted to help construct South Australia's first strawbale cold room.

The cold room was sized to fit bulk bins of fruit so they could be moved in and out easily with a small forklift tractor. Three strawbale walls were built on a concrete slab in which semicircular pieces of 19mm poly pipe had been set. This enabled high tensile fencing wire to be passed through the foundation and up over the wall to tension the bales down. The walls were plastered with a cement render, a coldroom door and roof fitted, and a drop-in refrigeration unit inserted through the roof. Presto! A fridge for three and a half tonnes of fruit. The strawbale insulation is so effective (greater than R7) that it can generally be run at night, on cheap power, and switched off during peak demand periods.

Graham with Brian Thomas, builder of the unique dehydrator that has cut energy costs by 90%.

A bin full of organic pistachios are placed inside the strawbale cool room.

Annemarie tests the water from the reedbed.

Graham enjoys the fruits of his labour!

Innovative nut dryer

The energetics of the pistachio processing system at The Food Forest were, however, not good. The nuts had to be transported to the Riverland for de-hulling and drying meaning the removed hulls were lost from the nutrient cycle of the farm. This also meant that a co-processor had to be certified organic. So a secondhand de-huller was purchased and the quest for a dehydrator began.

A borrowed unit using the very energy efficient refrigerated-drying technique was unable to dry the nuts enough to store from season to season, so Graham sought out an engineer to crunch the numbers for a radical new design that would dry anything from a tonne of dripping wet pistachio nuts to the delicate leaves of basil.

The concept involves a super-insulated box with internal fan that forces air past heating elements and up through a series of perforated trays of product, absorbing moisture on the way. Moist air is expelled through a flue whilst a small amount of fresh air from the warm, dry, food processing building is sucked into the machine. Heat generated by the fan is sufficient for low temperature dehydration and the ergonomics of the dryer make loading and unloading a pleasure.

In avoiding the trip to the Riverland and with the new machine's efficiency, energy costs have been slashed by 90%, other major savings have been made and the quality assurance audit trail has been simplified. A wind turbine is to be erected on a knoll adjacent to the mains electric supply to build credit for the electric power used in food value-adding processes.

Reedbed greywater system

With water a major preoccupation in Australia's driest state, The Food Forest needed to develop a water recycling system that met all the requirements of the South Australian Health Department.

The cloudy, smelly water from the septic passes through a plastic bin full of gravel in which reeds grow, extracting nutrients and suspended solids and satisfying the oxygen demand from organic matter. After treatment in the reedbed the water trickles, crystal clear and odour free, into a sump from which it is pumped in batches through sub surface dripper lines running through an orchard or woodlot.

All wastewater from the home and food processing facility is fed through the system. This simple and economical system avoids the use of equipment requiring regular inspection by service personnel.

For better or for worse

But is it any better than a conventional system? Comparing a 'multi-yield' permaculture system with a conventional horticultural system reveals some fascinating figures, as Graham discovered when preparing a paper on the way organic farmers can measure their farm's sustainability.

He compared the non renewable energy that went into cultivation, fertilisation, harvesting and primary processing per hectare with the energy value of the yield (the actual nuts) of both a benchmark conventional nut growing farm and The Food Forest. While the conventional farm produced more nuts per hectare, it consumed five times the amount of energy per kilo of nuts produced. Significantly, the amount of energy used for production on the conventional farm was twice the energy value of the crop produced.

The Brookmans also run short courses, open days, workshops and tours. This eco-education and tourism business now earns more than the farm itself.

How's that for value-adding!

www.foodforest.com.au

Value of wind and landscapes

A groundbreaking report is helping develop a national methodology for measuring the impact of wind farms on the landscape. Dominique La Fontaine from AusWEA gives us an update

After rooftop or building integrated solar energy, wind farms occupy less land area per kilowatt-hour of electricity generated than any other energy conversion system. Furthermore, the greenhouse gas emissions that wind farms offset are helping to protect Australian landscapes from the negative effects of climate change.

However, wind farms have a number of unique landscape characteristics. They are tall structures that need to be placed in locations exposed to consistently strong winds, often on prominent hills or ridge lines. Consequently, they have a strong visual presence. In contrast, large-scale coal-fired power stations—the source of 84% of Australia's electricity and almost 45% of Australia's greenhouse gas emissions—are by and large out-of-sight and out-of-mind.

The Australian Wind Energy Association (AusWEA) recognises that the long-term sustainability of the wind industry depends on appropriately sited and sensitively developed wind farms. Landscape values are already an essential consideration for any wind farm development and ensuring that these values are standardised across the country is a priority for the wind energy industry.

A national approach to measuring the impact of wind farms on the landscape will help prevent conflict over wind farm locations.

Need for consistency

In Australia, these considerations, addressed in AusWEA's Best Practice Guidelines, are regulated through state planning processes. The placement of wind turbines is restricted in areas of importance such as national parks, some coastal regions, and areas of national significance. Most wind farms are sited on farmed or cleared land already significantly altered by European settlement.

However, there is currently no single methodology for assessing landscape value across Australia. To address this, in March 2004 AusWEA and the Australian Council of National Trusts (ACNT) embarked on a landmark joint project to develop mutually agreed methodologies for national landscape assessment. Stage one of the project, funded by the Australian Greenhouse Office, involved developing an issues paper on wind farms and landscape values. The paper was released by the Federal Minister for Environment and Heritage, Senator Ian Campbell, in June 2005.

The issues paper is groundbreaking. Not only does it address extremely complex matters, its formulation has been a truly consultative process, with all stakeholders given the opportunity to help identify a set of national landscape issues for the Australian wind industry. The paper identifies, analyses and prioritises key landscape issues for wind farm developments. It recognises concerns including potential positive and negative impacts of wind farms on landscapes, existing landscape assessment approaches, and directions for applying project findings to wind farm developments.

Different points of view

An unanticipated outcome of this process was an exchange of views and ideas between people and organisations that normally pursue quite disparate fields of interest. A stakeholder survey, conducted as part of stage one of the project, identified several impacts of wind farms on landscapes.

To some, the visual presence of a wind farm 'speaks of inspiration and aspiration'. The clean lines and form of wind turbines, their uniform appearance and their contrast with the landscape were cited as positive benefits by many respondents in the survey, with some indicating that the wind turbines can improve the appearance of a degraded area. Indeed, some of those who objected to the impact of a particular wind farm recognised that the structures themselves exhibited some aesthetic value. Many also welcomed the 'machine element' of a wind farm on a landscape and saw it as a positive example of humans working in harmony with nature.

To others, their visual presence unacceptably changes the character of a landscape. Several respondents claimed that wind farms contribute to an 'industrialisation' of rural and natural settings. It was also felt that large collections of wind turbines have the greatest potential impact on the character and scenery of a landscape. Some respondents described how it seemed their emotional and spiritual connection with the landscape had been adversely affected by the introduction of wind farms.

Managing impacts

The issues paper identifies ways in which these effects can be minimised. However, some are difficult to avoid. From a visual amenity perspective, it is virtually impossible to totally hide or screen a wind farm. Given the height of the development on the landscape, vegetative screening is only of use when located to screen views from a viewpoint, rather than to a tower.

Similarly, typical treatments for minimising the visibility of developments on landscapes, such as integrating the development with topography, or utilising the line, form, colour and texture from the surrounding landscape, are very difficult to achieve and may even be undesirable.

Instead, careful layout which avoids particularly sensitive features and enhances a wind farm's positive attributes is a more effective tool. With this in mind there is a range of design, placement and management options which reduce the intrusive impacts of wind farms, improving their appearance and therefore their acceptability.

The issues paper also found a growing recognition that landscape assessment on a regional scale is essential to understanding the relative value of landscapes. Some state governments have identified particular areas, such as national parks, as unsuitable for wind farm developments. In such cases, landscape assessments may be unnecessary.

At present, the impacts of wind farms are assessed case by case, in response to development applications. Although this is essential for detailing the specific effects of a proposed development, the relative region-wide importance of an area is also a key consideration. Failure to identify particularly significant areas can create unnecessary conflict and uncertainty in the development of a wind farm.

Given that some impact is unavoidable, and given that there are state, national and international objectives promoting wind power as a renewable energy source, planning processes must take account of the need to balance high-level policy directions with the desire to protect valued landscapes.

Next steps

The work undertaken to develop the issues paper sets the framework for stage two of the project, which will result in the culmination of an agreed set of national landscape methodologies to be adopted by the Australian wind industry and promoted by the National Trust.

Using the analysis of landscape issues from stage one, four broad areas of priority were identified for stage two:

- **Landscape assessment methodologies.** Review approaches to methodologies including the potential for broad-scale and site-specific assessment methodologies in Australia and overseas. The review would make recommendations for the application of methodologies in Australian planning, environmental assessment, and protection frameworks.
- **Wind farm design guidelines**. Develop guidelines for best practice wind farm design and site selection, including the minimisation of negative landscape impacts. The guidelines will be developed in consultation with key stakeholders, including governments, communities and industry.
- **A site-specific landscape assessment model**. Develop a 'model' for site-specific assessment by reviewing and building on the strengths of existing methodologies. The model will include guidelines and protocols for the visual representation of development proposals.
- **Community engagement guidelines.** Develop guidelines for developers intending to conduct public consultations on proposed wind farm projects. The guidelines will build on successful public consultation processes and include practical advice about ways of balancing expert advice with community input.

It is expected that the outcomes of the project will strengthen the landscape assessment procedures in the Best Practice Guidelines, facilitate planning authorities' consideration of proposed projects with regards to landscape issues, and assist responsiveness of all parties to community concerns.

The stage one report is available from www.auswea.com.au/auswea/htmlfiles/landscape.htm

PVs do produce more power than it takes to make them!

Michael Harris takes a big stick to an old myth about photovoltaic solar panels

For many years there has been a myth floating around that photovoltaic (PV) solar panels never produce enough energy to 'pay back' the energy used in their production. This has been used as the basis of the argument that they do not have a net environmental benefit. However, this myth is false and is very damaging to a product with major environmental benefits.

Payback time

The payback time for monocrystalline panels in a roof-mounted grid-interactive system is 3.2 years (based on a study by Alsema and Nieuwlaar, 2000). The payback times include the energy consumed in the manufacture, transport, installation, operation and decommissioning of a photovoltaic array. They also include the energy used to produce the other components in a system, such as control equipment and inverters.

For thin-film amorphous solar panels, the payback time is only 2.7 years, with the figure dropping to just 1.7 years with some of the newer technologies.

When you compare these payback times with the actual life of some of these panels, the comparison is dramatic. Mono and polycrystalline photovoltaic panels can have a guarantee as long as 25 years and a panel life of well over 30 years.

When you compare that with an energy payback time of 3.2 years then you have panels that give back around 10 times the energy used in their manufacture.

PVs take more energy to produce than they ever generate? What rubbish!

The worst payback time is for standalone PV systems that require battery storage. These can have an energy payback time of eight to 11 years. However, this includes all the components including the batteries.

The origins of the myth

The original belief that PVs never recover the energy used in their production can be traced back to the very early years of PV cell production for the US space program.

Those cells were produced in small quantities with no regard for the energy used in manufacture, and as a result had a payback time of 40 years. Just two years later this had dropped to 3.1 years for polycrystalline cells.

The energy required to manufacture is coming down, while the life and the amount of energy produced over the systems life is increasing. So next time someone tells you that solar panels don't pay back the energy used to create them, you can tell them that they produce over 10 times the energy used to manufacture them.

This information is based on a paper written by Bryce S. Richards and Muriel E. Watt, University of New South Wales, titled *Use of the Energy Yield Ratio as a Means of Dispelling one Myth of Photovoltaics*.

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My freezer-to-fridge thermostat

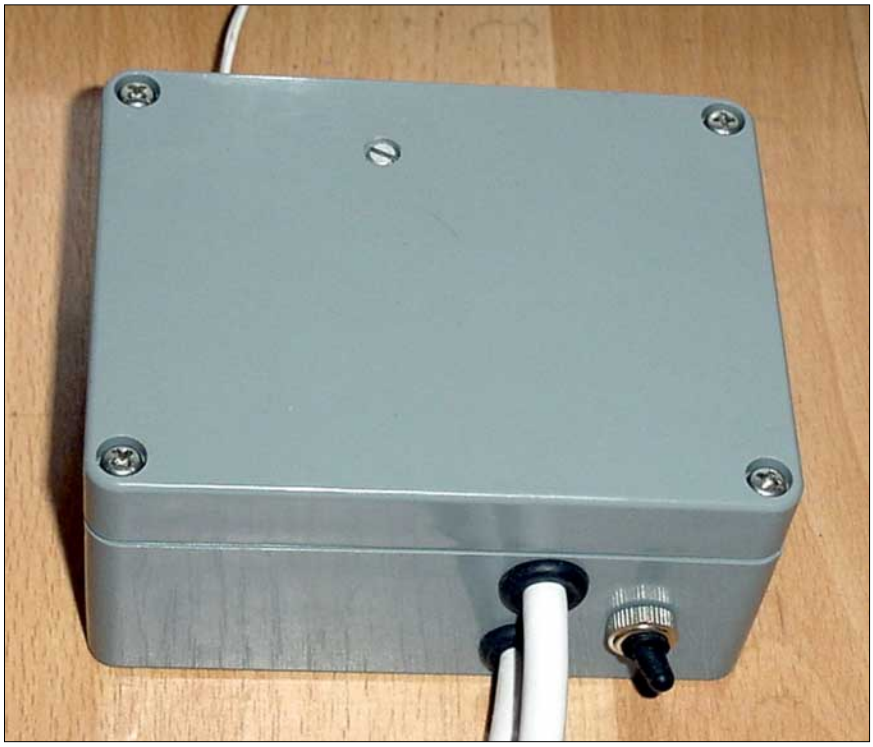
In response to the huge demand from his article in ReNew 90, Tom Chalko describes his new thermostat designed for freezer-to-fridge conversions

Since the article about my 0.1 kWh/day chest fridge was published in *ReNew 90,* I have been receiving inquiries daily from all over the world about the thermostat that I used to convert the chest freezer into my ultra-efficient fridge. Apparently, my article has been posted and discussed at quite a number of internet forums and attracted attention of some academics and researchers, some of whom contacted me directly.

This article aims to answer those inquiries. It describes details of the thermostat system that I had to design myself, because I couldn't find a ready-made unit that was able to meet all my requirements.

The Jaycar QT7200 thermostat (described in *ReNew 92*) that I first tried in November 2004, failed after around six weeks of use. Its relay contacts fried because they were not rated for inductive loads of any kind. I had to disconnect it in a hurry when the relay began to produce loud, bright plasma arcs that illuminated my kitchen at night.

Although, in essence, the thermostat function is very simple, design of a really good freezer-to-fridge thermostat system is not quite so trivial. There are some unexpected problems and challenges that become apparent only when one aims to design a system that works really well.



The thermostat at work. Bottom wires are 240 volt in and out, wires entering the enclosure via rubber grommets. The end of the top wire connects to thermistor R1. Switch SW1 is equipped with a waterproof boot. The potentiometer shaft end is accessible for easy temperature adjustment. A bit of a good tape or a drop of silicone can be used to cover the potentiometer shaft if the full waterproofing is required.

Warning!

Any project involving 240 volt mains wiring should be considered dangerous if suitable safety precautions are not taken. When working on this or similar projects make sure you do not come into contact with 240 volt AC voltages. If you are not confident about working with such voltages then you are strongly advised not to attempt projects that involve mains wiring. The author and *ReNew* disclaim any liability should anyone be injured or killed working on this project.

Let's begin by outlining general requirements for a freezer-to-fridge thermostat.

Thermostat requirements

1. Reliability. Fridges need to be very reliable household devices, simply because our health depends on it. Excessive temperature fluctuations due to any malfunctioning of the thermostat accelerate food spoilage and introduce associated health risks. The thermostat should work unattended for many years.
2. Safety. The 240 volt power supply to the fridge should be well insulated from all extra-low-voltage electronic components of the thermostat.
3. Zero 240 volt power consumption during the standby period (when the fridge compressor is off). This requirement is very important in the situation when the fridge is powered by an inverter that has an auto-start feature. Using zero-standby-power appliances allows inverter users to save up to

0.4kWh per day just by allowing their inverter to enter the standby (sleep) mode at every opportunity.

4. Hysteresis. The number of fridge compressor starts per hour should be kept as low as possible, not only to conserve energy, but to minimise compressor wear.

5. The thermostat should be easy to install and should not require any modifications to any freezer you may buy for this conversion, so a new freezer warranty is not compromised.

6. The thermostat should be simple and easy to construct from readily available, low-cost components.

Zero-standby-power challenges

From my experience with the failing Jaycar thermostat illuminating my kitchen with plasma arcs it became obvious that a 240 volt relay used to switch the fridge compressor on and off should be properly rated for inductive loads.

The general trend in modern industry is to replace electro-mechanical relays and contactors with solid-state semiconductor relays. However, in our case, this clashes with requirement number three. Solid-state relays have significant capacitance when off. This means that when they are connected in series with a motor (a resistive/inductive load) they allow a small current to flow through the motor windings, even when everything is off. This current causes a continuous power loss of about 0.5 watt as measured when connected to my Vestfrost freezer compressor. Since semiconductor switches and relays cannot meet the zero-standby-power requirement, we have to consider them unsuitable for our application.

Hence, we need to settle for a properly rated relay. After experimenting with a few brands and designs, I decided to use an Omron G6RN-1A DC12 relay. In addition to its ability to handle small inductive loads and its low-energy switching requirements, it has around a seven kilovolt insulation rating between its 12 volt coil and its 240 volt contacts, which I consider essential from a safety point of view. A number of these relays have been working for six months in thermostats that I have built, with no signs of any deterioration in performance.

