soft technology

Alternative Technology in Australia No 39 Autumn 1992 $3.95

Inside:

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- Energy efficient appliances – how do they rate?
- Solar water heating – do-it-yourself ideas
- Composting toilets – plumbing the depths
- Perth's Solar Energy Information Centre

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SOFT TECHNOLOGY

Issue Number 39 Autumn 1992.

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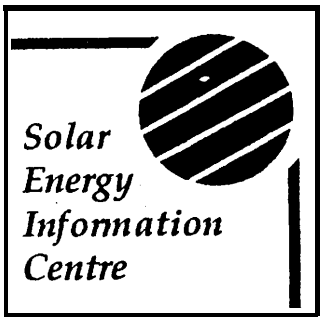

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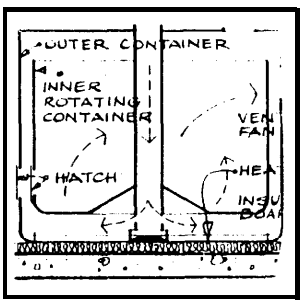

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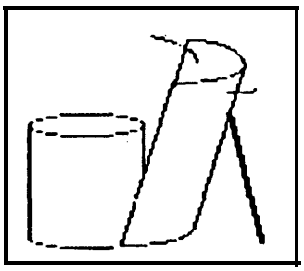

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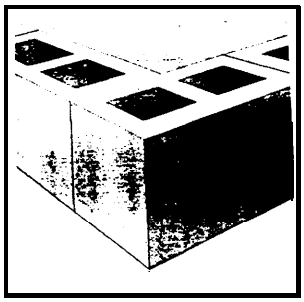

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ENERGY FLASHES

Storing Sunshine

We all know that we need to take advantage of times when solar energy is plentiful and store it for rainy days. The Weigmann Institute in Rehovot Israel has used concentrators to provide heat to drive an energy-storing chemical reaction: Methane & Steam & Energy --> Syngas (Hydrogen & Carbon Monoxide). 64 heliostats (sun tracking) mirrors focus on a chamber atop a 66m tower, where methane and steam are heated to 900°C to form syngas, which can be stored at room temperature or pumped along pipelines. A proprietary catalyst is used to release heat and reform the steam and methane. Syngas can also be burnt to give water and carbon dioxide. The same heating process can use methane and carbon dioxide to reduce both greenhouse gases and increase energy content by 44% (see Skaneff Solar 91 p.411). We tend to think of methane as an energy source, but it is also useful as an energy store. Dr. Stuart Licht, who did the project's initial calculations, says we need a light-weight material, but one which can also store a lot of heat per unit weight.

The solar tower can collect 3,000kW of energy, which researchers calculate would provide 450kW. The process is more expensive than burning fossil fuels, but economically competitive for countries which lack these but have plentiful sunshine.

Popular Science May 1991.

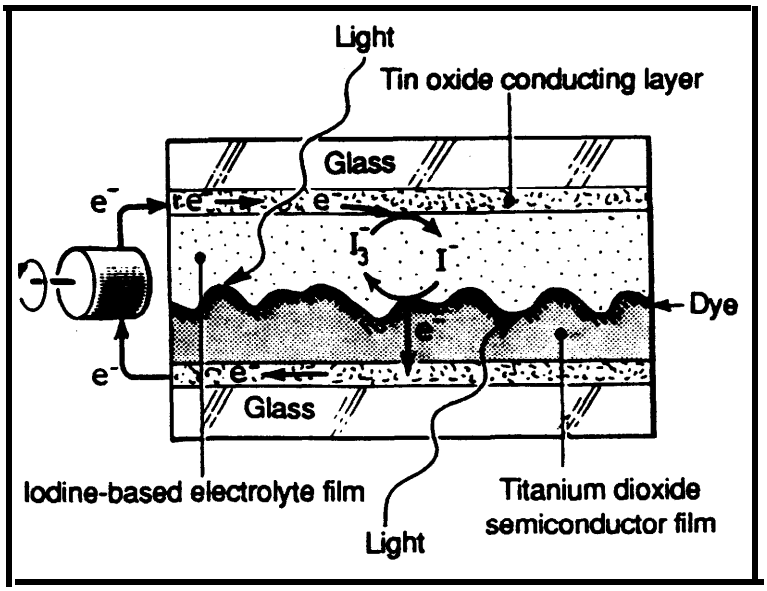
Greenhouse Gas Reductions

The German chemicals giant Hoechst, the world's third biggest producer of CFCs, has announced that it will stop making CFCs before 1995. Hoechst also said it will not produce HCFCs, which are less damaging than CFCs, but still destroy the ozone layer. Other major producers insist that HCFCs are essential replacements for CFCs. Hoechst plan to produce another CFC replacement, HFC 134a. This destroys no ozone, but is a powerful greenhouse gas. Hoechst have promised to recycle all the HFC 134a it produces.

Still in Europe, Norway has announced that it proposes to totally outlaw the use of halon gas by the year 2000. Halon gas is used largely in fire extinguishers and has a six to ten times more damaging effect on the ozone layer than chlorofluorocarbons (CFC) gases.

According to the Norwegian State Secretary, Jens Stoltenberg, the aggregate reductions of both CFC and halon gases will cut Norway's total discharges of greenhouse gases by 20 percent, and put Norway slightly ahead of the schedule it committed itself to at the Montreal conference.

European Technology Review, November, 1991



Windows acting as solar cells - the double glazing of the future?

Clean Ships

The installation of the world's first seawater "scrubbing" system fitted on board ship has been completed by a Norwegian passenger ferry company. The equipment will dramatically reduce sulphur and nitrogen oxide emissions from the vessel. Preliminary tests of the equipment have revealed that the SO2 emissions from the vessel are reduced by between 75 and 92 per cent.