Due to the zero-standby-power requirement, all the electronics of our thermostat, including the temperature-sensing system, need to be powered from a battery-based power supply. Since we also require our system to work unattended for years (or decades) we have another challenge to meet: design of a UPS (uninterruptible power supply) that can work for many years unattended. The battery in this UPS needs to be charged only when the

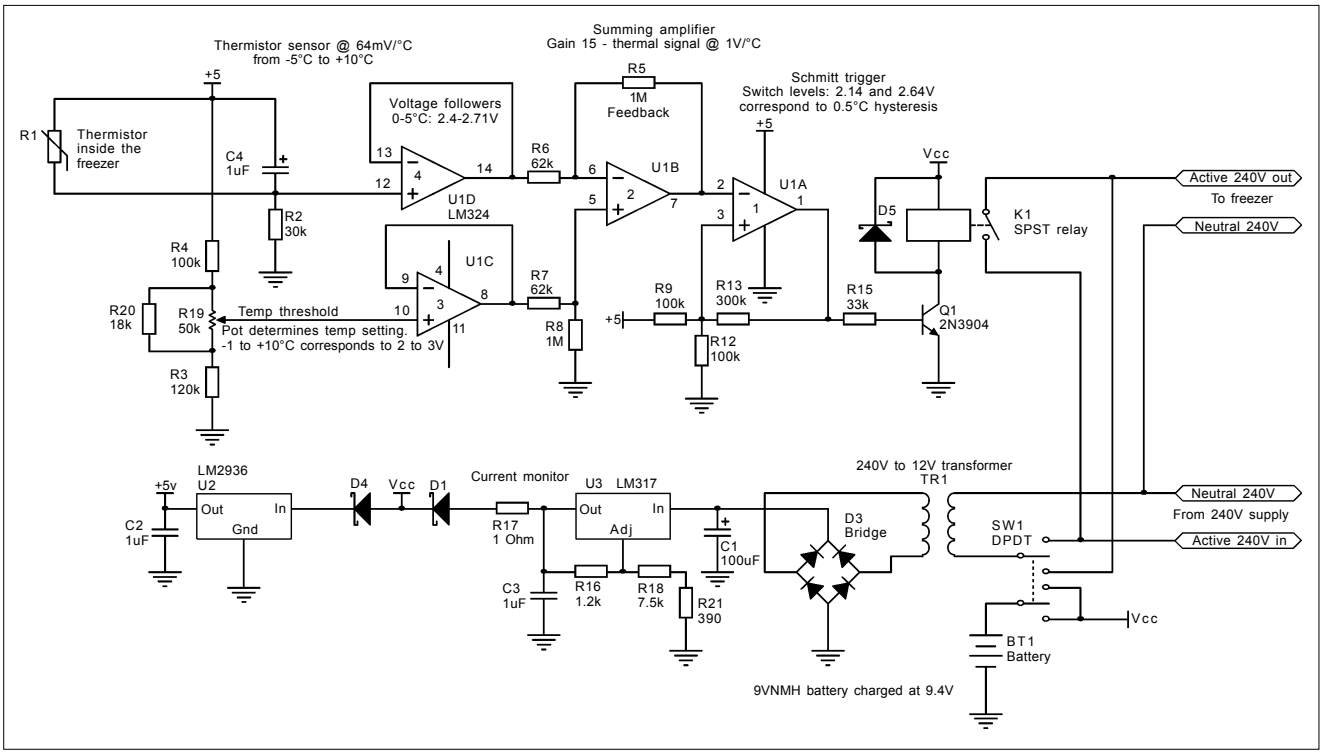


Figure 1. Schematic of the zero-standby-power freezer-to-fridge thermostat. The diagram is annotated for easier understanding. While not shown here, the earth line from the 240 volt input wire must be passed to the freezer output!

fridge compressor is turned on.

The design

The schematic of the system that I currently use, after making several not-so-interesting mistakes and attempts, is depicted in Figure 1. It is a result of a compromise between the minimal possible power consumption, simplicity and the cost of components. The temperature sensing system consists of thermistor R1 (10kΩ at 25°C) interfaced with an op-amp. The LM324 quad op-amp chip has quite low current consumption (less than 0.7mA) and can operate from a single voltage power supply, which greatly simplifies the design.

U1C and U1D serve as buffers to reduce the power consumption taken by the temperature measurement and comparison system down to negligible values. U1B is a summing amplifier. U1A is a Schmitt trigger with easy to adjust hysteresis (by changing R13), set here at approximately 0.5°C. Capacitor C4 prevents radio signals that appear on the long thermistor cable from interfering with functioning of the system.

The switch SW1 addresses the issue of powering the system down (the center-off position) and allows the thermostat to operate in two modes: powered by 240 volt mains ('SW1 up', in which case the battery can be removed) and from the battery ('SW1 down', the zero-standby-power mode). The 'SW1 up' mode also addresses the issue of the initial charging of the battery, as the battery is charged by mains power.

Note the use of the micro-power LM2936 as a 5 volt regulator. The commonly used LM7805 would, by itself, consume five times more power than the entire circuit and would prevent the system from being classified as a micro-power system. Using an LM7805 would make battery discharge cycles five times deeper and hence requiring five times more battery capacity for sustained operation, not to mention a bigger transformer to keep it charged. It is interesting to note that the system in Figure 1 will work correctly even if the LM2936 is removed and bypassed (pin 1 pad connected to pin 3 pad). This is because all key voltages in the system are proportional to the LM324 supply voltage.

In 'SW1 down' mode, the battery is charged when the freezer relay (and hence the compressor) is on. For my Vestfrost fridge this is between one and two minutes per hour. The rest of the time, the thermistor circuitry is powered by the battery, so it does not draw any current from the 240 volt supply.

During the system operation, the nominal 8.4 volt NiMH battery voltage varies between 9.2 and 9.4 volts, so that in practical terms the battery remains fully charged and can therefore operate for many years.

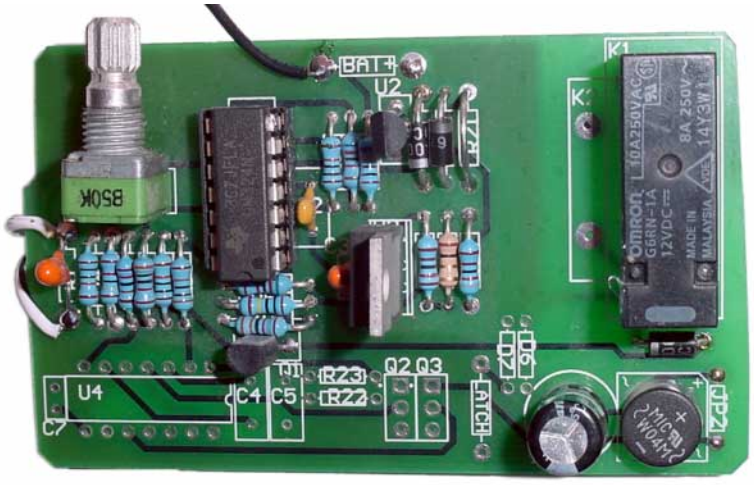
When choosing the transformer, we need to be aware of its magnetising current specifications and choose the one with the lowest magnetising current. In my design I used a cheap 2VA transformer with built-in thermal fuse and the magnetising current was less than 20mA. Since the battery charger section (transformer TR1 and LM317 regulator) only works for one to two minutes per hour, its optimisation was not attempted.

Installation

The thermostat system described above is designed to be installed in the middle of a power extension cable that delivers power to the freezer. No freezer modification is needed. The thermistor, soldered at the end of a thin cable of sufficient length, needs to be inserted into the freezer interior. This is best achieved using a freezer drain hole.

Temperature measurement

I deliberately omitted temperature measuring and display from my design in order to keep the design as simple as possible (a one IC design). What helped me in this decision was



The printed circuit board of the thermostat is double-sided and has insulating solder masks to maximize the circuit safety and reliability. The 240 volt section contains only two pins and they are well insulated from the rest of the circuit.

an abundance of the fancy temperature measuring gadgets available on the market. I used the 'dual thermometer' from Jaycar Electronics, which cost less than $20. Its sensor needed to be sealed with silicone sealant—if it isn't sealed, moisture inside the fridge will conduct electricity and the thermistor will give false readings. The thermometer measures two temperatures: one inside the fridge and one in the room outside it.

The weak point

The design above has one weak point. When the 240 volt power is not available and the fridge interior temperature rises, the 60mAh battery will power the relay coil for about four hours and will then go flat. This time can be extended by using a larger capacity battery.

I have doubts if this issue requires attention. My view is that if the power goes down for many hours, the contents of any fridge, no matter how advanced, will need a very careful inspection and manual intervention. When the power is restored, my system will require switching to the 'SW1 up' mode for a day or so, so the battery becomes fully recharged.

Living with the chest fridge

My Vestfrost freezer-turned-fridge with the thermostat described in this article maintains the preset fridge interior temperature with an accuracy of approximately ±1.5°C. The minimal fluctuations in temperature help to minimise food spoilage. For example, one of my test jars contained some yogurt that was still edible six months after its expiry date. Have you ever tried to store half a jar of yogurt in a fridge for six months?

Other published designs

The thermostat design published in another magazine recently has been designed to draw about 60Wh per day from a 240 volt source. This power draw comes from the 240 volt plugpack and the triac relay. Connecting this thermostat to my Vestfrost freezer-to-fridge conversion would cause my 0.1kWh per day fridge power consumption to rise by about 60%!

People who rely on solar power would incur even more energy waste of 200 to 400Wh per day, because the thermostat would prevent their inverter from ever entering the standby (sleep) mode. In that case, the amount of wasted power would be equivalent to running at least two (and up to four) additional Vestfrost fridges equipped with my thermostat.

A kit of parts for this thermostat is available from the author, Tom Chalko. Please contact the author for prices and availability of the kit. Tom's email is: tom@mtbest.net

Inside the thermostat: the enclosure is waterproof. Top: transformer surrounded by soldered and double-insulated wires. Bottom: the 9V NiMh battery. Cables are intentionally left longer so that the assembled pcb can be removed for inspection without disconnecting it from any part of the circuit.

Happy chooks in Adelaide

Contented Chook organiser Frith Kennedy crows over the living quarters of some hens living the good life

Did you know a young rooster can generate about 78 dB(A) at 10 metres, with spectra at 655Hz and a harmonic at 1310Hz? One of our Contented Chook Awards entrants, Pearu Terts, does! This is just one example of the thought that goes into the making of a great Aussie chook house.

Open for a little over a month, the Contented Chook Awards have already garnered entries from every state! To give you an idea of what to expect, have a look at Andy Johnstone and Keryn Hassall's entry in the urban category.

'I'm overly proud of the design and construction, as it is entirely my own work,' says Andy. 'We have three Australorps and two Welsummers, living in chook heaven, 20 minutes' bicycle ride from the city of Adelaide.'

'They have the run of approximately 400 square metres [of] back garden, and happily put themselves to bed in the henhouse each evening.'

I don't blame them! Their home has been designed with low thermal mass and good ventilation to maximise summer cooling, as mild Adelaide winters are rarely an issue. 'Our chooks shrug off cold but can be distressed in very hot weather,' says Andy.

The shed features translucent polycarbonate wall panels left over from a solar awning project, maximising internal daylight. It boasts a mesh floor to simplify cleaning and poo collection, a very attractive mini-orb gable roof for ventilation, and a 'chook-port' on one side as a rainy day shelter (to add to the tiny house/barn effect). The nesting boxes are externally mounted for easy egg collection.

It's decorated with red roof paint 'naturally aged by sparrow poo'. Andy has reduced the number of perching sparrows by stringing a single fishing line along the roof crest.

Above: On location with Andy and Keryn's chook shed, 'naturally aged by sparrow.'

Right: The shed's translucent poly-carbonate walls maximise internal daylight.

The chooks' ramp is made from a reclaimed cocoa butter crate circa 1950! The use of lightweight materials and wheel mounts at each leg mean it's also easily movable. It's current position in the garden features plantings of wormwood and pennyroyal 'to keep bugs away from the chooks.'

Both humans and poultry get their water from rainwater tanks—a total of 9250 litres—the mains are turned off at the street. The chooks have a water dispenser as well as small reused olive containers in various places around the garden.

There's no runoff problem, as the chookhouse is in the middle of the food garden, so any runoff is captured by the beds. In fact, there's no runoff from the garden at all, as the stormwater is collected and tanked on site for home use.

So, are they content sleepers as well? 'The hens favoured the lower perch when they were youngsters, but now usually occupy the upper perch together. It will be interesting to see if they spread out again in summer,' says Andy.

I can't wait to find out!

The Alternative Technology Association presents: The Contented Chook Awards

Australians are renowned for their innovation, adaptability and creativity. As a result we have some of the best chookhouses in the world!

If you think you—and your chook shed—have these qualities, then enter the Contented Chook Awards!

The inaugural Contented Chook Awards are sponsored and run by the Alternative Technology Association (ATA), Australia's leading organisation promoting sustainable building and consumer issues.

The Contented Chook Awards close 31 December 2005. Applicants must complete a simple, two-page application form (available from our website, www.ata.org.au or by mail from the ATA office), including non-returnable plans or photographs.

There are three categories:

- **The Contented Chook, Urban category**—this structure must be within an area with designated street lighting.
- **The Contented Chook, Rural/Regional category.**
- **The Contented Chook, Design category**—Don't despair if the chook house of your dreams has not yet eventuated – if your design wins, we'll give you the opportunity to build it! Students of art, design and engineering are particularly encouraged to enter this category.

Terms and conditions

Our celebrity panel will judge the Great Australian Chook House on: climatic suitability, solar orientation, innovation, water usage, material choice and artistic merit.

It goes without saying that chickens require housing that will protect them from the elements. ATA also expects each structure to comply with local government regulations on poultry housing.

In addition to a year's subscription to *ReNew* and other prizes, all winners will feature in upcoming *ReNew* magazines.

For any queries, please contact Frith Kennedy at the ATA on ph:(03) 9419 2440 or email: frith.kennedy@ata.org.au. Visit the ATA website at www.ata.org.au for an application form.

The big food experiment

Genetically modified foods are sneaking into the country through food imports and animal feed. If we don't act now we will be dragged into a gigantic food experiment, warns Greenpeace

Genetic engineering (GE) is a technology that can alter life forms in ways not possible in nature. Unlike traditional breeding processes, GE manipulates genes and then transfers them from one life form to another. The resulting 'genetically modified organisms' (GMO's) are processed into foods and sold all over the world.

A major environmental concern is that genetically engineered plants, animals and microbes can spread indefinitely. Scientists cannot predict the long-term impacts of these new life forms. Introducing GE crops into Australia is akin to the release of cane toads—once released they can't be recalled. We are on the brink of a new form of biological pollution.

(c)Greenpeace/Nimtsch

Australia's worst case of GE contamination was recently discovered in a shipment of canola bound for Japan.

Australian contamination

In July, Australia's worst case of GE contamination was discovered in a shipment of canola bound for Japan. Non-GE canola was found to have been contaminated with Bayer's GE herbicide—resistant 'Topas'. Worryingly, we still don't know where the GE seeds came from, or how widespread they now are in Australia. They may have come from Bayer's trial plantings in Victoria, or from imported US seed. Australian canola growers could now be unknowingly growing GE canola—putting Australia's reputation as a GE-free country at risk.

Instead of taking responsibility for this contamination and its ramifications, Bayer's response was to downplay the size of the contamination and even stated in a press release that 'Trace levels of [genetically modified] material is a reality in agricultural production systems around the world where seeds are exchanged between countries.'

Would we consider 'just a few fireants' an acceptable risk? The Bayer contamination scare shows just how vulnerable Australian farmers and export industries are. Greenpeace proposes that state governments introduce a zero tolerance for genetic contamination and strict liability legislation to protect farmers, consumers and our environment.

It's only fair that biotech companies take full responsibility for the GE products they design, patent, and sell. They must certainly take full responsibility for any harm or contamination that their products cause.

GE out of control

Australian consumers may currently be exposed to illegal GE corn in food imported from the US. Recently, agricultural conglomerate Syngenta admitted it had been accidentally selling US farmers a non-approved type of GE corn, called Bt10, for four years. Bt10 has never been tested for its effects on human health or the environment.

The exposé, by the journal *Nature*, resulted in the European Union banning US corn shipments and Japan rejecting six contaminated shipments. However, the response in Australia has been underwhelming. Despite hundreds of letters of concern from consumers, our food regulator, Food Standards Australia New Zealand (FSANZ), has refused to investigate which foodstuffs may contain the rogue GE corn or to institute

any measures to prevent continuing imports of the corn.

The Australian Consumers' Association's Food Policy Officer, Clare Hughes, finds this unacceptable, stating 'Because Bt10 has not been assessed and approved, any product containing Syngenta Bt10 contravenes the Food Standards Code. FSANZ must take action to determine the extent to which the contaminated corn is present in the Australian food supply.'

Inadequate regulation

The inaction by FSANZ highlights the inadequacy of our regulatory system for GE food and crops. The federal regulator responsible for assessing GE crops for commercial release, the Office of the Gene Technology Regulator (OGTR), is similarly lax. The OGTR approved both Bayer and Monsanto's GE canola for commercial release in Australia, with little regard for the impact GE contamination would have on Australia's GE-free status. State governments have had to impose their own bans on GE canola to protect our canola farmers and their export markets.

The current safety testing of GE crops and foods in Australia is minimal. Our regulators take the word of biotech companies regarding the safety of their GE organisms, without an independent testing regime. The scientific tests conducted by and for biotech companies are treated as 'commercial-in-confidence' documents and are rarely published for scientific review.

Dr Judy Carman, spokesperson on GE food for the Public Health Association of Australia, and director of the Institute for Health and Environmental Research has expressed concern highlighting, '…our potential exposure to unfamiliar or unexpected proteins, toxins and allergens through eating GE food. In addition, GE agriculture may encourage a greater level of pesticides in our food.'

GE in Australia

GE crops

Canola is Australia's first official GE food crop, and was approved for commercial release in July 2003. However, moratoria, or bans, on the commercial planting of GE canola are in place in all canola growing states until at least 2006.

Since Monsanto's pull-out in 2004, Bayer is now the only biotech company still conducting small-scale GE canola crop trials in Australia—mostly in South Australia and Victoria.

Only two GE crops are currently grown commercially in Australia—cotton and carnations. GE cotton enters the food chain as cottonseed oil (often used for deep-frying), whilst GE cottonseed meal is used as cattle feed.

GE imports

Large amounts of US corn and soy crops are now GE. Australia imports both corn and soy from the US as processed ingredients and as animal feed. These imports are at risk of being GE contaminated, unless companies have a policy to avoid GE.

GE animal feed

Poultry

Thanks to thousands of shoppers nationwide telling chicken producer Inghams that they don't want to eat chicken fed GE soy, the company has committed to going GE-free later this year. Bartter Steggles, Baiada and other producers have followed suit, and more than 80% of Australian poultry will soon be GE-free.

Pork, beef and dairy

Australian pork, beef and dairy products may come from animals that have been fed GE feed, unless the producers have a specific policy against this.

It's not printed on the label

Unfortunately, Australia's GE labelling laws have many exemptions. This means that Australians often don't know if they are eating GE food.

The following GE foods are exempt from labelling:

- food made from animals fed with GE stock feed (eg meat, milk, eggs and honey)
- highly refined foods that are derived from GE crops (eg canola, corn and soy oils, sugars and starches)
- food prepared at bakeries, restaurants and takeaways
- food 'unintentionally' contaminated by up to 1% or containing GE flavours at less than 0.1%, and
- processing aids or food additives using GE microbes.

In Europe, new GE labeling laws mean that any products derived from GE crops need to be labeled as such. Surely Australians deserve the same!

Biotech companies are determined to control food markets with their genetically engineered products. GE soy and corn are now endemic throughout the United States. It is thanks to the vigilance of farmers, consumers and environment groups that Australia still does not grow GE food crops, but pressure is mounting on state governments to lift their GE crop bans. It's time for the 70% of Australians who don't want to be part of the GE experiment to speak out.

For more info go to the True Food website: www.greenpeace.org.au/truefood

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DW1 8811

Green Power buyers' guide

Since our last guide thousands of customers have taken up Green Power. However, it can still be quite a confusing process, with a number of new products on the market—some of which do not directly contribute to the generation of new renewable power. Table by Govind Maksay

So you want to make a difference, support renewable energy and reduce Australia's greenhouse gas emissions?

The federal government's Mandatory Renewable Energy Target (MRET), was designed to act as an incentive for the development of the renewable energy industry by placing a liability on electricity retailers to purchase an additional 9500 gigawatt-hours (GWh), of electricity from new renewable energy sources by 2010.

If you think this is meagre, and insufficient to achieve necessary deep cuts to greenhouse gas emissions, you can make a further contribution. To date, over 150,000 domestic and commercial customers across Australia have collectively used over 2400GWhs of new renewable energy by simply asking their energy retailer to source their electricity from new renewables.

Green Power is a voluntary scheme that allows us all to drive an increase in the development and investment in new renewable energy generation. Electricity may be sourced from wind, solar, low-impact hydro power, and biomass from landfill or waste products from agricultural processes, such as bagasse from sugar mills.

Success so far

As a result of the growing demand for Green Power, over 150 new renewable energy projects have been installed in Australia since 1997, including the southern hemisphere's largest solar farm at Singleton, New South Wales and numerous wind farms including Crookwell and Blayney also in NSW, Codrington in Victoria, Lake Bonney in South Australia and Townsville in Queensland. Growth of the renewable energy industry and the installation of new generators has also made a positive contribution to employment and tourism in regional areas.

Over 150,000 customers have helped support the development of the renewables industry in Australia and save the environment by buying Green Power.

History

Green Power was first introduced in NSW by the Sustainable Energy Development Authority (now part of the Department of Energy and Utilities) in 1997, and has gradually expanded nationwide. The program is administered by the National Green Power Accreditation Steering Group (NGPASG) comprising representatives from each of the relevant state government authorities. The steering group accredits and audits all Green Power generators and retailers to ensure that they deliver on their marketing promises.

Why it costs more

Green Power does come at a price premium to your current electricity. The reason is simple. Renewable energy, as an emerging technology, is clearly at a cost disadvantage compared to its established, environmentally damaging competitors. Existing electricity is primarily generated from the burning of fossil fuels, which has benefited from the legacy of government ownership and continues to enjoy generous government subsidy and support.

If Australia is to reduce its dependency

on fossil fuels and reduce levels of greenhouse gas emissions, then there must be an increase in the share of electricity generated from renewable energy.

Green Power acknowledges that not everyone can afford the premium for 100% Green Power (approximately $5 per week). Hence, retailers offer a variety of blended products. This means that you can choose what percentage of your electricity you wish to be sourced from new renewable electricity—the Green Power accredited component. The remainder—known as backfill—may be sourced from old renewable energy or fossil fuel sources.

The result is an additional few cents on top of your standard electricity charge for each kilowatt-hour of electricity that you use, depending on the percentage blend you choose.

New versus old generation

So what is so special about Green Power accreditation that means you should pay an extra few cents per kilowatt-hour? Several electricity retailers offer electricity that is from 'renewable sources', but not Green Power accredited. The difference is subtle, but significant.

Some 10% of Australia's electricity currently comes from renewable energy, mainly from hydro-electricity schemes built several decades ago in the Snowy Mountains and Tasmania. The construction of these hydro-electricity facilities was capital intensive and largely funded by public investment. Hence, they now compete on the wholesale market with fossil fuel generated electricity, which is why electricity from these sources costs no more than normal fossil fuel generated electricity.

Dependency on water supply—now under threat as climate change begins to impact—and the environmental damage from building new dams has all but halted any expansion of large-scale hydro-electricity in Australia. No amount of demand for electricity generated from this source will drive the expansion of large-scale hydro-electricity or a reduction in our greenhouse gas emissions. Paying a premium for this electricity may only further reward the generators, but will not stimulate new supply.

A number of electricity retailers offer products that are not Green Power accredited, that claim to provide consumers with 100% renewable energy, for no additional cost. These products are sourced from old renewable energy sources built prior to 1997 and hence there is little scope to further reduce the level of overall emissions or contribute to the development of new renewable energy.

Green Power is sourced from new sources—built after 1997—while most non-accredited products are sourced from old renewable generators such as large-scale hydro-electricity systems.

Greenhouse Friendly

Another source of confusion is the Greenhouse Friendly program. This is a federal government program that accredits emission reduction activities, such as the flaring of methane or emissions capture from landfill. These emission reductions are then used to offset the emissions from the electricity (or gas) that you purchase.

So some retailers may purchase these offsets to negate the emissions from the fossil fuel generated electricity that you use. While the electricity that you use may be considered greenhouse neutral, Greenhouse Friendly will do little to directly encourage new renewable energy generation.

Green Power accreditation

To increase consumer confidence all products sold with the Green Power tick of approval are individually assessed to verify that they comply with high environmental standards and are

accredited under the NGPASG. Ongoing compliance of products is checked regularly via technical status reports provided by the energy supplier and are independently audited and verified. Generators using native forest products, major flooding hydro or municipal waste incineration are not able to be accredited for Green Power.

A review of the Green Power Accreditation system is currently underway, with the intent of ensuring greater transparency and stricter marketing standards so consumers are aware of the difference between the old renewable energy, new Green Power and the backfill component in the product they are purchasing.

Process

Once you are ready to make this commitment and have decided what blend of Green Power product you are will-

ing to purchase, you need to contact a retailer that provides Green Power products (see table). Another useful resource is Green Electricity Watch (available at www.cana.net.au/electricitywatch), a body comprising Australia's leading environmental groups, which compares electricity retailers based on their overall response to the challenge of climate change.

In several states of Australia you are free to choose your electricity retailer, so shop around for the electricity retailer and Green Power products that suit you. Most retailers allow you to change to Green Power using their online website.

Since the last *ReNew* Green Power Buyers Guide (*ReNew 75)* the process for signing up has generally become easier. Be warned though, do your homework and be clear on the product you are purchasing because some customer service staff may be unfamiliar with the details of Green Power products.

Purchasing accredited Green Power guarantees that the electricity you use is sourced from new renewable energy sources built after 1997. So the message is simple: if you want to contribute to the development of new renewable energy and actually reduce Australia's level of greenhouse gas emission, purchase only Green Power accredited products.

Look for the Green Power tick when purchasing green electricity.

How to use the table

The table outlines the Green Power products currently on the Australian market for residential customers. There are also some products and one retailer that cater for commercial customers.

Product options: Customers choose what percentage of their electricity consumption is sourced from renewable energy.

Solar/Wind/Hydro/Biomass: the percentage breakdown of energy sourced from different generator types.

Backfill: The source of the non Green Power component of the product. This may be sourced either from old renewables, other non-accredited sources or fossil fuels.

Mix: combination of the above sources.

Premium: Prices are supplied as a premium price in cents per kilowatt hour, unless otherwise stated in the notes. For example, if you are already paying 14 cents per kWH for electricity and the Green Power premium is three cents, you will pay 17 cents per kWH for Green Power. NB: We were unable to ensure all prices include GST. *

www.greenpower.com.au

Green Power accredited retailers

ActewAGL
Ph: 13 14 93
www.actewagl.com.au/greenchoice/

AGL *
Ph: 13 12 45
www.agl.com.au

Country Energy
Ph: 13 23 56
www.countryenergy.com.au

Energex
Ph: 13 12 53
www.energex.com.au

Energy Australia *
Ph: 1800 648 326
www.energy.com.au

Ergon Energy
Ph: 13 10 46
www.ergon.com.au

Integral Energy Australia
Ph: 13 10 02
www.integral.com.au/residential

Origin Energy
Ph: 13 24 63
www.originenergy.com.au

TRU Energy
Ph: 13 34 66
www.tru.com.au

Western Power *
Ph: 13 13 53
www.westernpower.com.au/naturalpower

Non-accredited

JackGreen
Ph: 1300 465 225
www.jackgreen.com.au

Red Energy
Ph: 131 806
www.redenergy.com.au

* These retailers have accredited and non-accredited products. Check product details with retailer.

Retailer	Product name	New Green Power Component	Total Sales (MWh) 1 Jan - 30 June 2005	Green Power Breakdown				Backfill	Premium (additional cents per kWh)	Comments
				Solar	Wind	Low-impact Hydro	Biomass			
Green Power Accredited Products										
ActewAGL	Greenchoice	5kWh to 15kWh	15,306	0%	70.00%	0.00%	30.00%	Mix	See comments	Extra 4.95 cents per kWh. So the daily cost for a customer to purchase 5kWh is 24.75 cents; 10kWh is 49.50 cents; 15kWh is 7.25 cents.
AGL	AGL Green Energy	10%	9747	0%	80%	1%	19%	Mix	0.66c/kWh	Breakdown refers to 2004 portfolio.
		25%							1.43c/kWh	
		50%							2.75c/kWh	
		100%						None	5.5c/kWh	
	Green Living	5%	6	0%	100%	0%	0%	Old renewables	No premium.	Customers pay no extra cost in order to get this product.
Country Energy	countrygreen energy	12.50%	10,269	0.30%	49.80%	0%	49.90%	Mix	See comments	Customers pay an extra $1.50 per week which is used to purchase 6950 kWh of electricity per year.
Energex	Earth's Choice	$10-$60	66,929	0.04%	34.64%	27.06%	38.26%	Mix	See comments	Choose your level of support, which ranges from as little as $10 per bill to $60 per bill. For each contribution level Energex will purchase a set amount of energy from Green Power sources on behalf of the customer. For example, a $10 contribution will purchase 330kWh of green energy.
Energy Australia	Pure Energy	100%	56,524	0.55%	0.55%	19.40%	79.50%	None	4.25c/kWh	No products on offer in Victoria, South Australia, and the ACT. Only on offer in NSW.
Ergon Energy	Clean Energy from Ergon	$0-$120	15,442	0%	0%	0%	100%	Old renewables	See comments	Customer simply chooses how much money they want to spend up to $120. For example $10 per quarter will buy 333kWh of electricity.
Integral Energy Australia	Green Energy	20%	115	0%	100%	0%	0%	Mix	1.5c/kWh	Customers choose what percentage of electricity comes from wind power. There are no other sources of renewable energy from Integral Energy.
		50%							3c/kWh	
		100%							5c/kWh	
Origin Energy	GreenEarth	25%	38,407	0%	20%	80%	0%	Old renewables	See comments	$1 extra per week for peak meter. $2 extra per week for off-peak meter. Only available in Victoria and SA
	GreenEarth	12.50%		0%	10%	90%	0%		See comments	$1 extra per week for peak meter. $2 extra per week for off-peak meter. Only available in NSW.
	GreenEarth Extra	62.50%		0%	50%	50%	0%		See comments	In Vic/SA - extra $3 per week for peak meter and $5 extra per week for off-peak meter. In NSW - extra 2.56c/kWh.
	GreenEarth Wind	100%		0%	100%	0%	0%	None	5.5c/kWh	
	GreenEarth Solar	100%		100%	0%	0%	0%	None	6.13c/kWh	
TRUenergy	TRUenergy Planet	20%	2801	0%	Up to 50%	0%	Up to 50%	Old renewables	1.43c/kWh	
	TRUenergy Planet Plus	50%		0%				Old renewables	2.86c/kWh	
	TRUenergy Wind Power	100%		0%	100%	0%	0%	None	5.775c/kWh	
Western Power	Natural Power	25%	6876	0.10%	99.90%	0%	0%	Mix	3c/kWh	
		50%							3c/kWh	
		75%							3c/kWh	
		100%							3c/kWh	
Non-accredited Products										
Energy Australia	Green Future	0%	–	0%	0%	0%	0%	Old renewables	See Comments	For a premium of $1 per week Energy Australia will feed into the grid 1MWh of electricity generated from landfill gas and/or bagasse per year.
	ClearAir Electricity	0%	–	0%	0%	0%	0%	Old renewables	See Comments	For every kilowatt-hour of electricity you buy, the same amount of electricity will be generated from 100% renewable sources. It costs nothing extra but the customer must sign a three-year contract with EnergyAustralia.
Jack Green	Green 100	0%	–	0%	0%	0%	0%	Old renewables	No premium	
Red	My home	0%	–	0%	0%	0%	0%	Old renewables	No premium	
Greenhouse Friendly Off-set Products										
AGL Electricity	Green Balance	0%	–	0%	0%	0%	0%	–	See Comments	Customers can elect to offset either 50% or 100% of the greenhouse gases associated with your household electricity usage. To offset 50% it costs 0.55c/kWh. To offset 100% it costs 1.1c/kWh.
Western Power	Earth Friendly	0%	–	0%	0%	0%	0%	–	See Comments	Customers pay a 2c/kWh premium on top of their normal tariff to offset GHG emissions from the electricity they use.

Join Australia's No.1 Green Power provider

More than 80% of Victorians who choose Green Power, choose Origin Energy. It could be because our GreenEarth Wind and GreenEarth Solar products are rated number one by Green Electricity Watch but it's most likely because we're making a real difference to the environment by investing in new renewable energy.

With an Origin Energy GreenEarth Home, you can help reduce the effect of your home's greenhouse gas emissions and help the environment. Origin Energy's GreenEarth Home is a combination of GreenEarth Electricity, produced from 100% renewable sources, and GreenEarth Gas which offsets your home's natural gas emissions.

GreenEarth Electricity

As Australia's leading Green Power provider, Origin Energy gives you the choice of 100% new renewable electricity sourced from wind or solar energy.

GreenEarth Wind is sourced from 100% new renewable wind power and GreenEarth Solar is 100% new renewable solar power. Both GreenEarth Wind and GreenEarth Solar were rated number one by Green Electricity Watch – a body comprising Australia's leading environmental groups. Origin Energy was also rated best overall corporate citizen by Green Electricity Watch for our strong commitment to the environment.

All Origin Energy GreenEarth Electricity products are accredited under the National Green Power Program, so you can be assured that the contribution you are making is being reinvested in new renewable Green Power. To find out more visit www.greenpower.com.au

GreenEarth Gas

We all enjoy cooking and heating with natural gas but it also contributes to greenhouse gas emissions. With Origin Energy GreenEarth Gas, you can help minimise your home's impact on the environment by offsetting your natural gas greenhouse emissions.

When you choose GreenEarth Gas, we invest in valuable emission reduction programs approved under the Australian Government's Greenhouse Friendly Program like the burning of methane or capturing greenhouse gas emissions from landfill sites. Origin Energy's GreenEarth Gas is the first product of its kind in Australia to help offset natural gas emissions in the home.

When you choose GreenEarth Home, we can help reduce the overall impact to the environment together.

For more information on Origin Energy GreenEarth Gas and Electricity visit **www.originenergy.com.au**

It's easy to have an energy friendly home.
Join Australia's No.1 Green Power provider today.

Call 13 24 63

The Greenhouse Friendly and Green Power logos are your guarantee that our GreenEarth products are government certified. For more information visit www.greenhouse.gov.au/greenhousefriendly and www.greenpower.com.au

Products not available in all states

Origin energy

An ethical choice

With the introduction of superannuation choice, Michael Walsh looks at ethical investment funds

From 1 July, Federal legislation came into force that gives about five million Australian employees the power to instruct their employer to change the fund to which their superannuation contributions are made.

Ethical investment funds are a small fraction of the finance industry but have been widely available in Australia for the last 10 years. With about 50 options to choose from, Australian ethical funds under management are now worth approximately $4 billion.

Ethical funds are used mainly because people or organisations are not comfortable having their money invested in companies whose activities are contrary to their beliefs. For example, investors working in health care or welfare with people suffering from substance abuse or addictive behaviour may not want their money invested in gambling or alcohol companies, even though these activities are legal and the companies profitable.

But does the investment performance of ethical investing stack up? Or is greed still good?

Comprehensive research here and overseas indicates that, for a long-term investment like superannuation, ethical funds tend to perform on a par with mainstream investment funds, so members can expect a similar return. However, because they limit the range of companies in which they invest, short-term returns tend to be more variable. Apart from this, investment issues for ethical super are no different. Members still need to consider their risk and return profile over the time horizon before they retire and fees play an important part in the level of benefits they ultimately receive. Many people prefer to take professional advice before they switch super funds.

Choosing the right ethical superannuation also offers a few additional considerations. You might want to avoid companies with direct involvement in gaming, alcohol, human rights exploitation, tobacco, native forestry and uranium. You may then want to narrow your focus further, supporting good corporate citizens—companies that are actively working on addressing climate change, social welfare, and health for example. If you are 'dark green', your pool of companies for investment could have bright long-term prospects but they will be smaller and riskier so you will need to be patient in order to achieve good long-term returns. But this has been achieved!

So how to choose? There are a handful of retail ethical superannuation fund options available from fund managers like AMP, Australian Ethical Investments, BT Financial Group, Hunter Hall and Perpetual. If you have a financial adviser, some master funds like ASGARD and Netwealth also offer several ethical funds on their investment menu. Then there are a range of industry based super funds that offer an ethical option.

According to research being conducted by the Ethical Investment Association (EIA), employees working within the non-profit sector are particularly well served by the choice of ethical superannuation options available.

The EIA is researching the number of superannuation funds that already offer their members a socially responsible investment (SRI). Funds currently offering an SRI choice include Australian Retirement Fund, HESTA Super, JUST Super, Christian Super Fund, UniSuper, Health Super, Vision Super, Catholic Superannuation and Retirement Fund, Non-Government Schools Superannuation Fund, Australian Christian Superannuation and Combined Fund.