European Technology Review, November, 1991

Sunpower Windows

Buildings could become more efficient by fitting transparent solar panels rather than glass. These panels have the efficiency of silicon-based solar cells but are five to ten times as cheap:

Michael Gratzel of the Chemistry department at the Lausanne Swiss Federal Institute of Technology, who developed the panel with his U.S. colleague Brian O'Reagan, announced his patent in 'Nature' (24th October 91, p.737). The beauty of the panels is that the layers are made of common materials and are easy to form. Light passes through glass with a heavy tin oxide conducting coat, similar to common float glass, and into an electrolyte layer based on iodine. The light par-

titles (photons) reach a dye and release an electron into a convoluted titanium dioxide ceramic film. (Titanium dioxide is a white pigment in paints, shoe cleaner etc.) The electron is conducted away in the tin oxide layer of the bottom glass layer in the sandwich.

The efficiency of 7.1 - 7.9 percent is roughly comparable to silicon cells, but panels would cost between $40 - $80 compared with some $400 for silicon cells.

New Scientist 26 October 1991.

Tip Gas Power

The City Council of Waverley, in Victoria, has approved a plan to extract methane from Springvale rubbish tip for conversion to electricity, which would then be sold to the State Electricity Commission. Regional Manager for the South Eastern Regional Refuse Disposal Group, John McDonald, said preliminary tests showed potential to produce about seven mega-watts of power from the tip - about enough for a suburb of 20,000 homes. At the moment, the methane produced by the rotting material is simply floating into the atmosphere and harming the ozone layer. The extraction requires sinking pipes into the tip after its surface has been sealed with clay, and using the gas in a gas turbine or engine. Several other Victorian councils (such as Sunshine, Berwick, Clayton, Corio, Broadmeadows, Brunswick and Northcote) are also investigating co-generation schemes.

Waverley Post 22/10/91

Natural Sewage Plant

An area of spare arable land has been turned into an artificial marsh on a cattle farm in Sweden in an attempt to create a natural sewage plant. Sewage water and manure from the barns as well as domestic waste water is passed through the marsh where much of its high nutrient content is absorbed by vegetation. The project was initiated by Dr. Olof Pehrsson in co-operation with farmer Bertil Nilsson, to find a relatively inexpensive way to deal with the problem of nutrient leaching into the local river and then into the sea. Dr. Pehrsson maintains that the marsh is cheaper than a chemical plant, and is less of an eye-sore as it follows natural eco-cycles.

European Technology Review, November, 1991

Manufacturing Solar Cells

Unisearch Ltd., the University of NSW's commercial arm, has joined with it's Centre for Photovoltaic Devices and Systems to manufacture and market the P.V. solar cells developed by Professor Martin Green. Unisearch manager David Hogg expects to manufacture around 10,000 cells per year for the low volume, high cost end of the market. The cells will use laser groove technology (which has the conductor buried in deep laser cut grooves) and Passivated Emitter and Rear Locally diffused (PERL) cell structure. These Green cells will have a commercial efficiency of around 20%, compared with their world record 24.2% efficiency research cell. The university has already licensed 4 of the 6 largest PV manufacturers with a 17% version, used in the "Spirit of Biel" car in the 1990 World Solar Challenge.

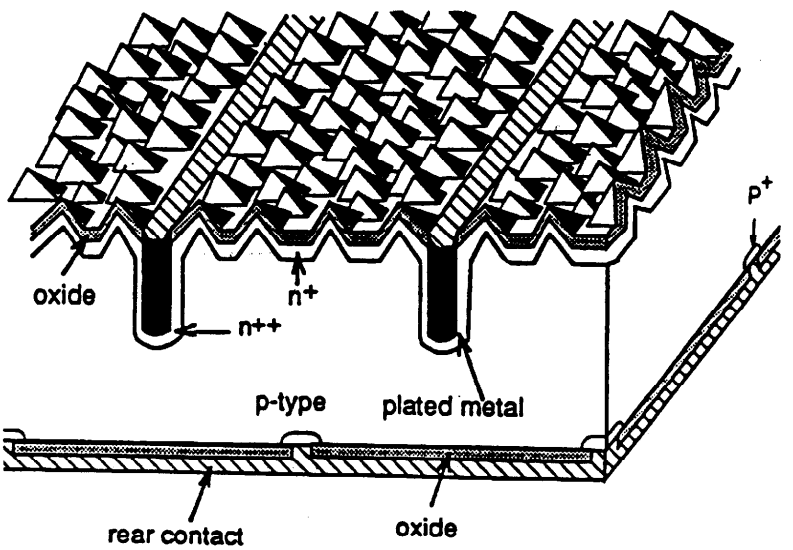
Engineers Australia 13th Dec. 1991 - Solar 91 Proceedings P213

Solar Power Boost For Trucks

European scientists believe solar cells could be used to improve truck fuel consumption by up to eight percent.

They base this view on tests in which electrical power from solar cells fitted to a van roof were used to replace much of the power produced by the vehicle's generator, so reducing demands on the van's engine.

In the tests (which were conducted by Solemns SA of France and Phototronics Solartechnik of Germany) the van was driven at a constant speed for 80 minutes and then left to stand and charge for the rest of the day, and fuel savings of four percent were recorded.



Professor Green's laser-grooved solar cell

"This points to a most significant and potentially larger saving of up to eight per cent on diesel engines where specific fuel consumption is lower and generator loads are higher," says Iain Garner, one of the scientists involved in the solar tests.

Solar cells could also be used as part of an independent power pack for certain electrical functions in vehicles, such as electric windows. "With the advent of lower-cost, large area solar cells there is now a viable possibility of incorporating this technology into vehicle design," says Garner.

The above snippet was sent in by Ian Boehn, Member. It came from 'Transat' which is a free trade magazine on land based mobile Information Technology published by Inmarsat. Thanks Ian!

Mini Motors

Toshiba Corp., Tokyo, said it had developed the tiniest yet electric motor, which is minuscule enough to travel inside the human body. The company said the motor packs bearings, magnet, coils, and the rest within an outside diameter of 2.5 mm. Driving power for the motor is only 2-3V.

IEEE Spectrum, December 1991, p3.

Electric Cars Exhibited

A host of electric cars, some set for production, have been displayed at the Frankfurt Motor Show. BMW, Volkswagon, Audi and Peugeot were among the European manufacturers to preview new battery powered cars, but the one to go on the road first is a British designed machine, destined for Los Angeles. The CleanAir, designed by the UK based organisation, IAD, and commissioned by the Los Angeles City Council, goes on sale in 1993.

The electric motor has a top speed of 70 mph and a range of 40 miles between charges. It is supplemented by a Japanese micro-car engine that acts as an emergency generator, topping up the battery charge and ensuring that the driver is never stranded. Production of the vehicle is planned to reach 25,000 cars a year by 1995.

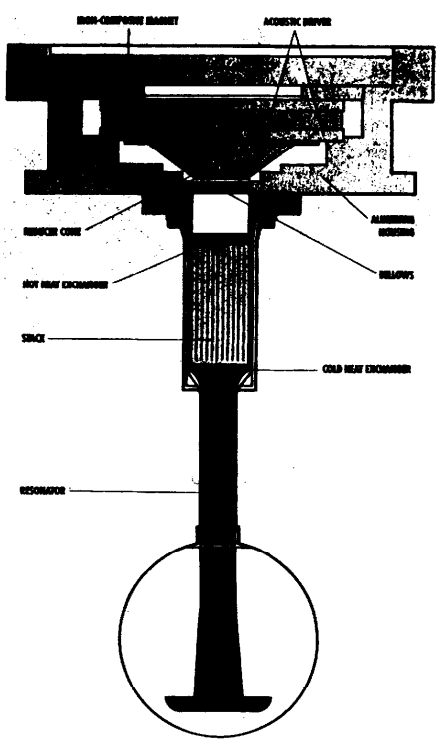
European Technology Review, November, 1991.

New Building Material

A new construction material, suitable for erecting one and two storey buildings, has been developed in Sweden. Called the ISO-beam, it consists of two wooden flanges surrounding a styrofoam block. The components are joined together by means of a polyurethane glue.

The makers claim that the ISO-beam is ideal to replace solid wooden beams of larger dimensions, which are the most expensive cuts of wood used in the building industry. The company points out that its ISO-beam saves up to 65 percent of the wood in a conventional beam and weighs only about one-third as much.

European Technology Review, January, 1992.



A really "cool" sound system!

The Loudspeaker Fridge

The Naval Postgraduate School in Monterey, California, has developed a "cryocooler" -a new type of thermoacoustic engine which cools using sound waves in a mixture of helium and argon, in place of the conventional combination of compressor and ozone-destroying CFC refrigerant gas.

A small loudspeaker sits on top of a rigid aluminium chamber containing a helium/argon mixture at a pressure of 10 atmospheres. When the speaker is turned on, the gases are compressed by the cone heating them. The hot gas molecules have some heat removed by plastic baffles, which in turn are cooled by a heat exchanger. As the speaker cone moves the opposite way, the gas expands and cools further. A loop of liquid antifreeze takes the cold to the walls of the storage compartment in the fridge. Professor Steven Garrett has already built a number of acoustic coolers with temperature down to -70°C. Because of their small number of moving parts and low vibration, one is bound for a space shuttle ride this year.

Popular Science.

Magnetic Ship

The Yamoto 1 is the first boat to use superconductors as a means of propulsion. The 29-metre vessel was launched in Osaka Bay, Japan, last year and is to have a top speed of 16 km/h. Seawater flows through a duct surrounded by superconducting coils which set up huge vertical magnetic fields. Electrodes in the duct conduct a horizontal current, and the reaction of

the electric and magnetic fields forces the water out the stern without any moving parts.

Popular Science May 1991

Sun Beads

Although prices of photovoltaic panels are falling in price per watt, the base material of high-grade, purified silicon still costs A$90 per kg and most require careful assembly. In working on this, Southern Californian Edison Co and Texas Instruments have developed a new breed of solar cell which could deliver clean energy at lower prices.

The new cells consist of tiny, 1mm beads of silicon, phosphorus and boron. The spherical solar beads are made from low-grade silicon, which costs about A$2.50 per kg. When the balls are formed most of the impurities migrate to the surface where they are removed. Some 170 beads per square centimetre are then pressed into aluminium foil, which replaces wiring. As each sphere is an independent working cell, if one breaks down it won't affect the function of the others. Test production cells are 100mm square, but N. Palopoft of Southern Californian says 9 square metre panels could produce 1kW at a cost of US$2000. At this price it would be economic for energy-conscious residents to pump unneeded power out of the house and into the grid

Popular Science.

Wind Pays Its Way

Early this year, Delabole, in North Cornwall should see the opening of Britain's first commercial wind farm.

The 4MW site, which is battered by strong winds most of the year, was awarded a power-purchase contract under the non-fossil-fuel obligation in 1990, and construction has been proceeding. The local farmer and landowner who initiated the project, Peter Edwards, recently agreed to a contract with Vestas of Denmark to supply and install ten wind turbines.