The EIA is also conducting research among superannuation fund members on whether they are more likely to consider or choose SRI super, now that the choice is available. The research will also consider whether the availability of an SRI option from their existing fund is likely to influence that choice.

The EIA website (www.eia.org.au) has information about ethical investing, a list of financial advisers specialising in the area and details of superannuation funds that have ethical investment options.

The Association of Superannuation Funds of Australia (www.asfa.asn.au) is an ideal independent source for general information about superannuation choice.

Michael Walsh is the editor of *Ethical Investor* magazine.
www.ethicalinvestor.com.au

Revolution in the suburbs

Benjamin Pederick looks at the future of Australian suburbs, when he visits a newly built eight-star Californian bungalow

The spread of sustainablility is most exciting when it happens in the nation's own backyard, the suburbs. That is just what two friends have achieved, one with a passion for sustainability, the other an experienced builder.

After two years of planning and permission, and many hours consultation with long time friend Stuart Nesbitt, builder Peter Turewicz has built a house in six short months with a theoretical eight-star energy rating. To put this into context, under the Victorian state government's First Rate energy rating tool, homes with a one-star rating have minus 100 points. Five star homes, the highest possible rating under the government's test, have seven points. In contrast, Pete's first 'pilot' project is a custom designed 1910s Californian Bungalow style home with a total of 39 points.

Stuart, who works for Hume City Council in Sustainable Energy Management, said that his constant talk about sustainability eventually turned Pete into an enthusiastic proponent. Pete's first energy-efficient house is designed from the ground up, to achieve a perfect match with the features and details of the traditional Californian Bungalow style. However, under the surface Pete's house is a blueprint for sustainable suburbs, and an indication of real possibilities for the future.

Its all in the slab

The house performs as a thermal envelope, starting with an on-ground concrete slab beneath the house insulated at the edges with Polystyrene foam to prevent energy transfer. The house uses passive solar design techniques with an emphasis on the north facing windows

to soak up winter sunlight, storing it for the house's main living areas the lounge, kitchen, and dining room.

The second storey is of lightweight construction, meaning upstairs walls do not require internal bracing walls, increasing living area while still staying true to the appearance of a heavyweight Californian Bungalow. Lower walls are brick veneer, and the upper storey walls are polystyrene rendered boards with a stucco finish, the boards providing cladding and insulation and the stucco reflecting the desired style. The lightness of design is evident in features like a kids play room, an extra space in the sloping roof transformed and lit by a skylight.

Double-glazed stained glass

The house faces due west, its facade mimicking perfectly the period architecture of the area. Low emissivity 'Azura' glass has been specifically used for all the front windows facing west, including the custom leadlight door glass that has been stained and double-glazed. Azura glass deflects 53% of the sun's radiant heat, and also takes off summer glare.

In the master bedroom the second pane of double-glazed glass, in unison with the outside low-e glass, dampens radiation both in and out, allowing light to enter the room while preventing heat moving in and out through the windows. Custom-made window sashes match the period nicely, with attention extending to the style of window frames and lighting fixtures.

All other windows in the house are uPVC frame double-glazed and placed to correspond with a correct ratio of eave overhang and window size, delivering ideal passive solar design for Melbourne's temperate conditions. This regulates the house's temperature all year round, with detachable sails providing additional living options, especially over the large spa and raised wooden decking.

Right: The Jet Master gas log fire provides enough heat for the whole house.

Below: Natural light through the double-glazed windows provides warmth to the downstairs living areas.

The uPVC window frames have the insulation properties of wood and the rigidity of aluminium. Easily maintained and cleaned, the uPVC has the added advantage of not warping or degrading over time so all the seals keep working as the house ages. Ceiling insulation is R3.5 polyester batts, and on the exposed wall R2.5, adding to the requisite insulation of the vapour barrier.

The thick window blinds are fitted directly above the window frame to interrupt heat loss by convection currents.

The external plumbing ready for the installation of rainwater tanks and Rain Bank system that will supply water for flushing the toilet.

Owner-built

As an expert builder Pete planned and built the whole house himself. Stuart had been in his ear for years every time they went motorbike riding together, a shared hobby. Pete said, 'I was getting a lot of info from Stuart. He had just finished a course on sustainable design, plus I got the final details from Wes Polley, an energy efficiency advisor for window design company CertainTeed Windows'.

As a result of his newly discovered passion Pete is keen to improve on the efficiency of his current success. Pete's plans for the next and more energy efficient house on a block in the same street are already well advanced.

Materials guided design

The design was guided by the choice in materials, with a west-facing facade using timber for the front windows and door—the only timber in the house aside from the groundfloor floorboards.

Pete said, 'Looking at it from the front it is pretty authentic, and up the side the only thing that is slightly different is that the windows have a different frame. All other features appear to be what you'd find on your traditional Californian Bungalow'.

Reduced energy bills

The house is set on a dual occupancy block. Pete also built the second house using sustainable principles. The owner has reported a 50% reduction in her energy bills. 'The biggest challenge is trying to build something you like without compromising environmental sustainability, said Pete'. Every point in the house where energy might leak has been expertly crafted to maintain core temperature. 'The building envelope is created by paying attention to any point where energy can escape, adds Stuart'.

All lighting is low energy, with the few 50 watt halogen lights used being fitted with Osram IRC Energy Savers, cutting energy use to 35 watts. Elsewhere the house's traditional period style lighting fixtures have been customised to fit compact fluorescent lights.

Each bedroom has a radiant panel heater, but Pete's wife Georgina said, 'We only tend to use the one in the baby Victoria's room a bit in the morning to keep her sleeping, otherwise the whole house is heated by the Jet Master gas log fire'.

The house employs a heat shifter, ducting warm air with an axial fan from the main living room to a floor register upstairs. These rooms have ceiling air extractors ducted to a roof vent, especially useful in summer to remove excess heat from upper storey rooms.

Window blinds are made of thick fabric material and help to interrupt convection currents rising in the centre of the room and moving across the ceiling to the window where energy is lost. All

rooms have ceiling fans and in the winter these are used on low speed to circulate warmer air. Georgina said, 'In our old home it would get so cold in the Melbourne winter the kids would wake up. Now using the ceiling fans it is perfect'.

In his next project Pete plans to improve on his current design by installing tiles on the living room floor. The higher thermal mass of tiles directly laid on the concrete slab will further improve the passive use of the sun as a source of energy for the thermal needs of the house.

The house is also ready for the installation of a rainwater tank and a Rain Bank system, which will automatically switch water supply to the toilets from rainwater to mains water according to availability of stored water.

Building for the future

Stuart said, 'There's lots of ignorance in the trade sector and Pete is a start to changing that'. For Pete, his enthusiasm for sustainability comes from a combination of finding a solution to rising energy prices, and preparing for the inevitable changes to the construction sector. Pete said 'The first thing was the cost of resources and energy. Rising electricity and gas bills were one of the main factors. Plus, I think this is where the future is going now and if you can get in now and understand how it works then when everyone is going that way I reckon I will have the upper hand over builders who have put it in the too-hard-basket'.

Georgina, Victoria, Pete and Hannah enjoy reduced power bills and a warm house during Melbourne's cold winters.

Nestled in among the rows of leafy gardens it seems clear that there is a sustainable revolution stirring in the heart of suburban Australia.

The national picture

ReNew's regular policy columnist Alan Pears looks at the implications of the new Asia–Pacific Climate Alliance

Big news on climate change policy recently as the Asia-Pacific Climate Alliance announced its intention to tackle climate change through the development and rollout of low emission technology. The Alliance, which includes the USA, Australia, China, India, South Korea and Japan, has no targets and will focus on positive cooperation. It is supposed to complement Kyoto—but some reports suggest it is intended to undermine negotiations on post-2012 Kyoto targets. The first meeting of the Alliance is planned for November.

The implications are still unclear. Will the Kyoto countries be unified, and develop stronger strategies in response to the competition? Will short-term actions be diluted while the focus shifts to long-term 'magic bullet' technology solutions? Will renewables and energy efficiency be important parts of the strategy? Or will geosequestration, nuclear energy and new supply-side solutions dominate?

One positive message is that the US government has finally acknowledged that human-induced climate change is really happening, and that something needs to be done.

Aluminium, Australia and the World

Australia's aluminium industry has been a powerful opponent of emissions trading and carbon taxes because these could add hundreds of dollars per tonne produced to their costs relative to international competitors. In May, Australia's aluminium industry and the global industry both released sustainability reports (available at www.aluminium.org.au and www.world-aluminium.org) that highlight the issues within the industry.

Globally, it is argued that aluminium could be greenhouse neutral within 20 years. This claim is based on including credits for factors such as fuel savings due to lightweighting of vehicles manufactured with aluminium, and predicted increases in recycling. The Australian aluminium industry has attempted to ride on the back of this global study, with Australian Aluminium Council chair Wayne Osborn saying '… every kilogram [of aluminium] used to replace heavier materials in car production can save 20 kilograms of carbon dioxide over the life of the car.'

This sounds good. Unfortunately, only a modest proportion (26% globally) of aluminium is used in transport. There are other ways of lightweighting vehicles (eg. use of carbon fibre from renewable carbon sources or simply buying smaller cars) that may deliver larger net greenhouse benefits—or we could use cars less. And production of each kilogram of Australian aluminium involves generation of about 17 kilograms of greenhouse gas. Using Australian aluminium for transport doesn't create much net benefit—unlike aluminium from many other countries. Meanwhile, over a third of Australia's aluminium cans (over a billion cans with a greenhouse 'cost' of around 220,000 tonnes of CO_2 per year) are 'lost' rather than recycled.

The two reports highlight that Australia is really one of the global 'black sheep' of the aluminium industry. According to my calculations, Australia smelts less than 7% of world primary aluminium (including primary and scrap) but generates about 18% of its electricity-related smelting CO_2. To smelt a kilogram of aluminium in Australia generates on average around 14 kilograms of CO_2 from electricity, three times the average for the rest of the world. The Portland smelter is even higher than this. Proposals for expansion of Australia's coal-based smelters compete with low emission alternatives in other countries such as Middle East natural gas, much of which is now flared as waste. 55% of world aluminium smelting uses hydro-electricity

How long will Australia's dirty smelters be tolerated by a global industry that is trying to reposition itself as clean and green?

I should stress I'm not trying to be anti-aluminium here. Australia's alumina industry, which provides the raw material for aluminium smelting, is world standard in terms of greenhouse intensity. Aluminium plays important roles in the world economy, many of which can contribute environmental benefits. But does it make global sense to smelt aluminium using coal-fired electricity? Maybe a solution is for Australian smelters to become world lead-

ers in energy efficiency, shift to renewable electricity themselves, and aggressively help other parts of the Australian economy to cut their emissions to offset those from smelting? It will be an interesting decade or two.

Appliance energy labelling dilemmas

Australia's appliance energy labelling scheme is widely used and delivering large energy and greenhouse savings, but it may be time for a rethink about how it works. As we focus more on climate change issues and manufacturers shift to different technologies, some cracks are beginning to appear in the scheme.

For example, some efficient front-loading clothes washers have only a single water hose connection, so they use cold water and heat their own water when required. This heating uses electricity instead of hot water from a gas or solar hot water service, increasing both running costs and greenhouse gas emissions. Then there's the difficulty of trying to make meaningful comparisons between gas, electric, electric heat pump and solar (gas or electric boost, day-rate or off-peak electric) hot water services for varying levels of hot water usage.

Then there is the scaling. The best European fridges would score more than the maximum 6-stars on a scale that was only updated a few years ago, while micro-fridges using inefficient Peltier devices (apparently just the thing for your bedroom) and portable fridges don't seem to carry labels.

Maybe governments could develop and approve web-based calculators that people could use to assess their own circumstances where manufacturers would otherwise have to provide detailed information on their products performance. Surely a reasonable request in the interests of consumer information. Once we had the models and could see the impacts of different appliances and their usage, we could explore better ways to provide information to consumers. The Virtual Home Audit tool on the New South Wales Government's energy website (www.deus.nsw.gov.au/les) is a useful step, but these options should complement labels, not replace them—unless we can have interactive energy labels!

Productivity commission lessons

The final report of the Productivity Commission Inquiry into Energy Efficiency is due out for release in the next month. The hearings were quite feisty at times, and reflected a great deal of confusion over what the Terms of Reference actually meant. Presiding commissioner Neil Byron commented (in July *EcoLibrium,* the Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) Journal), 'I don't think I've ever been involved in an enquiry that has had so much misrepresentation of what it's about.'

The Productivity Commission made it clear they think it makes sense to focus on energy efficient measures that deliver private benefits and ignore all of the public benefit such as reduced greenhouse gases. But, as I pointed out to them at the Melbourne Hearing (transcripts available at www.pc.gov.au), if that's so, they have no basis to make judgements about most existing and proposed energy efficiency policies and programs. Many have been justified on 'net public benefit' grounds, rather than any purely private assessment.

Then there's the challenge of drawing a clear line between private and public benefit, or the role public policy can play in reducing the costs of energy efficiency measures and enhancing private benefit from energy efficiency.

While the Productivity Commission is prepared to acknowledge the existence of some information failures, split incentives, and other barriers worthy of limited government action, they struggle to grasp the deep-seated and pervasive nature of these barriers. Lets face it, many businesses profit from encouraging energy inefficiency. Maybe the crucial question is, 'when does a market barrier become a market failure worthy of intervention?'

The Government might have been better off appointing a panel of psychologists, sociologists and marketing experts, rather than economists, to look at this issue.

It seems that the only way a 'rational economist' with faith in markets can reconcile the existence of cost-effective energy efficiency measures with the widespread failure to adopt them is to conclude that the benefits have been overstated and the costs of adoption understated. ✻

Naturally fine wines

Olivia Neville-Smith looks at a couple of wineries that are using sustainable production methods to produce award-wining wines

Wine—that beverage lovingly crafted from the succulent, sun-drenched 'fruit of the gods' and fit to savour by Bacchus or us mere mortals (in moderation of course).

It would seem logical then, to grow the grapes and make the wine using natural, sustainable production methods, especially given the desired outcome of a high quality product. However, 'putting something back' for the sake of the environment is a commitment not every producer is prepared to make, though perhaps more growers would if they knew the full benefits.

Finding sustainable solutions to problems faced in the production process, as well as regenerating and caring for the land, means investment and lots of hard work, and so it is not always a high priority for producers. However, for vignerons who have revegetation programs and for those that use sustainable technology, the benefits can be many. The return of natural predatory insects and animals can improve the ecosystem and eliminate the need for pesticides. Added to that, organic wines are now winning awards alongside their non-organic competition!

Temple Bruer

Established in the early 1970s in the Langhorne Creek wine growing region of South Australia, Temple Bruer has grown to be Australia's largest certified organic winery. Joint founder David Bruer was previously head of Roseworthy College's Oenology Department before becoming a full-time vigneron. With his wife Barbara, they have a philosophy to 'make the best wines from the fruit vintaged, to present the wines well, and to make them affordable'.

Chemical sprays have not been used on the property since 1975, and in the early 1990s full conversion to certified organic practice commenced, with all plantings now certified A-Grade Organic by the Biological Farmers of Australia (BFA).

Solar still and water saving

The winery features a large-scale experimental solar still which takes the waste product from the wine-making process and seperates the liquid from the organic matter for reuse. Designed by solar water purifier manufacturer Thamesford P/L, the system consists of 60 collector panels. The black plastic in the collector panels is heated by the sun, evaporating the water which then condenses on the glass before running into a collecting trough. The concentrated organic matter runs through a tortuous path to a separate drain hole. This nutrient-rich organic waste is then pumped onto compost heaps before being transferred back onto the vineyards.

To further save on power, the owners have plans for an auxiliary generator, using biodiesel, to heat the liquid waste before it enters the solar still.

In the past, water from bores was simply pumped directly onto the grape vines and flood-irrigated in spring. Now, a drip irrigation system is in place and water monitors ensure moisture levels are maintained. The owners are keen on the principals of renewable energy and as such the home, which the Bruers built in 1986, has solar hot water.

Major revegetation project

The owners have an extensive revegetation project on the property, which has

significantly improved conditions for wildlife and some rare flora. Of the 41 hectares, approximately 15% has been revegetated and there are plans for more, with a target of 30% by 2010. The long-term aim is for the winery to become carbon neutral. It is even part of the Commonwealth Government's 'Greenhouse Challenge'.

Due to the increased habitat, birdlife has been encouraged to return to the property, with a pair of nesting falcons now in residence. As a result there are no problems with common grape loving starlings and crows! Shield bugs also mop up light brown apple moth on the grapevines, and there is no need for additional pest control. The additional trees also prevent salinity by lowering the water table.

Recycling wine barrels

Temple Bruer reuses its French Oak and American Oak barrels that are sent to a factory in McLaren Vale for refinishing. The barrels are shaved back to bare wood and then toasted using a thermo-couple controlled toaster—a two metre long machine with an endless computer driven chain.

Sensible, sustainable practices like this are influencing industry practice, with large producer Southcorp now using recycled barrels. Approximately 90,000 recycled barrels were used to produce Southcorp's 2005 vintage.

Elgo Estate

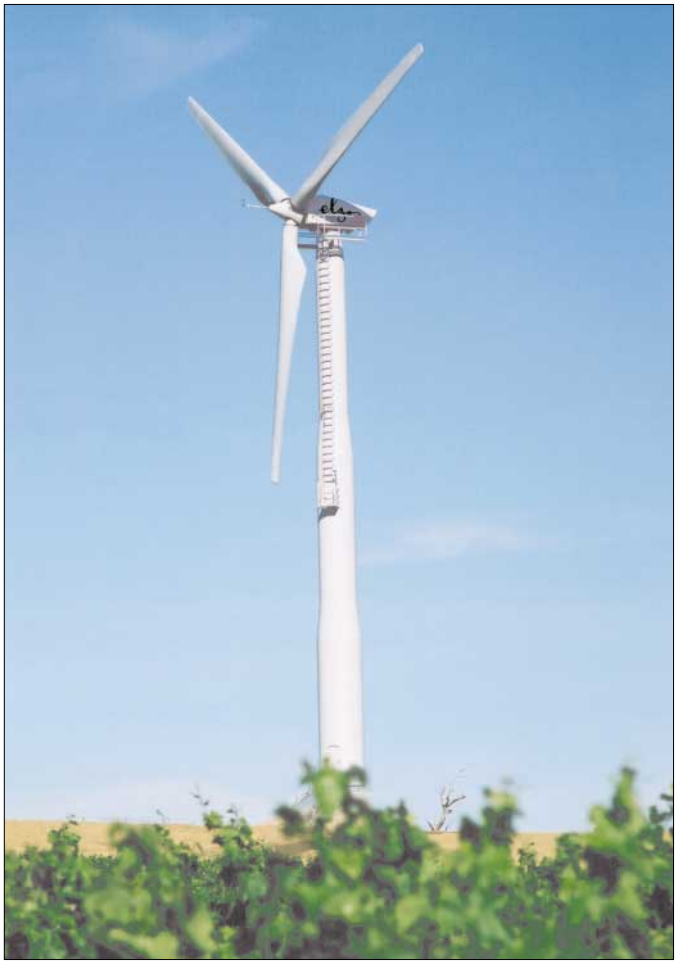
Another winery is taking a lead by installing a 150kW wind power system. This will provide power for the winery and any excess power will be fed back into the grid, saving around 500 tonnes of greenhouse gas emissions a year.