The project is owned by Windelectric Ltd., a company formed by Mr. Edwards and now jointly owned by his family (with roughly a 60% stake), National Power (which is providing an engineer to oversee the construction and operation) and South Western Electricity. When fully operational, it will produce more than 10GWh per year - enough for around 3000 homes.

IEE Review, September 1991, p282.

Fuel from Sewage

A cheap method of converting sewage sludge into a fertiliser or fuel has been developed by Wessex Water in the UK. A highly automated plant incorporating the new technology is planned to be in operation by the end of the year.

Raw sludge entering the plant will be mixed with large granules from the end of the system that were too bulky to be used as fertiliser. This helps thicken the sludge, which is then heated and dried in a rotating drum at temperatures in excess of 450 degrees C. the resulting granules are then graded, with the large material being recycled.

The granules are rich in nitrogen and phosphate making them useful as a fertiliser. Alternatively, they can be used as a fuel as they have the same properties as low-grade brown coals, but do far less damage to the environment because they contain less sulphur. The granules can be stored indefinitely.

European Technology Review, January, 1992.

The European Technology Review, referenced in these Energy Flashes, is published by the Office of The Agent General for Western Australia, London.

PRODUCTS

New Fluoros

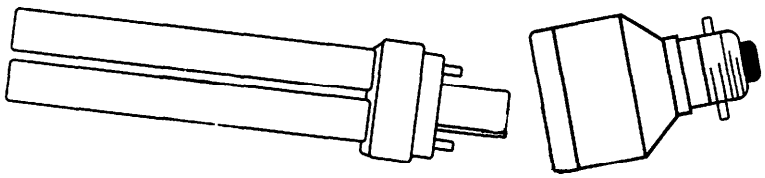
In Soft Technology 36, 1991, we reported that compact fluorescent lamps with separate tubes and ballasts were, unfortunately, not available in Australia - and that they didn't look like becoming available in the foreseeable future. Just one year later, we are pleased to report that not only are they now available, but that the new lamps are Australian!

Like the integral globes, the new globes - developed by Newtronics Pty Ltd of North Melbourne and Electronic Ballasts Pty Ltd of Bayswater, Vic. - can last between five and eight times longer than the traditional incandescent globes, and use only 20 percent of the power for the same light output.

The Newtronics lamp will be marketed under the Kempthorne brand, while the Electronic Ballasts product is called the Smart Lamp

The two pieces of the lamp consist of and adaptor (or ballast) - designed and made in Australia - and a high quality imported fluorescent tube.

This pioneering work was, in part, made possible by the help of the State Electricity Commission of Victoria (SECV). The Managing Director of Newtronics, Mr Gary Tescher, said the SECV helped in the design process and carried out exhaustive testing and evaluation to ensure that the claims relating to the efficiency and energy saving characteristics were met. Mr Bruce Dwyer, Managing Director of Electronic Ballasts, said that without the SECV guidance, his company would have needed another year to develop the Smart Lamp before it was ready for the market. The General Manager of the SECV, Mr George Bates, said that "Unfortunately, some people have been disappointed using some inferior compact fluorescent lamps which have been available. People can be assured these new lamps are guaranteed, quality Australian products".



The two piece lamps are only marginally more costly than the one piece products - and of course, they have the major advantage of replaceable tubes, which can be bought separately and cost about one third of the initial price of the complete light.

Under normal use, the adaptors, or ballasts, are expected to last up to 10 years, with the tubes enjoying a lifespan of between three and five years. Initially, they are sold as a set, and are available in the same variety of wattages and equivalent outputs as the one piece globes. They should be available at all major lighting outlets - if they aren't, ask why!

We tested one of each of the two new lamps in normal domestic conditions - in other words, we used them at home! - and found their overall performance very good. Our tester of the Kempthorne lamp said that the lamp had good brightness and colour, a short warm-up time and was lightweight and compact.

He summed up by saying that it is the best compact fluoro he has used to date. The brightness of the Smart Lamp was excellent. I found it a little glarey when first turned on, but quite pleasant when warmed up. It needs a shade of some sort, as without, it is almost too bright! This lamp is also lightweight and compact. I thought the colour could have been softer, but that is a personal preference, and of course, the advantage with these lamps is that the tube, which defines the colour, can always be changed.

For information about the harmonic and radio distortion of these lamps, please see page 34 of this issue.

Low Voltage Fridge.

In the last issue of Soft Technology we reported on the "Sunfrost", a 12/24 volt fridge, available in the United States that used only 350 watt hours a day. This 12 cubic foot fridge managed to achieve this level of performance by the use of specially designed, heavily

insulated cabinet.

Well we have managed to track down the Australian equivalent which uses the same compressors as the Sunfrost. Unfortunately without the extra insulation the performance is not as good, however it is still a cost effective method of obtaining 12/24 volt refrigeration.

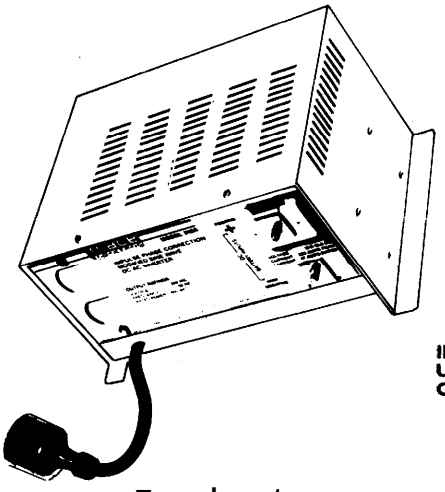
The fridge has all the mod cons with freezer, vegetable crisper, adjustable shelving, etc. It is available in 12 or 24 volts and has an average daily power consumption is 60 amphours a day at 12 volts, (720 w/h per day) for a capacity of 225 litres, (approx 8cu ft). Price: $1,495.