Elgo Estate, in the heart of the Strathbogie ranges in central Victoria, is named after a place called 'Elgol' near the Isle of Skye. When Scottish settlers arrived in this part of Victoria, the granite-covered landscape reminded them of home.

Right: Working with nature—an orb spider goes about its business on the Temple Bruer estate. Revegetation means growers can sit back and let nature lend a hand with pest control.

Below: Collectors in Temple Bruer's solar still soak up some sun.

The old farm—1800 acres—was purchased by the Taresch family in 1996, who then began to rehabilitate the property, and prepare 70 acres for grape production. The property was quite run down, and so the owners needed to rejuvenate the soil and prevent runoff, which included fencing off creeks and waterways to prevent further erosion.



Wine gets a little help from wind—Elgo Estates' 150kW Bonus turbine set to go at their vineyard in the Strathbogie Ranges.

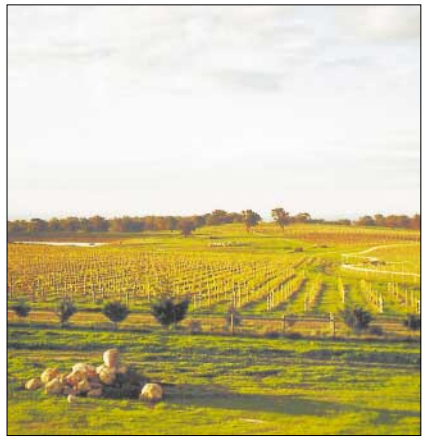
Wind power system

Realising they had a windy site, the owners had a wind assessment completed in 2003, to look into the possibility of running the winery on wind power. As manager of the family business, Grant Taresch says they believe that 'farming can sometimes take away from the environment, so we wanted to try to make the least impact'.

Once it was confirmed the site was suitable for wind power, they purchased a reconditioned 150kW Bonus turbine from the Netherlands. It is hoped that the excess power generated will be enough for approximately 50 homes. While the turbine is all set to go there have been 'a few hiccups' sorting out the contract with the power utility. Elgo hope to have the system up and running in the new year.

Nature corridor and pest control

An area of 200 acres on the eastern flank of the estate has been designated sheep and cattle free to provide a small nature corridor on the property, and to encourage natural predators for pest control. The owners decided not to use netting to protect their grapes, instead opting to install a solar powered bird scarer to frighten pest birds away.



Rows of vines bask in the morning sun.

Wastewater from the wine making process is aerated and de-sludged in a series of two ponds, stored in a third 'lagoon' then composted with spent grape skins—known as 'marc'. The compost is then used to enrich the soil with organic matter.

Carbon dioxide reticulation

Another practical and energy saving measure is the reuse of carbon dioxide generated by fermenting wines, to protect maturing wines in adjacent tanks. Excessive exposure to oxygen will prematurely age wine—and in extreme cases turn it into vinegar. The 'blanketing' of wines with recycled CO_2 will protect them from this risk, saves money and saves greenhouse gas emissions.

Good practise, great wine

Consideration for the environment, non-toxic pest control and conserving valuable resources such as water suggest the future looks rosy for sustainable wine production.

The added benefits, for those that enjoy the occasional tipple, are great tasting wines and the knowledge that their beverage, and the environment the wine was produced in, are as close as possible to the way nature intended.

Temple Bruer wine is available online at www.templebruer.com.au and from a variety of retailers in South Australia, New South Wales and Western Australia.

Elgo Estate wine is available online at www.elgoestate.com.au and from a variety of retailers in Victoria and New South Wales.

Desulphators in the Daintree

Battery desulphators are supposed to improve battery life by reversing sulphation, but do they really work? Hugh Spencer, of the Cape Tribulation Tropical Research Station, describes the results of their desulphator testing

Settlers in the iconic Daintree rainforest lowlands (on the coast midway between Cairns and Cooktown) have no grid electricity supply, so have some form of remote area power supply (RAPS) system. Prior to 1994, very few had primitive photovoltaic (PV) based RAPS systems. The remainder made do with generators, or kero and candles (hoping all the time that the much-promised grid connected electricity would appear).

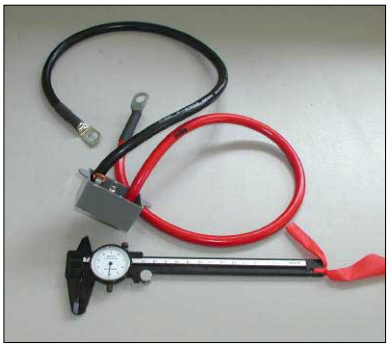
As a result of the Queensland government providing rebates to Daintree lowlands households for the purchase of RAPS, the area now constitutes one of the largest 'non-intentional' renewable energy settlements in the world.

However, over the past ten years we have observed an incredibly high incidence of RAPS failure, particularly due to battery degradation.

Desulphators, an electronic device that can supposedly reverse battery damage caused by sulphation, were being touted as the answer to battery degradation. As a result, my colleague Paul Hollis and I secured Queensland Environment Protection Authority (EPA) Sustainable Industries funding to trial desulphators, a scheme that ran from 2000 to late 2003.

Basic Daintree RAPS (DRAPS) systems

Most of the Daintree lowlands RAPS systems were installed in a rush during 1995, the first year of the DRAPS scheme. The almost total lack of experienced solar installers in the area meant marine electrics and battery sales businesses moved into the new market, learning their skills on the job. The funds available were only sufficient for a basic system for most householders. As a result most installations showed no understanding of the issues that arise in climatically difficult areas such as the Daintree. Worse, most householders demanded that their systems cost no more than the $15,000 rebate, as they were not prepared to invest their own money. There was little attempt, by either the installer or the government, to educate the user.



The desulphator used for the trial. Note the heavy battery leads to reduce losses from the high current pulses. The calipers, which are 230mm long, are there for scale only.

Basic systems comprised a 10 panel PV array (80 watts per panel), a basic non-adjustable roof mount, charge controller, batteries (mainly 1000Ah flooded cells), a sinewave inverter, and, if the inverter was not a bi-directional inverter-charger, a basic battery charger. Last, a petrol or diesel alternator (usually 5kVA) provided backup and charging capabilities.

With further additions to the DRAPS scheme following the re-election of the Beattie Government, many residents upgraded their systems, largely through additions to their PV arrays. Uptake of the DRAPS scheme was further encouraged by the ruling in November 2001 that further provision of grid-based electricity north of the

The Celltron CTM-100 conductance analyser used in the study. The battery test probes have two spring-loaded pins which dig into the lead terminal posts. This is called a 'Kelvin' connection, and allows the instrument to measure currents and voltages at the point of connection with the battery posts.

Daintree River was prohibited by the Queensland legislature.

Desulphators

Desulphators are electronic devices designed to inject fast high current pulses into the cell to 'twang' the electrochemical process. This is understood to reduce the tendency of the lead sulphate crystals (formed as part of the discharge process) to form larger crystals. Large crystals tend to detach from the plates and form the characteristic white deposit on the floor of the cell, which indicates a sulphated cell. This results in a loss of surface area of the plates due to the loss of plate material, correlating directly with loss of battery capacity.

There are two main types of desulphator device: modulated pulse and simple pulse. The advantages of each are unclear, but as the simple pulse desulphator was electrically the easiest to implement, it was used for the trials.

Because the cells were large, we decided to use the highest pulse current possible so the cell capacitance would not degrade the pulse rise time. A basic low-power desulphator design was previously published by Alistair Couper. We analysed the function of his pulse forming circuit and made a simple desulphator that could reliably deliver 1000 amp plus pulses (0.1uS wide at 1000pps) into a 12 volt battery that was used as the test system. As ever, the devil was in the details!

Fifty of these desulphators, constructed at the Cape Tribulation Tropical Research Station for the project (there being no equivalent commercial unit available), were fitted. Towards the end of the trial, eight commercial modulated-pulse desulphators (from Hotwire in Adelaide) were also fitted.

As the initial purpose of the study was to assess long-term desulphator performance, we designed the trial so the battery bank could be divided into two parts—one to be the test, the other the control.

Measuring battery capacity

Since a rapid and accurate measurement of cell capacity is essential to assess the efficacy of the desulphator, we used a relatively new technique, conductance analysis.

Conductance of lead-acid cells is directly proportional to the amount of active area in the cell. A new cell has the largest possible active area. As the cell ages and sulphation occurs, the amount of active material decreases, and the relationship between state of charge and the cell capacity collapses. A severely damaged cell can have as little as 1% of its original capacity, even though the battery is 'fully charged'. As conductance reflects the active surface area of the cell, it can be used to assess any changes resulting from the effect of the desulphator or other battery treatments.

Conductance analysis measures the AC resistance of the cell by applying an AC constant current and measuring the voltage developed across the cell internal resistance (which usually is in the order of milliohms). The resistance is converted into the reciprocal to give conductance, measured in siemens (S).

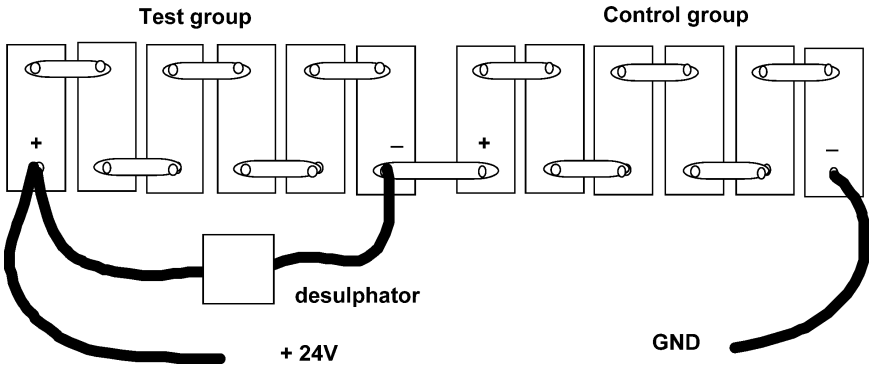


Figure 1: In this arrangement all cells in the battery have exactly the same charging and discharge conditions, so any impact that a de-sulphator might have should be demonstrated as a statistically significant difference in capacity between the treatment and control sections of the battery. This approach compensates for all aspects of battery treatment by the householder.

Thus, a new 1000Ah cell commonly has a conductance of about 2500S. This figure falls as the cell ages and sulphates. Conductance must be measured cell by cell, as an otherwise good battery with a faulty cell is indistinguishable from a degraded battery.

Using a conductance-based analyser allows battery capacity to be measured in a very rapid and reproducible fashion without requiring interruption to the RAPS system operation (and making enemies of the householder!). For this project, we obtained a Micro-Celltron CTM 100, manufactured by US company Midtronics.

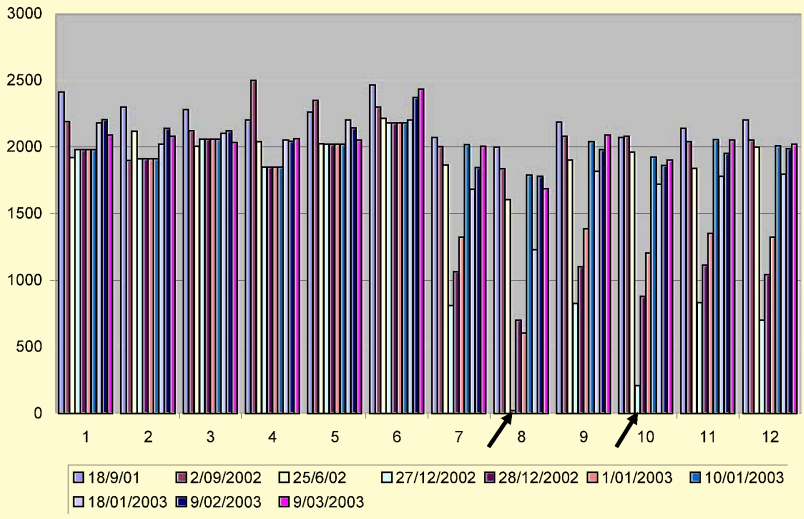


Figure 2. A time series indicating the dramatic positive effect of the pulse desulphator fitted to the only set of gel cells (Sungel SG1100) in the study, installed in June 2000. The pulse desulphator was fitted to cells one to six on 1 January 2002, with cells seven to twelve as the control section. Approximately six months later the conductance of the cells on the test side remained constant or had improved, while those on the control side had started to show a decline in conductivity.

On 27 December 2002, after a prolonged period of cloudy weather and generator troubles, the system collapsed, with the conductivity of two cells (eight and ten in the control section—marked by the arrows) falling to lows of 22 and 209 S (the nominal original value was 2000), indicating very severe damage. The rest of the cells in the control group fell to an average of 700. The test group showed no change.

A second desulphator was immediately fitted across cells seven to twelve, and the batteries were brought up to equalisation voltage using the generator and maintained in this state as far as practicable. Conductivity readings on 9 March 2003, indicated that the cells had made good recovery, but cells eight and ten had not achieved their pre-collapse conductance levels and were subsequently replaced. Cells seven and nine collapsed in November 2003 and were replaced. The test cells one to six have retained their original conductivities although now (mid 2005) they are showing decline due to heavy cycling.

While not in anyway conclusive, this observation strongly suggests that the pulse desulphator exerts a significant protective function on gel lead-acid cells, quite distinct from its impact on flooded lead-acid cells.

Our results

Fifty three households completed the three-year study period. Desulphator effectiveness was calculated as:

$$\frac{\text{Initial average conductance - final average conductance}}{\text{Initial average conductance}} \times 100$$

The initial average cell conductance was calculated separately for the 'test' and 'control' sides of the battery banks and the percentage changes plotted (see Figure 3). This allows us to compare the effects of the desulphator on cells of different amp-hour capacities.

Even in an experimental design that compensates for the actual and expected variation in battery behaviour during the study, a detailed analysis of the impact of the desulphators becomes very difficult indeed. Some of the results suggest that the desulphator exerted most of its effects early in the study, and its continued use caused some degree of degradation (at least for flooded cells). Unfortunately, the variability in battery conditions encountered during the trial makes it impossible to verify this. Certainly the gel cell bank has continued to show maintenance of capacity on the test side, a long-term positive effect (see Figure 2 on the next page).

In conclusion, desulphators are not a panacea, although for gel cells they are definitely worth further investigation as protective devices.

The entire desulphator test report can be obtained on CD for $30 (including postage and GST) from Australian Tropical Research Foundation, PMB 5, Cape Tribulation QLD 4873.

This survey was funded by Queensland Department of the Environment.

References

A Couper, 'Lead-Acid Battery desulfator' Home Power #77, p84, 2000.

R Lloyd, D Lowe and L Wilson. Renewable Energy in Remote Australian Communities (A Market Survey) Final report, ACRE Murdoch University 2000.

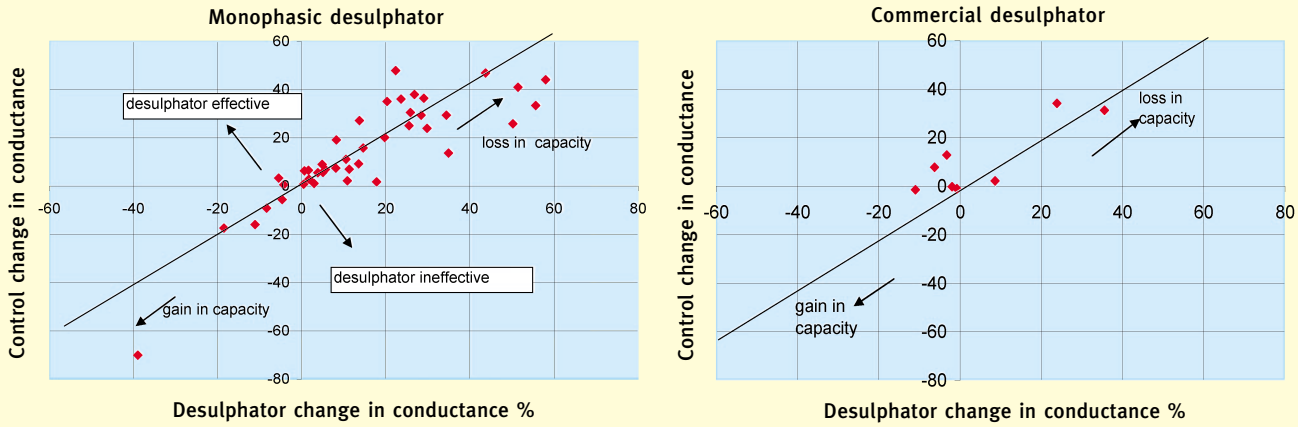


Figure 3. Plot of conductance changes in the test battery population compared to the control side. Most batteries were monitored over the whole three year period. The trend line indicates where both the test and the control sections of the battery have deteriorated equally (right of zero) or improved (left of zero), and there is no discernible effect of the desulphator. Values clustered around the zero point indicate that there has been no significant change in capacity over the trial. Points to the left of the trend line show that the desulphator has increased the capacity of the test section compared to the control (ie, it has been effective), despite general reduction or improvement in capacity of the entire battery. Indeed, it is possible that some points on the right-hand side suggest that the desulphator had a negative effect on a few batteries (though the mechanism for such a negative effect is unknown).

The clustering of points on the upper left of the line indicates that these systems have degraded during the course of the study (with only five showing improvement), yet 23 systems have shown some reduction in degradation which could be ascribed to the action of the desulphator.

One system showed a quite spectacular improvement, which doesn't appear to be due to the desulphator. The battery of this system was in very bad shape at the start of the trial and improved, presumably due to a greatly increased frequency of equalisation charging (that is, the system owner started to take notice of his system, as we were using it as an experimental subject!).

Points in the far upper right hand of the graph, to the right of the trend line, are harder to interpret—either the desulphator has had a negative effect (unlikely), or more likely, that the degree of conductance variation of batteries showing this degree of damage (30 to 60% loss of conductivity) is such as to make any interpretation of the results (favouring or otherwise the effect of the desulphator) moot for this group.

Unfortunately, the sample (and test time) for the commercial 'modulated' pulse units (the right-hand graph) was too small to give results that could be compared with the main study, but the pattern was similar.

www.slowfood.com and www.slowfoodfoundation.com

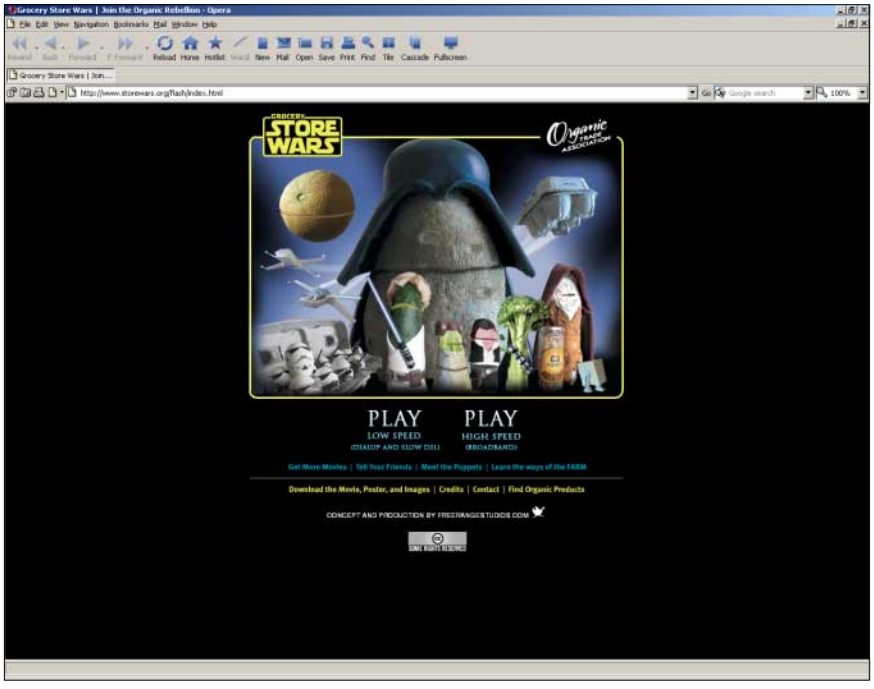
The Slow Food Foundation for Biodiversity was founded in Italy to organise and fund projects that defend our world's heritage of agricultural biodiversity and gastronomic traditions.

Both sites set up by the foundation contain vast amounts of information about this heritage. For example, many of the world's original varieties of foods have disappeared in the last century or so. 75% of European food diversity has been lost since 1900, 93% of American food diversity has been lost in the same time period, and 33% of livestock varieties have disappeared or are near disappearing. Probably the most amazing fact of all is that 30,000 vegetable varieties have become extinct in the last century, and one more is lost every six hours!

The foundation envisions a new agricultural system that respects local cultural identities, the earth's resources, sustainable animal husbandry, and the health of individual consumers.If you are interested in good food and wine, and preserving the varieties of old, then check out these sites.

www.storewars.org

Just when we thought we had seen everything silly on the internet, along came www.storewars.org. Put together by the Organic Trade Association, the site seems to be provided purely for you to download and watch a rather bizarre, but quite clever, rip-off of the star wars saga, only with food as the main heroes (and villains).



If you think this sounds weird, you're right, but it is a movie with a message—that organic food is the way to go.

While most people will go there just for the movie, there is more to the site than just animation. There is also basic information on organic food, and why it is better than the stuff you get at most supermarkets.

There is also an organic produce directory, which is basically the main site of the Organic Trade Association in the USA. As a result, some of the information is of limited use to people in other countries. However, the information on organic food and other produce is just as relevant to people in the southern hemisphere.

Noel's Treasures from Trash

Make a cooker that can heat foods without using any fuel

To make your own Solar oven you will need:

A large pizza box and one the next size down

- Black plastic to line the smaller box
- Extra wide potato chip bag
- Clear plastic (Gladwrap)
- Sticky tape
- Scissors and a knife (a steak knife is best)
- Newspaper
- Parents to help and learn

Many foods can be cooked at quite low temperatures—some as low as 80 degrees Celsius. With a little boost, sunlight can easily reach this temperature, allowing you to cook using just the rays of the sun.

A simple solar cooker made from a couple of pizza boxes!

A simple solar cooker

You can make a very simple solar cooker from a couple of boxes and a few other items.

Cut the potato chip bag around the edges, open them out and wipe them clean.

Clean the pizza boxes as well as possible and place the smaller box in the centre of the top of the larger box. Mark the outline of the smaller box on the lid of the larger box. Cut out three sides of the square you have marked on the box lid. Leave the fourth side uncut to form a hinge. Bend up the flap along this side. The small box should just fit into the hole.

Next, cut the lid of the small box along three sides, about 1cm in from the edge, and bend the flap up, just like you did with the larger box.

Slide the smaller box into the larger box and turn the two over. Loosely roll some sheets of newspaper and place in the space between the boxes as insulation.

Turn them back over again, lift the lid of the smaller box and line with the black plastic, holding it in place with some glue. Cover the hole in the lid of the smaller box with the clear plastic film—stick it down with tape, pulling the film tight to reduce wrinkles.

To make it easier to open the small box, you can make some opening tabs using wide sticky tape with the end folded over. Stick these to the front edge of the small box lid so that they stick up so you can grab them to lift the lid.

Now you have to make the reflectors. Cut the potato chip bag into pieces the same size as the two large flaps. Then glue or tape them to the insides of the flaps. Fix the two flaps at right angles, pointing the 'V' towards the sun so the sun is reflected into the small box. Use sunglasses when adjusting the reflectors, so that you don't blind yourself!

Your cooker is now finished. To use it, lift the lid of the small box and place the food inside. Make sure it doesn't stick to the inside of the clear film. Place the cooker in the sun and aim it at the sun. The temperature inside the box will rise quickly and start to cook the food. Try cooking things like marshmallows, crackers or chocolate. Dry food is best, as moist foods will release a lot of water vapour that condenses as moisture on the plastic, slowing the cooking process.

A word of warning

Don't allow food to sit at a temperature below 60 degrees for extended periods, as bacteria can breed rapidly at these temperatures, resulting in food poisoning. We suggest you don't use this cooker for any foods that take more than 10 minutes to prepare.

Practical solutions for sustainable living

Make sure your home is beautiful, comfortable and saves you money—every day.

The ATA (Alternative Technology Association) has been providing advice on how to make homes more energy and resource efficient for over 20 years, to more than 40,000 Australians.

ATA members and supporters:

- Make it possible for ATA to publish magazines like *ReNew*, our new annual magazine *sanctuary: sustainable living with style*, and other ATA publications like the Solar Hot Water, Solar Electricity and Wind Power booklets.
- Keep our voice active in public forums calling for better support from government and industry for people making sustainable choices at home.
- Support practical projects in the community, like our International Project Group's work providing simple renewable energy solutions for remote communities in East Timor.

ATA members also receive:

Free advice and practical tips

Receive free technical advice from the ATA experts either over the phone, via email or through the ATA web forum.

ReNew magazine

Receive a free subscription to **ReNew** magazine—packed with practical advice and product information on sustainable building and energy and water conservation.

Discounts from the ATA shop

The ATA webshop others a range of publications, energy-efficient lighting and other products to help you with your sustainable lifestyle.

Discounts from a wide range of suppliers

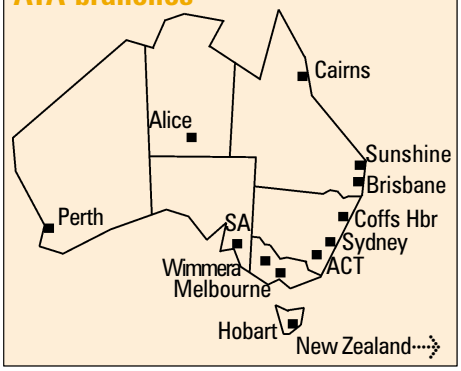
Mention you are an ATA member and receive a discount from more than 50 suppliers of sustainable building and renewable technology products and services.

To become an ATA member or supporter go to the ATA webshop at www.ata.org.au or call (03) 9419 2440. Alternatively, fill out the order form on page 76.

Member discounts

• A B & S Solar Industries 10% • Advanced Energy Systems 10% •Alternative Fuels 10% • Aqua Block 10% • Aqua Clarus 10% • Australian Correspondence Schools 5-15% • Biome Living 10% • BP Architects - free 'Green House Plans' book • B/W Solar 10% • CERES nursery 5-10% • Cycletrek Bunbury WA 5-10% • Design Habitat 20% • Earth Basics 10% • EcoSouth $250 off power systems • Environment Equipment 5-10% • Everglaze Industries 5% • F2 Design - free energy rating with design sketch • Federal Batteries 10% • Going Solar 10% • InSolar 10% • K & C Stork Solar 10% • LEDsales 5-10% • Natural Paint 10% • NENSYS New Energy Systems 10% • Ogden Pumps 10% off pump building instructions • Outback Energy Supply 10% • Pearcedale Conservation Park 10% • Permaculture Visions 10% • PV Solar Energy 10% • Sandford Electronics & Solar 10% • Sharpe & Jephcott 10% • Smartflo 10% • Solar Charge 10% • Solar Energy Australia 10% • SolarTasmania 10% • Solazone 5-10% • Sun Plus CPC Solar 10% • Sustainable Impact 5%, plus 5% donation to ATA • Talisman Consulting 10% • techbits 10% • The Environment Shop 10% • The Solar Shop $300 off complete home solar package • Tri Nature Greensborough (VIC) distributor 10% • Wattagan Innovations 10%• Wren Industries 20%. NB: the ATA website has full details of member discounters outlets.

ATA branches



ATA shop by mail

Your Home Technical Manual

Price: $49.50. NB: $15 postage on this item

Gives you the information you need to design and build a more comfortable home that is less expensive to run while being more environmentally friendly.

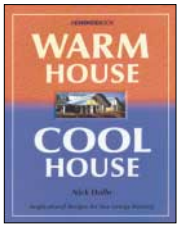
Contains over 60 fact sheets on sustainable solutions for designing and building your home. *Item code: YHTM*

Building with earth bricks and rammed earth in Australia

Price: $27.50 ($26.50 for ATA members)

This book represents the collective experience of the modern generation of earth builders, expressed in a form relative to building regulations in the 21st century.

Covers design, materials, earth brick and rammed earth wall construction, service installation etc. A good primer for anyone wanting to build from mudbricks, rammed earth or similar materials. *Item code: BWEB*



Warm House, Cool House

Author: Nick Hollo

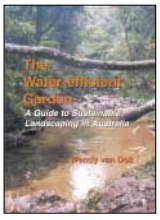
Price: $33.00, Paperback, 172pp

An easy-to-read introduction to the principles of energy-efficient housing design. Covers a broad range of topics and contains an abundance of drawings, plans and photographs. *Item code: WHCH*

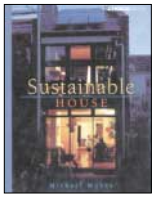
The Water-efficient Garden

Author: Wendy van Dok

Price: $25, As reviewed in *ReNew* issue 81



Practical and detailed information on planning and design of a water-efficient garden, including use of greywater on the garden. *Item code: WEG*



Sustainable House

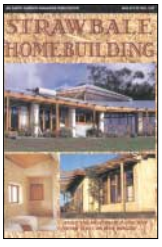
Author: Michael Mobbs

Price: $38.50, Paperback, 188pp

The sustainable house in Sydney provides all of its own power and waste water recycling on-site. Contains many great ideas on how to make your house less of a burden on the planet. *Item code: SHB*

Strawbale Homebuilding

Price: $19.95, Paperback, 156 pp

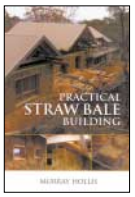


This book details practical strawbale building practices you can use to build anything from a small cabin in the bush to a mansion in the city. A great book that details many homes that have been built around Australia.

Item Code: SBH

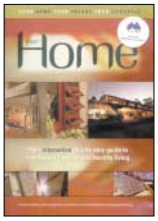
Practical Straw Bale Building

Price: $29.95



Practical Straw Bale Building describes the best of current practices and introduces new ideas in a step-by-step approach, supported by technical data and analysis.

Item code: PSBB



Your Home Technical Manual DVD

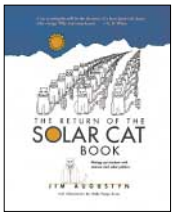
Price: $27.50

This DVD allows you to virtually visit some of the most beautiful, innovative and low-maintenance houses in the country. Be inspired as you take a visual tour of some of Australia's most comfortable and stylish homes, created by leading architects and designers.

Item code: YHTMDVD

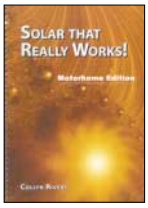
Solar Cat book

Price: $32.95 ($31.95 for ATA members).



Learn about renewable energy in a simple and light-hearted way with the solar cat book.

Item code: SCB



Solar that really works

Price: $35 ($33 for ATA members)

Running caravan or motorhome electrics from solar energy is neither difficult nor complicated. Planning is relatively simple, and anyone comfortable with basic tools can do it. This book is a down-to-earth guide to getting it right first time, and is available in both Caravan and Motorhome editions.

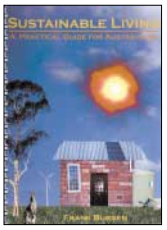
Item code: STRW-CARAVAN and STRW-MH

Sustainable Living - a Practical Guide for Australians

Author: Frank Burton B.Sc, Ph.D

Price $25 ($22 for ATA members),

A4 ringbound paperback, 104pp



This book covers the everyday actions that we can all take in the quest for sustainability. *Item code: SL*

Windpower Workshop

Author: Hugh Piggott

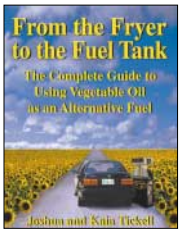
Price $30.80, Paperback, 160pp

The ultimate resource for anyone who has ever wanted to build their own wind turbine. Provides practical advice on how to design and build a machine up to five metres in diameter. *Item code: WPW*

From the Fryer to the Fuel Tank

Author: Joshua Tickell

Price: $34.95, Paperback, 160pp



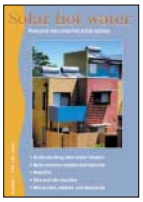
A great book that shows the reader how to make a clean-burning renewable fuel from waste vegetable oil. Includes detailed instructions on making and using the fuel in a standard diesel vehicle. *Item code: FFTFT*

Renewable energy and energy efficiency in detail

Brisbane Institute of TAFE has published a range of renewable technology resource books.

Introduction to Renewable Energy Technologies	$78.95	*Item code: IRET*
Solar Water Heating Systems Resource Book	$89.95	*Item code: SWHSRB*
Photovoltaic Power Systems Resource Book	$87.95	*Item code: PVPSRB*
Energy Efficient Building Design Resource Book	$67.95	*Item code: EEBD*
Wind Energy Conversion Systems	$93.95	*Item code: WECS*
Hybrid Energy Systems	$74.95	*Item code: HES*

Solar hot water



ATA Booklets series: Solar Hot Water

Price $10 each inc postage ($9 for ATA members)

Solar hot water is possibly the best way to get started with renewable energy. This booklet outlines all of the different system types and which one will best suit your needs.

Solar electricity

ATA Booklets series: Solar Electricity

Price $10 each inc postage ($9 for ATA members)

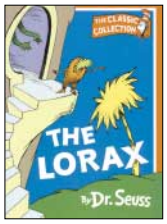
Covers all the basics you need to know when designing a solar power system.

The Lorax book and tape

Price: Book only: $8.95 ($8.00 for ATA members); Book and tape: $14.95 ($13.95 for ATA members).

This Dr Zeuss classic is a great story teaching kids about the need to care for the environment.

Available as the book only, or both book and cassette tape. The tape is read by Rik Mayall.



ATA Booklets series: Wind Power

Price $10 each inc postage ($9 for ATA members)

This is our new wind power booklet. In it you will find all the information you need to get an understanding of wind power electrical and water pumping systems, how to size and install them correctly, how to look after them, safety requirements and a great deal of other information.

Kits, LEDs and energy efficient lighting

Dynamo torch

Price: $29.95 ($28 for ATA members).

This is a super-bright LED wind-up torch that will provide light anywhere, anytime, without requiring batteries or an external power source.

One minute of winding provides light for up to 30 minutes, and you can switch between one or all three LEDs. Ideal for emergency use. *Item code: TORCH_DYNAMO*

Aluminium 4 LED torch

Price: $8 ($6 for ATA members).

This machined black finished aluminium torch uses 3 AA-cell batteries (supplied) to drive four 5mm LEDs. Never be stuck with a blown bulb again! The torch is water resistant and very robust. What's more, a set of alkaline batteries should give at at least 24 hours of usable light.

Solar powered flasher

Price: $24.95 ($23 for ATA members).

This multi-purpose solar-powered warning light has six high brightness red LEDs. Ideal for bicycle lights, emergency warning lights or personal emergency lights for walking or hiking. Comes with a magnetic stand, belt clip, elastic strap and clip and a bicycle mounting bracket. *Item code: SOLAR_FLASHER*

Windup radio torch

Price: $33.90 ($32.90 for ATA members)

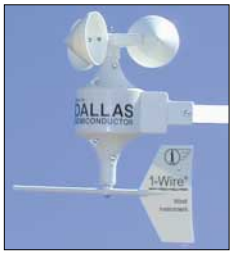
This is an AM/FM radio which is compact, portable, splash proof and best of all it can operate without batteries! The radio can be powered three ways: built-in lithium battery (wind it up for 90 seconds for 20 minutes of use); two AAA batteries; or an optional DC adaptor

The unit also features an LED torch. The unit's casing is water resistant so it is ideal for use outdoors as well as in.