More information is available from:
SOLAR CHARGE Pty Ltd.
115 Martin Street,
Gardenvale 3185.
Phone:(03) 596 1974

Trace Inverter.

Although its isn't exactly "new" the Trace inverter deserves special mention. The Trace inverter is more than just a solid, reliable, high efficiency inverter. It can also be a battery charger, which is an important advantage when you consider a separate battery charger for a large renewable energy system could cost over a thousand dollars.

Trace inverters have good surge power characteristics which is very important when is comes to starting that washing machine or power tool.



Trace Inverter

The "Impulse Phase Correction" circuit which the inverters use assists the inverter when running reactive loads such as fluorescent lights and induction motors. Many inverters which are available on the market do a poor job in this area, particularly when it comes to running fluorescent lights.

It includes other useful features such as LED indicators to warn you about low and high battery voltage and over temperature, overload protection and a 2 year warranty complete.

Although it is a bit more expensive than other inverters, the extra benefits of Trace inverter indicate they should warrant serious consideration.

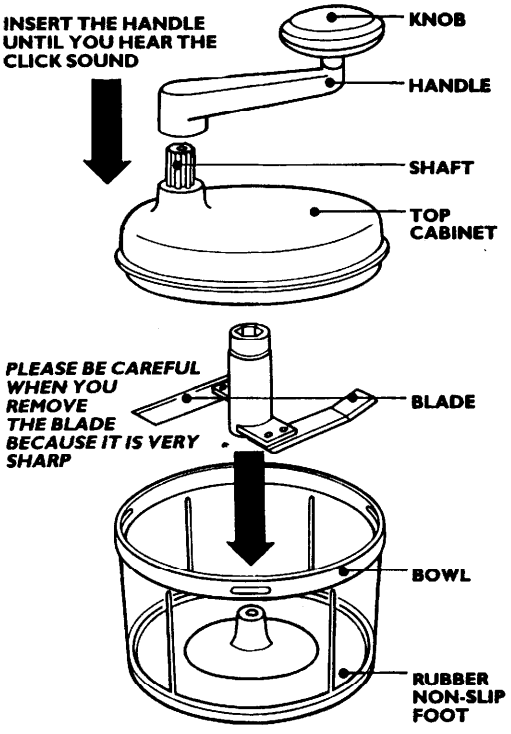
More Information is available from:
BP Solar Australia
P.O. Box 579,
BROOKVALE NSW 2100
Phone (02) 938 5111
or your local BP Solar agent.

Manual Food Processor

Not all your need have to be serviced by an electric gadget. Here is a food processor which will do all the basic jobs with a flick of the wrist.

The "Culinare" is a cost effective alternative to electric food processors. It provides a quick and easy method of chopping all kinds of vegetables and can just as easily be used to puree food to make your favourite dip.

Because it is so simple you could even find there is less to wash up.



'Culinaire'

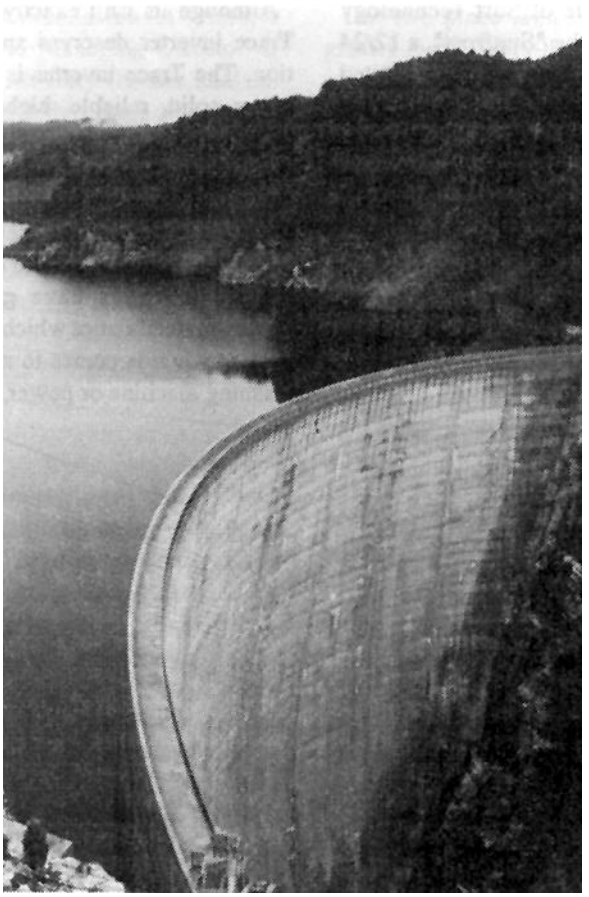
The Politics of Power:

Tasmania Ten Years On

On the tenth anniversary of the Gordon-below-Franklin battle, Tasmania is again in the midst of an energy debate. Journalist Suelette Dreyfus went down to the Apple Isle to follow the recent election and examine Tasmania's energy future.

Suelette Dreyfus is a freelance magazine journalist specialising in energy and environment reporting.

By Suelette Dreyfus



The Gordon River Power Development is the largest water storage in Australia.

In 1982, conservationists began a battle with the Tasmanian Government over a proposed hydro-electricity scheme which would flood parts of the Franklin and Gordon rivers. The conservationists argued the state did not need the scheme to meet its expected energy needs, and the proposed dam would result in the senseless flooding of superlative wilderness areas. The then premier of the state, Robin Gray, responded by declaring the Franklin River a "brown ditch - leech-ridden and unattractive to most people." Prime Minister Fraser stepped into the fray, and after a very public brawl between the PM and Tasmania's Premier, the contentious site became a world heritage area.