Item code: DYNAMORADIO

1-wire weather monitoring kit

Price: $200.



The 1-wire weather station connects to a PC to measure wind speed, wind direction and temperature.

Use it to monitor the weather, or log a possible site for wind turbine suitability.

Item code: WEATHER-AAG

Aluminium 9 LED torch

($25 for ATA members).

This is a machined aluminium torch that uses 3 D-cell batteries to drive nine 5mm LEDs. Never be stuck with a blown bulb again! The torch is water resistant and very robust (we have drop tested it onto concrete!). What's more, a set of alkaline batteries should give at least 48 hours of usable light. Price: $30 **Note: Actual stock is silver in colour.**

Nightstar kinetic torch

Price: $70 ($65 for ATA members)

This amazing torch uses no batteries and no incandescent globes, yet will provide light when you want it with total reliability. The Nightstar uses a high power rare-earth magnet passing through a wire coil to provide the electricity to charge a super capacitor that drives the white LED lamp. Around 30 to 60 seconds of gentle shaking gives 5 minutes of full light and a steadily reducing level for another 15 minutes. *Item code: NIGHTSTAR*

12 volt, 1 amp switchmode plugpack

Price: $25 ($23 for ATA members)

This plugpack is ideal for running our LED halogen bulbs or LED halogen replacement kit. Use it to replace the inefficient transformer supplied with most halogen fittings, or wherever you need an efficient 12 volt plugpack.

Item code: SMPLUGPACK

Greywater Diverter

Price: $33.00 plus $8 postage

Don't send that water down the drain, use it to water your garden! Fits standard 50mm pipes, or other sizes with appropriate adaptors.

Item code: DIVERTER

Cool new products

Universal fast charger

$99 ($90 for ATA members)

This charger will charge up to four AAA, AA, C or D nicad or NMH batteries in any combination, as well as slow charging up to two 9 volt batteries. Features full microprocessor control and automatic discharge for nicad cells to prevent memory effect. You can even charge a combination of nicad and NMH at the same time! Other features include a constant current pulse charging system, automatic current selection for each battery, negative delta V end-of-charge detection, short circuit and reverse battery protection, defective cell detection, and separate indicator LEDs for each battery being charged.

New

This is the ultimate charger if you have large capacity NMH cells. Powered from the supplied 12 volt DC 1 amp plugpack. This charger should also work from a 12 volt battery system, though we haven't tried it. *Item code: BATTCHARGERLARGE*

Miniature wind turbine kit

Price: $49.95 ($47.95 for ATA members)

This great little kit allows you to make a tiny wind turbine that is both educational, as well as a functioning turbine that can produce power. Maximum output is up to 10 watts, though we would rate it more like a watt or two realistically. *Item code: WINDKIT*

More cool products

Shake-powered calculator

Price: $14.90 ($13.90 for ATA members)

You will no longer have to buy replacement batteries for your calculator or put up with fading calculator screens. The battery free calculator is powered by shaking the calculator side to side.

Electricity is generated by a magnet passing through a coil of wire. If the screen starts to fade, just shake it again for power.

The calculator features an eight-digit screen and a clear plastic body so you can see the workings.

Item code: CALCULATOR

Power-Mate energy meter

Price: 10 amp version is $380 ($360 for ATA members); 15 amp version is $480 ($460 for ATA members)

We have been selling the German-made SparOmeter energy meter for some time, but while it does a good job, we have been looking for a locally produced equivalent or better meter for general household use, and finally we have found it!

The Power-Mate has all the functions of the SparOmeter, as well as quite a few extras. The unit consists of a hand-held meter which can be connected to the appliance it is measuring via a simple piggyback plug and socket set. The meter features an LED display for easy reading and high visibility at all times. The meter can tell you a variety of measurements including: power in watts, voltage and current. The meter can tell you the minimum, maximum as well as instantaneous readings.

The meter can also tell you: cost of running the appliance, how much energy the appliance used in kilowatt-hours and how many kilograms of greenhouse gas emissions it produced. All in hourly, yearly, quarterly and accumulated figures. *Item code: POWERMATE*

We also have a Power-Mate for hire for $50 a week!

Low-power halogen replacement bulb

Price: $50 ($45 for ATA members)

This bulb can be plugged into almost any 50mm halogen downlight socket that uses an MR16 halogen lamp. It uses a 3 watt ProLight LED as the light source, which is available in either warm white or cool white. The LED is driven by an inbuilt switchmode power supply. Beam angle is around 30 degrees, suitable for task lighting or highlighting. The body is made of aluminium for good heat dissipation. Power consumption is around 4 watts, and the bulb will run from any power source of around 12 volts, either AC or DC, so can be plugged straight into a halogen socket without changing the transformer. *Item code: LEDHAL3W*

New

LED bike light

Price: $29.95 ($28.95 for ATA members)

This light has five white superbright LEDs and is powered by four AAA batteries. The light has two modes—continuously on and flashing—and is waterproof to 20 metres.

The light comes with a slide locking handlebar clamp to allow easy removal of the light from the bike to prevent theft. This means that the light can also be used as a general purpose torch and even a diving torch, providing you don't exceed the 20 metre rating. *Item code: BIKELIGHT5LED*

Power House kit

Price: $290 ($280 for ATA members)

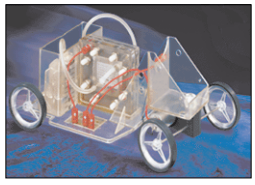
Make a renewable energy powered model home!

The kit focuses on the heat and light energy from the sun, the energy from the wind, as well as with electrochemical and plant energy.

With the Power House kit you can build a model house complete with solar panels, windturbine, greenhouse and desalination system. You can build and operate an electric train, windmill, solar cooker, solar hot water tank, hygrometer, electric motor, power hoist, sail car, and more! Plant watercress, prepare sauerkraut, and make chewing gum. Learn how plants convert sunlight into energy for your body and your engines.

Over 20 different building projects in one kit, including Power House, wind-powered generator, solar collector, solar oven, solar power station, greenhouse, current indicator, oil press, sail car, hygrometer, refrigerator, thumbtack scale, electric motor, electric crane, electric train, lemon Battery, oil lamp, light telescope, rice cooker, electric switch experiments. Includes a 96-page full colour manual. *Item code: POWERHOUSE*

Fuel cell car kit



Price: $290 ($280 for ATA members)

The Fuel Cell Car and Experiment Kit provides an introduction to the technology of fuel cells. With this unique kit, you can build your own experimental reversible fuel cell car to learn more about this energy source. With more than 30 experiments and demonstrations, users will learn how a reversible fuel cell works to perform electrolysis as well as to create energy. The electricity required to activate electrolysis is created by a solar panel included with the kit.

The 96-page, full colour Experiment Manual offers over 30 experiments, including: how to build a solar-powered car, effects of direct and indirect radiation, characteristics of a solar module, electrolysis and its effect on water, oxy-hydrogen test, how to construct and load a reversible fuel cell, decomposition of water in the fuel cell, qualitative and quantitative analysis of gas in a fuel cell, how efficient is electrolysis?, how light influences electrolysis, solar electrolysis, and making a fuel cell-powered car. *Item code: FUELCELLCAR*

Wireless weather station

Price: $249 ($239 for ATA members)

We now have a new wireless weather station that measures not only wind speed and direction, but indoor and outdoor temperature, humidity, barometric pressure, and even rainfall.

The data is collected by two sensor packs that are connected to a wireless transmitter. This sends the data back to the base station every minute or so, which then uses the information to give averages, accumulated totals, maximums, minimums and trends of the various data.

The transmitter requires two AA batteries while the base station is mains powered, with three AA batteries for data backup. The base station does not have the facility to connect to a PC, so you can't download data, but it does just about everything else. *Item code: WIRELESSWEATHER*

1 watt and 5 watt Luxeon LEDs

Each 1 watt Luxeon LED is equivalent to a dozen or more high-brightness 5mm LEDs in light output.

With over twice the current draw and twice the voltage of a 1 watt LED, each single 5 watt LED is equivalent to up to 50 or more high-brightness 5mm LEDs in light output. Available in blue, green, cyan and white (**Note: the 5 watt white LED has a rated life of 1000 hours**). For more information, prices and to order, go to the ATA's website at www.ata.org.au or call the ATA on (03)9419 2440.

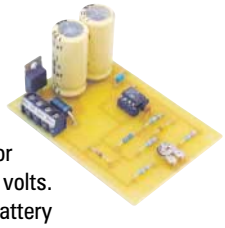
Now available: 3 watt LEDs and 1 watt warm white LEDs! See our webshop for details.

Luxeon optical collimators

Price: $10 each

This 25mm optic with holder solves the problem of how to attach the optics to the LEDs! Available in wide, medium and narrow versions.

Mini-maximiser kit



Our popular mini-maximiser kit will handle pumps up to 6 amps. The kit allows you to build the unit for use on either 12 or 24 volts. Note: not suitable for battery charging use! Price: $45 ($40 for ATA members). *Item code: MINIMAX*

30 amp speed controller kit

Price: $45 ($40 for ATA members)

This controller allows you to vary the speed of 12 or 24 volt DC motors from 0 to 100%. It is also ideal for controlling loads such as incandescent/halogen lamps and heating elements. It is ideal for use on small electric vehicle projects, such as electrically assisted bikes and go-carts.

We have tested it to over 30 amps without problems.

Item code: SPEEDCON

Hexagonal lens/holders for Luxeon LEDs

Price: $6

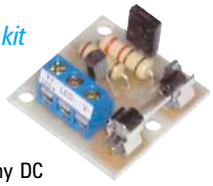
These assemblies consist of a 20mm diameter lens in a hexagonal holder which is designed to fit to 3 and 5 watt Luxeon star LEDs. They come in 6, 15 and 25 degree angles and the 4 x 25 degree line optic. *Item code: LED_OP6DEG, LED_OP15DEG, LED_OP25DEG, LED_OPLINE.*

Simple 1 amp rectifier kit

This very simple kit allows you to build a rectifier for use with polarised LED halogen lamps or for polarity protection of electronic equipment. Uses four Schottky diodes to reduce voltage drop and includes a 1 amp fuse. $5.

Item code: RECKIT

Constant current circuit kit



Price: $8

This short form kit allows you to build a simple constant current circuit for driving LEDs from almost any DC voltage. It is available in four sizes, 20mA, 50mA (for the Superflux LEDs), 300mA (for the 1 watt Luxeon LEDs) and 650mA (for the 5 watt Luxeon LEDs).

Please specify which current rating you need when ordering.

Item code: CCBOARDxxx where xxx is the current rating in mA (020, 050, 300 or 650).

Superflux LEDs

Price: Red and amber: $2 each, green, blue and cyan: $3 each

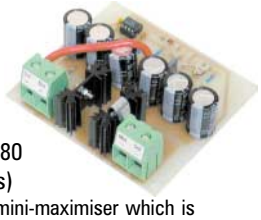
The Superflux LEDs are about the best value for money available in LEDs today. Each 8mm square Superflux LED has the equivalent light output of several of the best 5mm LEDs, for the same or less cost as a single 5mm device! Available in red, green, cyan, blue and amber.

Chinese Superflux LEDs

Price: Red and amber: $0.50 each, white, green, blue and cyan: $1 each

These are a cheaper Asian-sourced Superflux LED which are the same size and shape as the Lumileds Superflux, but not as expensive. Although they probably won't last as long as the Lumileds LEDs, they should be great for most uses.

Maxi-maximiser kit



Price: 12 amp: $70 ($65 for ATA members), 20 amp: $80 ($75 for ATA members)

A larger version of the mini-maximiser which is available in 12 and 20 amp versions. The kit allows you to build the unit for use on either 12 or 24 volts. You must specify current rating when ordering. Note: not suitable for battery charging use!

Item code: MAXIMAX

Switchmode LED driver kit

Price: $30 ($25 for ATA members)

This kit allows you to build a simple switchmode DC to DC converter with either voltage limiting (for powering small DC appliances from up to 30 volts DC) or current limiting (for driving LEDs directly from up to 30 volts DC). The voltage or current is fully adjustable, allowing the one design to be used for a huge number of appliances or LED types, including the 1 watt and 5 watt Luxeon LEDs. Efficiency is typically over 70% on most input voltages.

Kit includes circuit board, all components and instructions. No case is provided.

Item code: SWITCHMODE.

Expand your *ReNew* collection

All available back issues up to issue *ReNew* 76 $7.50 inc. postage within Australia. *ReNew* issue 78 onwards $8.50 inc. postage. For a listing of what is in each issue, see the ATA's web site at www.ata.org.au.

Issues available are: *Soft Technology* issues 46, 47, 48, 49, 50, 51, 52, 53, 54, 55 and 56. *ReNew* issues 57, 58, 61, 62, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91 and 92.

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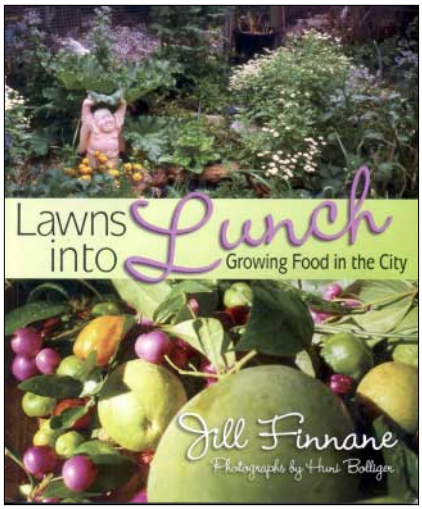

Lawns into Lunch

Jill Finnane
RRP: $29.95
Published by New Holland
ISBN: 174110209X

This beautifully illustrated book is packed with so much gardening know-how that you feel the urge to immediately grab some seeds and mulch and get your hands dirty.

Wandering through 22 gardens, Jill Finnane engages people from all walks of life in very open conversations that capture their experience of growing food in the city. As these personal gardening journeys unfold you discover how and why the gardens have evolved, the challenges particular sites and plants have presented and the positive impact that the gardens have had. You also learn about permaculture, reusing greywater, caring for chooks, home-made worm farms, seed saving, herb spirals, mandala designs and more! There are recipes scattered throughout and a good reference section.

A wide range of gardens are visited including the standard backyard, a number of communal gardens and an area designed for a disabled gardener. Valuable lessons are shared, the most prominent being problems turned into opportunities. This is clearly shown in a garden where an old Hills Hoist becomes a garden feature when it is surrounded with herb plantings and encircled with a garden path.

More than anything, this delightful book confirms how wonderful it is to have fresh produce at your doorstep, the opportunity to eat seasonally and being able to share your harvest with your neighbours, friends or local community.

The plants featured in these Sydney gardens are not suitable for all parts of Australia. However, the endearingly frank accounts of these gardening journeys and the wealth of knowledge shared make it clear that anyone in the city can be successful at growing their own food. It is important that food production returns to our cities and this inspirational book will give you a great deal of confidence in your own ability to do just that.

Review by Wendy Clarke

Christie Engineering

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Huge power bills?

It's difficult to measure how much power many appliances use because they run intermittently.

However the Power-Mate is designed to accurately measure and record volts, amps and energy used by an electrical appliance. It can also calculate the greenhouse gas emissions.

Better still is that the Power-Mate will calculate the actual running cost of the appliance so you know exactly how much it is costing you every hour, quarter or year.

Price is $380 ($360 for ATA members) for the 10 amp version. The Power-Mate is also available for hire for $50 per week (to ATA members only).

For more information please contact David on ph:(03) 9415 2112 (Tuesday and Thursday only), email: david@ata.org.au or go to the ATA webshop via our website at www.ata.org.au

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INV400	900	350	$149
INV600	1500	600	$249
EXU1200	3000	1350	$495
EXU2000	4500	2000	$695
EXU3500	7500	3300	$1295

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MODEL	SURGE WATTS	NORMAL WATTS	SPECIAL PRICE
PSU500	1050	350	$395
PSU800	1950	650	$795
PSU1500	3600	1200	$1195
UPSU2000	4500	1500	$1595
PSU2200	5400	1800	$1795
UPSU4000	9000	3000	$2995

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INTELLIGENT 3 STAGE CHARGER
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BAT25/12F	12	25	$499
BAT25/24F	24	25	$649
BAT50/12F	12	50	$649
BAT50/24F	24	50	$1299
BAT100/12F	12	100	$1299

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More sustainable living

Most architects and builders have little or no awareness of environmental issues, only doing the minimum required by Australian Standards. They source products from wherever is cheapest or easiest, with little consideration for their origin, which might involve mining of sensitive areas or logging of old growth forests.

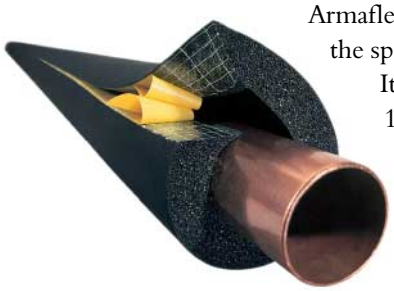
The Eco Collection is a group of architects and designers that design homes, furniture, kitchens and cabinets that are more sustainable and healthier than you'll find in your average display home, while still being affordable.

They use materials that have low emissions, including VOCs, and that have no rainforest timber or timber remnants. Embodied energy and pollution created during manufacture are also taken into account and minimised.

For more information, contact Eco Collection, PO Box 1227, North Sydney NSW 2059, ph:1300 885 578, fax 02 9969 8499, email: natliv@tpg.com.au, www.ecocollection.com.au

Self seal plumbing insulation

Split pipe insulation makes it easy to insulate plumbing work after all connections have been made, but the split insulation often allows plenty of opportunities for heat loss.



Armaflex is a self-sealing foam insulation that is fitted with adhesive to provide positive sealing of the split. Just fit the insulation, peel off the backing paper and press the cut edges together.

It comes in standard two metre lengths and is available in two insulation thicknesses—9mm and 13mm—and is available to suit pipes from 10mm to 42mm in diameter. There is a range of accessories, including adhesive, insulation tape and a paint finish for outdoor installation.

Available from Armacell Australia Pty Ltd, 13-17 Nathan Road, Dandenong VIC 3175, ph:(03) 8710 5999, fax:(03) 8710 5900, email: info.au@armacell.com, www.armacell.com

Solar travelling

If you travel a lot and use electronic devices while doing so, then a portable charger can be a handy thing. Voltaic Systems make a range of bags and backpacks that feature small solar panels built in to allow charging of small devices or to extend running time on larger devices like laptops. There are four bags in the range:

The Voltaic Messenger™ is reinforced and padded to carry and protect a laptop. With a volume of 14 litres, it has large zipped pockets for documents and multiple small pockets for electronic devices—ideal for use in town or as a travel bag.

The Voltaic Backpack™ is built tough for use as a weekend hiking bag or as a large daypack. There are pockets and wire channels for multiple electronic devices and 30 litres of storage space.

The Voltaic Daypack™ is built for use as a hiking bag or daypack. There are pockets and wire channels for multiple electronic devices, and a total volume of 25 litres.

The Voltaic Pouch™ is designed to attach to a larger rucksack to provide power for extended outdoor use. However it also stands alone as a small daypack and laptop bag. Volume is 10 litres.

The three solar panels on each bag measure 184mm x 88mm each, and use monocrystalline cells on an aluminium/plastic substrate for rigidity and protection of the cells. Total output of the three panels is around 4 watts (400mA at 10.2 volts).

RRP: All of the bags are US$229 each and replacement panels are US$30 each.

Manufactured by Voltaic Systems Inc, 252 West 14th Street #3, New York NY 10011, USA, ph:+1 212 627 5012, email: sales@voltaicsystems.com, www.voltaicsystems.com

They're not scratchy at all!

You could be forgiven for thinking that towels made from bamboo might be a bit on the rough side, but not these towels from Mad Mod in the USA.

Bamboo Comfort is a new textile line at Mad Mod and features 100% bamboo fibre towels with considerable socioeconomic and environmental benefits. Many textiles require chemical treatments to achieve the characteristics required, but the oblong, hollow structure of bamboo fibre gives these towels these traits naturally.

Bamboo is a very versatile fibre source. The plant achieves maximum growth and full maturity in three to five years, making it a highly renewable and abundant resource. It thrives without the use of fertilisers or pesticides and it is a natural soil conditioner.

According to Mad Mod, the Bamboo Comfort towels are soft, antibacterial, and more absorbent than cotton while being faster drying.

RRP: US$58 for the set, which includes one bath sheet (1620mm x 890mm), one hand towel (790mm x 430mm) and one wash cloth (33mm x 33mm).

Available from Mad Mod, 2013 Belmont, Nashville TN 37212, USA, ph: +1 615 297 5050, fax: +1 615 297 5588, www.mad-mod.com

Drier hands, lower costs

The choice between using paper towels and electric hand dryers in public toilets often comes down to running costs. Paper towels are cheap and hand dryers use a lot of energy, so a hand dryer that can reduce energy consumption has to be a good thing.

The Xlerator hand dryer uses a very high speed airflow to dry your hands in just 15 seconds, compared to 30 to 45 seconds for other electric hand dryers, according to the manufacturer. What's more, the 240 volt model is rated at just 6.5 amps, giving it a power consumption of around 1560 watts. Many other hand dryers use 2000 watts or more. For the Xlerator, this translates into an energy use per hand drying of just 6.5 watt-hours. These two factors reduce energy use by up to 80%, making the Xlerator a great alternative to paper and cloth towels.

The dryer features automatic start and stop, sensing when there are hands under the drying nozzel. The dryer runs for as long as you have your hands under the dryer, so that, unlike many other dryers which work on a fixed timing cycle, if your hands are dry and you move away from the dryer, the dryer stops immediately.

RRP: From $725 plus GST.

Available from Aladdin Onsite Cleaning Services P/L, PO Box 2057, Paramatta NSW 1750, ph:1300 781 277, fax:(02) 9630 7664, email: excel@aladdin.com.au, www.aladdin.com.au

A good night's sleep

You spend about a third of your life in bed, but very few people give a thought to what they are sleeping on. Most sheets are made from treated cotton or polyester, and can contain residues of many chemicals from the growth and manufacture of the fabric, including chlorine bleaches and pesticides.

If you would like to sleep in a less toxic bed, then the Ecodownunder organic cotton sheets are the way to go. Available in three colours—oxygen white, sky blue or mushroom—the sheets are available in king, queen, double and single sized sheet sets.

RRP: Single set $120; double $154;queen $165; king $187; two pillowcases $30.

Available from Biome, PO Box 2031, Milton QLD 4064, ph: 1300 301 767, fax:(07) 3371 0406, email: info@biome.com.au, www.biome.com.au

Recycled and recycleable

Polypropylene is one of those plastics that is just about everywhere, from wheelie bins to food packaging to car parts. Another use is packaging made from polypropylene sheet, such as the wine bottle bags shown here. Why are we promoting plastic made from petroleum you ask? Well, Bindweld, who make a large range of polypropylene sheet products, now have a range of sheets made from 100% recycled polypropylene.

All of Bindweld's material is 100% polypropylene, with no chlorine or heavy metals, but their recycled material is another step forward, as it is made from old stationery, packaging and scrap materials. The recycled material is currently available to government departments, councils, and other organisations. Once it has served its purpose, Bindweld will take it back to be recycled into something useful yet again.

The sheets are available in a range of colours and thicknesses to suit many applications, so if you must use plastic, at least use a recycled one!

Manufactured by Bindweld, 16 Merchant Ave, Thomastown VIC 3074, ph:(03) 9466 1933, fax:(03) 9464 0948, email: sales@bindweld.com, www.bindweld.com

Water from air

If you have a water dispenser in your office that uses bottled water, then you might want to consider using the Aquamaker instead. Bottled water is expensive and has to be stored or delivered consistently for there to be a reliable supply, but the Aquamaker literally takes water vapour from the air, condenses it into liquid water, and purifies it, ready to drink. What's more, the unit also filters the air in the process, removing 95% of airborne particles.

The Aquamaker can supply either cold or hot water (many offices have an urn running all the time, so the Aquamaker can replace this) and being digitally controlled, can be set for personal preferences. It also features an energy saving automatic shut off. However, the Aquamaker does use a reasonable amount of electricity, so that should be taken into account when assessing its environmental advantages.

Available from AquaMaker Australia Pty Ltd, 2/17 Simms Road, Greensborough VIC 3088, toll free: 1300 853 327, fax:(03) 9432 2655, email: sales@aquamaker.com.au, www.aquamaker.com.au

Paintable plastic wood

We have looked at several recycled plastic wood substitutes in the past but they all had one disadvantage—being made from plastics like polyethylene and polypropylene, they couldn't be easily painted or glued.

eWood is made from 100% recycled polystyrene and related styrenic plastics, and so allows paints and glues to stick to it.

Being made from plastic, eWood is weatherproof, rot resistant, UV resistant, insect and bacteria resistant, and flame retardant. eWood can be used for fences, garden edging, outdoor furniture, sound barriers, and any other use where wood planking is normally used.

It has almost the same characteristics as natural hardwood in terms of look, feel, density and structure, and can be worked, shaped and handcrafted like timber using woodworking tools. eWood is currently available only in 190mm x 23mm planks, in 6m lengths.

eWood is manufactured in Australia by Close the Loop, who specialise in the collection and recycling of electronics scrap with the sole purpose of making sure this hazardous waste does not end up in landfill.

Available from Close the Loop Ltd, 208 Hume Highway, Somerton VIC 3062, ph:(03) 9930 8600, fax:(03) 9930 8695, email: info@closetheloop.com.au, closetheloop.com.au/ewood

Long life colour

A single string of coloured incandescent light bulbs can have a power consumption into the kilowatts, so decorating a shop or business can be an expensive proposition when the power bill arrives.

These coloured compact fluorescent bulbs from Megaman are a direct replacement for coloured incandescents in many applications. While they cost a lot more initially, they will save their purchase price in electricity in less than a year, as they use just 7 watts per bulb. For example, replacing a string of twenty 35 watt incandescents with these bulbs will save around $360 a year if the lights are on for 12 hours a day (at current Victorian electricity prices).

They are more suited to situations where the lamps don't flash, or only flash slowly. We don't recommend them for faster flashing lamp strings due to their start-up time requirement (about half a second or so).

The bulbs have a rated lifespan of 10,000 hours compared to 1500 hours for a standard coloured globe. The globes are IP55 rated if used with an IP44 lampholder, which makes them perfect for outdoor use in all weathers.

Each globe is covered with a silicone rubber sleeve, so if the bulb breaks the rubber catches the glass making them excellent for use in public areas. They are available in ES27 bases only.

RRP: $17.95.

Available from Environment Shop, 221 High Street, Northcote VIC 3070, ph:(03) 9489 4855, fax:(03) 9489 1455, info@environmentshop.com.au, www.environmentshop.com.au

DC breakers

Most circuit breakers are not DC rated, and even if they are, they are usually rated for less current than for AC, as DC arcs a great deal more than AC. As a result, they are generally not suitable for DC systems, even though there are many renewable energy systems out there with these types of breakers in them.

BW solar is now importing circuit breakers designed specifically for DC power systems. They are double pole units rated at 20 amp, 250 volt DC, with an interupt capacity of 15,000 amp.

RRP: $99 including GST in single quantities, discounts apply for multiples.

Available from B/W Solar, PO Box 771, Scarborough WA 6922, ph/fax:(08) 9341 8790, email: info@bwsolar.com.au, www.bwsolar.com.au

Tiny Savonius turbine

There are very few Savonius-type wind turbines available in Australia, despite their advantages of robustness and reliability. The Forgen turbine, available from Solazone, is a small Savonius turbine designed for trickle charging of batteries in 12 or 24 volt DC systems.

There are two models; the Forgen 500 and the Forgen 1000. The 500 has a maximum output of 0.5 amp at 12 or 24 volts, while the 1000 can put out up to 1 amp. These outputs are rated at an average windspeed of around 4.5m/s.

The turbines are self regulating in high winds and have internal voltage regulators, so can simply be connected directly to a battery bank (via a fuse or circuit breaker of course). The generator circuit is designed so that the battery cannot be overcharged and is self adjusting for 12 or 24 volt batteries.

The turbines are said to be virtually maintenance free and are designed to run unattended for long periods. Like most Savonius designs, operation is virtually silent.

While designed for marine use, these turbines are ideal for electric fences, caravans, sea buoys and any other use where batteries need to be kept topped up or energy consumption is small.

RRP: $1100 for the Forgen 500, $1450 for the Forgen 1000. Prices include GST.

Available from Solazone, ph/fax:(07) 5448 8304, email: qld@solazone.com.au (QLD); ph/fax:(03) 9808 7337, email: vic@solazone.com.au (VIC); ph:724 2748, email: timor@solazone.com.au (East Timor).

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24 volt lighting

My husband and I are in the final stages of our new alternative energy home. Our electrician (who is not alternative energy minded at all), is somewhat puzzled by the 24 volt back-up lighting that we require.

We have the house wired for 240 volt and also 24 volt. The 24 volt is running directly from the batteries to the fridge and the freezer, and we have two internal and three external lights wired to 24 volts also.

Having contacted Going Solar and Sustainable Impact (our system installer), we have received differing advice as to the efficiency and life expectancy differences between incandescent and fluorescent (compact fluoro or strip tube fluoro) lighting.

We had planned to put a strip fluoro light in the dining area of the house as an alternative to the 240 volt light, for use in the winter (when the South Gippsland sun refuses to shine!) and also as a backup in the event that something goes wrong with the inverter. There is also a backup 24 volt light in the bathroom—this will most likely be a compact fluoro.

One source told us that incandescent 24 volt lighting is not efficient and the bulbs do not last very long, with the tube fluoro being the better alternative. Another source tells us that the tube fluoros are very disappointing and we should look at the incandescent and/or compact fluoro bulbs, depending on the length of time that the various lights will be turned on. It also appears to be rather difficult to locate 24 volt bulbs of any type.

The issue seems rather confusing. What 24 volt fluoros are available, preferably in a 20 watt configuration? Also, how reliable are the 24 volt fluoros—either tube or compact? If these are not readily available, is it possible to use a standard 240 volt strip tube and fit it with an inverter to run it from 24 volts?

Irene Brumley,
irene@oakleys.net.au

Including a 24 volt lighting circuit in your home is the easiest way to boost performance of your energy system. An inverter that is designed to provide several kilowatts is not very efficient when it comes to running a couple of lights.

There is a range of DC lighting options available. You can buy 24 volt general lighting service (GLS) lamps. These are standard looking incandescent lamps which appear the same as the 240 volt bulbs you use in a standard light fitting. They come in a standard bayonet cap (BC) and are available in 40 and 60 watt types and should cost around $8 to $10 each.

The next option is 24 volt halogen lamps which can be fitted in standard halogen downlight fittings. They are certainly available in 20 and 50 watts and may be available in other wattages. They should cost less than $6 each. A good electrical wholesaler will be able to get these in for you.

Another option is using automotive globes. Many trucks and four-wheel drives use 24 volt electrical systems so a range of globes and other equipment are available. A good auto parts supplier or specialist truck/four-wheel drive accessory retailer may be the best option to get these.

With regards to fluoros you can run most standard fluoro tubes by using an inverter. Small dedicated units are available in 20 watts (about $40) or 40 watts (about $60). You simply fit the inverter inside the fluoro fitting (after removing the standard starter and ballast). One source of good quality fluoro inverters is Solar Charge on ph:(03) 9596 1974.

I do not know of a source of 24 volt compact fluoros. You could always use a small 24 to 240 volt inverter to run a separate lighting circuit with standard 240 volt compact fluoros but the cost of the inverter and the inefficiencies of doing that would reduce the benefits.

Looking at lamp life and efficiency, with incandescent and halogen lamps your lamp life should be similar to those running on 240 volts. Because your battery voltage may be slightly higher than the rated voltage of these lamps they may have a shorter life.

With fluoros, the key factor is the quality of the fluoro inverter. Some cheap inverters give significantly lower light output and lamp life. But if you buy a good quality fluoro inverter from a reputable source the performance should be okay . Even if it is not quite as good as the 240 volt equivalent it will still give far better efficiency and life than the incandescent alternative.

Mick Harris

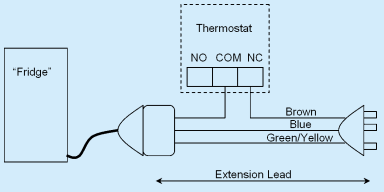
If I were installing lighting I would use fluoros or compact fluoros everywhere I could, except for maybe very short use areas such as in the toilet. This is because a good quality fluoro inverter and tube will be around five times more efficient than an incandescent lamp, and around three times better than a halogen.

Energy Today in Sydney (they do mail order) have a good range of DC lighting, including fluoros, halogens, incandescent lamps and fluoro

Notes and errata: *Issue 92*

In the fridge thermostat article starting on page 45, we incorrectly stated that the active wires to the fridge should be connected to the common and normally-open contacts of the thermostat relay. It should have read 'common and normally closed'. The diagram below explains this.

We have also had one reader write in stating that they tried this model of thermostat and the relay quickly burned out from the surge currents from their fridge. A better solution may be to use a much larger, heavier duty relay designed for heavier inductive loads. These are available from electronics component stores, as well as electrical wholesalers.



inverters in 12 and 24 volt versions, so have a look at their website at www.quirks.com.au in the DC equipment section. The ATA is also considering stocking a range of 12 and 24 volt DC miniature CCFL fluoro bulbs.

Lance Turner

Genset battery charging

Is there any reason why I shouldn't use a 24V 30A automotive charger running off a backup generator to top up my deep cycle batteries (in a solar energy system)? I know the convention is to use a Woods charger or suchlike, but an automotive charger is about half the price and seems well-suited to the job. I should add that this generator charging operation would be an infrequent event, occurring only when I don't get good sunshine for a week or so. I would be monitoring the state of charge manually during the charging session, since I assume the automotive charger may not have an intelligent charge tapering capability.

Dr Barry Manor,
b.manor@visioncrc.org

Automotive chargers are generally unregulated, and as such, are designed to taper the charge as the batteries pass 13 volts or so, once the batts start getting charged, the current will taper off rapidly and the final charging will take a lot longer than it should. Generally, a genset coupled to a 240 volt charger of this type will give a fuel to battery energy efficiency of around 1% or less! A direct charging DC genset is a much better option, with the efficiency being far higher (well, far higher as far as a genset is concerned, but the efficiency of gensets is pretty poor anyway).

If you already have the equipment, and it sounds like you do, then you are stuck with it unless you buy a separate DC genset. If doing so, the best option environment wise is to get a diesel genset and run it on biodiesel, or even better, straight vegie oil. Some of the slow speed diesels will happily run on straight vegie oil.

Lance Turner

Heating large spaces

Being older and sillier than I would wish, two years ago I bought a stone cottage high in the hills, hemmed in to hillside on the north. The walls are as thick as the old Pentridge prison cells, with weatherboard ends and a pitched roof. The cottage is about 12 squares, full of draughts and fruit bats, and is lacking mains power and modern insulation. Much has been done!

Our six by five metre lounge with high ceiling—six metres high— is hard to heat, even with a new firebox. We don't have enough solar power to run a ceiling fan for long to push the heat back down. Do you have any alternative suggestions? I can't find any battery driven fans, and my efforts to lower the ceiling have not been much help. Maybe there is some sort of mechanical fan I could use?

In the adjoining kitchen is a 125 year old wood stove with terrible draw, and the current chimney is not regulation distance from the ceiling supports. Do you have any suggestions regarding the angled chimney, which would have to pass through the aforesaid walls or weatherboard, and be feasible and safe?

Paul Maher,
pcmah@gcom.net.au

Heating large spaces with high ceilings is difficult. Make sure you have insulated and weather sealed the place as well as possible first. There was an Insulation Buyers Guide in ReNew *88, and the Raven Industries website (www.raven.com.au) has a good range of weather stripping products.*

If you want to heat the whole space you will need a lot of energy. Without circulating that heat you will have an uphill battle as your heat will rise to the ceiling. As you have already worked out, you need to use a ceiling fan to keep the hot air circulating. My advice is to save up your pennies and buy another solar panel to upgrade your energy system.

Where people have mains power or gas available we recommend local heaters that warm the person not the room. But this is not so easy to achieve in your case. However, putting your chair near the heater so that you are benefiting from the radiant heat would work to some degree. Also, foot stools make a big difference. The coldest air is on the floor and the floor itself may be very cold. Sitting next to the heater with a jumper on and your feet on a foot stool may be the best you can do.

Mick Harris

Write to us!

We welcome questions on any subject, whether it be something you have read in ReNew, a problem you have experienced, or a great idea you have had. Please limit questions to 350 words. Send letters to: ReNew, PO Box 2919 Fitzroy VIC 3065, email: renew@ata.org.au

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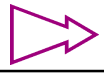

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