Now, on the tenth anniversary of the Gordon-below-Franklin battle, Tasmania is again in the midst of a growing debate about its energy future. This time, however, the decisions facing the newly-elected Liberal Tasmanian Government risk even more than one World Heritage-listed wilderness area. The decisions will affect the future of the state's industrial base and ultimately, much of the island's unprotected wilderness.

Tasmania has traditionally offered very cheap electricity to big companies such as Comalco, Temlpco and Pasminco. For many years, hydro-electricity schemes were seen as signs of progress and development in Tasmania - and heavy industry was sought after as the only real source of long-term employment for a state with such a small economy. A number of industries settled in the state specifically because Tasmania offered them the cheapest electricity prices in Australia. The electricity was sold cheaply, in part because hydro power was inexpensive to generate once a dam had been built, but also because politicians believed big industry was in the best interest of the state. According to energy policy adviser to the Green Independents Chris Harries, "Cheap electricity was seen as the cornerstone of Tasmania's economic development."

But as the big industries which were once employment boons begin laying people off, and the cost of generating more electricity becomes much more expensive, Tasmanians are beginning to wonder how their state can survive.

Tasmania is facing an energy and an unemployment crunch. Youth unemployment among islanders averages

more than 35 per cent across the state, and rises to 70 per cent in some areas. Meanwhile, the demands on the already stretched electricity system are likely to increase in the near future, with at least one major industrial user, Comalco, looking to expand its operations. The danger is that the pressure from both these problems may lead the new State Government to seek politically-sexy but over-priced energy solutions for Tasmania.

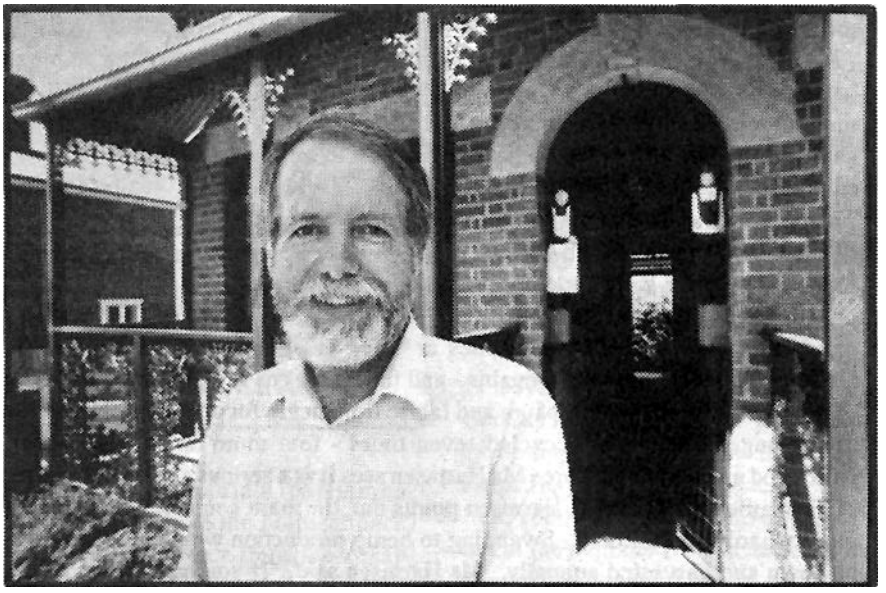
This past winter, engineers at the Hydro-electricity Commission were holding their breath and wondering how long the state's hydro capacity could withstand a deepening drought. The state's dams fell to a mere 22 per cent of capacity, following 14 years of below-average rainfall. One senior commission official reportedly said, "All good Tasmanians, down on your knees and pray (for rain)."

The commission's general manager, Graeme Longbottom, admitted in the 1991 annual report that the commission would have had to resort to power rationing had it not used on its emergency backup system; the 240MW oil-fired Bell Bay plant. But the emergency power did not come cheaply. In 1991, the commission spent more money running Bell Bay (about $53 million annually for an average load of 113MW) than it spent operating and maintaining its entire hydro system (average load almost 1000MW).

While recent rains have helped fill up the hydro system to about 38 per cent of capacity, another drought could be around the corner, particularly if the rains are a temporary gift from Mt. Pinatubo and extended drought conditions are, in fact, the norm. Another extended drought could push the state's electricity system to the edge - particularly if energy-intensive industries demand more power. However, the commission is convinced its potential power problems are over, in the short term.

In the longer term, Tasmania is considering how it can find more energy, and at what price.

Hydro-electricity provides about 97 per cent of Tasmania's electricity (compared to about 11 per cent of the entire nation's electricity) and water-power has traditionally been considered a cheap way of filling up a grid. But recent Tasmanian hydro schemes suggest the aquatic honeymoon is over. Despite this, the new state Liberal government announced during the recent election that it would consider building new hydro schemes to provide more electricity.



Dr. John Todd, of the University of Tasmania, standing outside an historic cottage tourist attraction - an example of the assets he sees as Tasmania's future for employment and growth.

Information provided by Tasmania's Hydro-electricity Commission reveals that the state's generating costs from new hydro schemes are not only more expensive than older schemes, they are considerably more expensive than other energy options. Dams built before 1972 in Tasmania generate power at about 1.2 cents per kwh, on average. That generating costs then rise to 22 cents per kwh for the Gordon Scheme (1978), to 5.9 cents per kwh for the Pieman Scheme, completed in 1987. By the time the King River and Anthony schemes (due to be on line this year and in 1994 respectively) are up and running, electricity generated from these new schemes will cost about 8 cent per kwh.

To put that in perspective, electricity generated from New South Wales' coal-fired Bayswater plant costs about 3.7 cents per kwh, while Loy Yang A in Victoria costs about 45 cents per kwh, according to Hydroelectricity Commission estimates.

Let these figures ovenwhelm you for a moment. To develop the King River and Anthony schemes, Tasmania will pay $907 million for an estimated average output of 112MW. That's nearly a billion dollars. By comparison, Victoria's coal-fired Loy Yang B plant, which has often been publicly criticised as unnecessary and too expensive, will cost about $3 billion for an estimated average output of 750 to 800MW

And Tasmania's power costs might well rise even further in the future, if

A Growing Alternative

Tasmania resident Patsy Harmsen has found one possible solution to the Apple Isle's problems: cannabis. Ms Harmsen hopes that one day the cannabis plant will replace the state's aged hardwood trees as a sustainable source for paper production. Her project is one of the many small enterprises which offer an alternative to relying on the state's traditional heavy industries for employment and growth.

Patsy and Fritz Harmsen with their experimental hemp crop

Ms Harmsen and her Dutch husband, Fritz, are growing a Government-approved experimental crop of cannabis to show that Tasmania is suitable for the production of hemp. The couple first discovered the vale of cannabis from the Dutch Government. The Dutch had originally set out to find the perfect rotation crop: one which did not need insecticides or weed-killer, improved soil structure, and was easy to cultivate. The Dutch Government came up with cannabis - and the Harmsens saw its potential.

People have been making paper and fabric from hemp for centuries. Hemp paper is stronger than wood-pulp paper, lasts much longer and can be recycled seven times - four more times than paper. Better still, the cannabis plant has both hardwood and softwood fibre. Ms Harmsen sees it as a serious alternative to the potentially unsustainable logging industry in Tasmania today. As Ms Harmsen points out, the main commercial value of Tasmania's indigenous forests lies in their quality hardwood timbers. Swapping to hemp production would also lead to sustainable employment, since crops must be sown and harvested annually. Ms Harmsen said, "If you have to have a pulp mill, the supply should come from an agricultural rotation crop, not from the forests."

Unfortunately, Tasmania's authorities have yet to see the light. Despite the fact that Ms Harmsen's seedlings are a low THC strain, which leaves smokers with a headache instead of a high, the police, and other government institutions have been difficult about the matter. Says Ms Harmsen, "In Tasmania, people are worried about the state's image."

one (reasonably) assumes that the island's most economically-viable hydro sites were developed first. Although careful in its choice of words, the commission admitted recently in one of its own documents that "the costs advantages of any new hydro schemes, over alternatives such as coal or wind-power, will not be as greater as in the past."

The commission's general manager, Mr. Longbottom, cancelled a long-standing interview with Soft Technology Magazine, and refused to discuss these costs and the island's future energy options.

The soaring cost of Tasmania's hydro-electricity makes windpower look very attractive, and two windpower companies have submitted confidential proposals for generating schemes to the Hydro-electricity Commission. One preliminary proposal, by Windtech Power Resources Pty. Ltd. in South Australia, to sell 32MW directly into the commission's grid for $120 million seemed to interest the decision makers. According to Windtech's operations director, Paul Hutchinson, the commission subsequently asked for cost details for a 200MW wind project.

Mr. Hutchinson could not reveal the financial details of the larger project, which would see Windtech construct, maintain and finance about 2000 wind towers in North West Tasmania. An independent evaluation estimated that some 500 to 600 new jobs would be created in the state over 10 years if the 200MW project went ahead, Mr. Hutchinson said. He added that one of the possible wind station locations in the island's north had been identified

by an American firm as having the best wind conditions in the world for generating electricity.

The second option for expanding Tasmania's power supply is the Bass Strait cable hook-up with Victoria's electricity grid. Basslink is estimated to cost about $350 million for a 200MW interchange capacity, according to a State Electricity Commission of Victoria report

The cable has some benefits. It would allow Tasmania to sell its hydro-electricity at a premium price during peak hours, while the SECV sold Tasmania its base load coal-fired power at off-peak times. Tasmania would not need to build more power plants, as it could simply meet its growing energy needs by buying more electricity from what Taswegians refer to as "The Big Island". The grid would offer some efficiencies in energy use on a national level.

But there are a number of problems with the grid as well. Tasmania has yet to use the electricity it already has efficiently. Giving a large utility with a propensity for billion dollar capital works projects access to yet another such project with a seemingly endless supply of electricity attached is a bit like letting a chubby child loose in the candy store.

Worse, politically motivated decisions could turn the cable from a potential money-earner for the state into a financial disaster of lost opportunities. University of Tasmania associate professor and co-ordinator of environmental studies John Todd described the potential economics of the project:

"Let's assume Tasmania is supplying electricity to Comalco at, say, 2 cents a unit. If there was a cable, Tasmania could supply electricity to Victoria at conservatively 6 cents a unit or so, given the cable cost. How could you rationally justify on economic grounds Tasmania selling any electricity to Comalco? It would be far better to supply it all to Victoria.

"If you supplied the electricity to Victoria instead of Comalco, the economic advantage to Tasmania would be an additional $120 million per year. You might conservatively employ 4000 people with that money instead of the 1000 currently employed at Comalco. It is not that simple of course, but in very simplistic terms, the state could probably generate four times as much employment. And the money could be spent on public services, teachers, etc. If there was a cable, I would argue that it should be totally paid for by the (mainland's) south eastern states," Dr Todd said.

The softer energy options were relegated to unstated status

Whether Tasmania's parliamentarians would have the political backbone to move away from the cheap-power contracts with heavy industry in favour of the more economically-sensible peak power sales to Victoria is another question entirely.

Gas has also been touted as a possible panacea for all Tasmania's economic and energy woes. One gas option, an estimated $500 million development of the Bass Strait Yolla gas field, was recently ruled out as an answer to the state's future supply problems. The decision to back out, which was made by the private consortium behind the proposal, might in fact turn out to be a good one in the long-run for Tasmania. Although the Yolla option would have been funded through the private consortium, the expenses of developing the only partially explored fields would have been built into the price, and the State Government would have had to guarantee to buy the gas. According to Dr Todd, the project would have probably required large indirect subsidies from Tasmania. "It just did not make sense," he said.

Another gas option is to build a pipeline from Tasmania to a Victorian processing plant. While there does not appear to be any price tag estimate available for the pipeline proposal, this option has been a fairly low-key one, and does not seem to be a forerunner in the race. The Government is also considering coal as another option, but Tasmania's natural coal reserves are poor quality and would require expensive underground mining.

Energy efficiency would seem the logical alternative to all these expensive supply-side options being considered by the Hydro-electricity Commission and the State Government, but both institutions seem to view efficiency only as a short term band-aid. Energy advisor Chris Harris said, "In the election, we found that the softer energy options were relegated to unstated status."

Dr. Todd believes it would be possible to cut the demand for electricity in the domestic and commercial sectors in half by using energy efficiency and alternative energy sources such as solar power. The commission is moving in the right direction, albeit somewhat slowly. Late last year, the commission announced positive although not terribly ambitious goal of 1 per cent energy efficiency savings each year.

The good news is that the commission no longer considers energy efficiency as "fiddling at the edges", as it once did during the Franklin River battle ten years ago. In fact, energy efficiency has even made its way onto the commission's corporate agenda, which is significant, since Tasmanians use more electricity in their homes than any other Australians.

The commission declared in its most recent annual report that it wanted to "lead Australia in the development of

an energy efficiency culture". Through surveys and energy audits, the commission identified 29 sites in Tasmania with potential for co-generation. This is particularly important because some two thirds of Tasmania's electricity is used by only 21 customers. The commission has also discovered energy savings totalling about $6 million at two of Tasmania's largest energy users: Comalco and Pasminco EZ. Unfortunately, it is not offering to finance these investments, and companies like Pasminco say they simply do not have the cash in hand during this recession to pay for the improvements. Financing this type of improvement could save the Commission money by reducing the need to build more generating capacity.

The commission is also behind the creation of the new Integrated Energy Management Centre in Hobart. The Federal Government has added $1.3 million to the commission's $800,000 to fund the centre, which will promote energy efficiency-throughout Australia. The centre's new head, Dr Peter Davis, an expert in solar energy, is optimistic that the centre will get energy efficiency up and running around the country.

But the commission's choices for Tasmania's energy future may matter less than what the politicians decide to do. During the recent election, politicians from both sides of the fence seemed to concentrate on the large, capital-intensive energy options for two reasons. First, big projects are often accompanied by even bigger promises of jobs. The daily press finds projects such as Basslink considerably easier to wrap their minds around than the prospect of thousands of high-efficiency compact fluorescent light globes. Second, large industrial electricity users want what they consider to be a "secure" supply of electricity in the future - and these few companies carry considerable political clout in the small state.

According to Mr. Harries, who has advised Green Independent leader Dr Bob Brown for 10 years, recent energy policy in Tasmania has been a case of "pork-barrelling in the extreme."

"In the middle of the election, we had an amazing scenario where the Liberals were saying, 'We are going to have three (new) dams on the west coast, and three pulp mills, one in the south, one in the north and one in the north-west.'

There is a view that by selling off all our crude resources we still make it

Then Labor started promising, 'We are going to develop a steel mill.' It became so absurd that the community started taking all these announcements for what they really were - wild claims," Mr. Harries said.

"There is a certain desperation, a sort of third-world status, we have here in Tasmania, as a result of being a small economy and being rather beholden to large industries," he added.

The parliamentary candidates must have been keenly aware of Comalco's desire to expand or upgrade its aluminium smelter operations, which will require up to 150MW of additional electricity a year - at the right price. the company has announced that it may consider closing down completely if it can not upgrade or expand. Comalco says it is not making political threats, it is simply stating its options.

The problem is not so much that Comalco - or any other energy intensive industry - wants more electricity. The problem is that they want it very cheaply in order to compete in world markets. But as the King River and Anthony schemes show, new power does not come cheaply.

Comalco says its does not want subsidised electricity prices, because they are not sustainable. But it is hard to imagine the company executives wanting to buy new power at more than 8 cents a kwh when their existing buying price is believed to be about 2 to 3 cents per kwh.

Further, Dr. Todd argues even if the government offered subsidies on new electricity for companies like Comalco, the money would not create new jobs. The state's traditional, energy intensive industries have been steadily decreasing their workforces over the past 10 years, and technological improvements born from international competition will see further lay-offs in the future.

Comalco has admitted as much. The aluminium smelter in Tasmania employs about 950 workers, some 100 to 230 of whom will lose their jobs as the result of a plant upgrade or expansion. These traditional, energy-intensive industries are offering little bang for the buck in terms of employment.

So what can Tasmania do to solve its energy needs, preserve its environment and create jobs?

Dr. Todd may just have the right strategy for the state. He believes that Tasmania should concentrate on those industries which draw on the state's natural competitive advantages. These include smaller, non-energy intensive enterprises such as aquafarming, which requires clean, uncrowded waterways; tourism, which relies on the state's unspoiled wilderness, and high value, gourmet agricultural goods. It is these types of industries which have seen steady employment growth in Tasmania during the past few years.

Dr. Todd's strategy for Tasmania's energy infrastructure is a steady-as-she-goes plan, which stresses paying off the mortgage on the family home before investing in a summer cottage. He would like to see Tasmania hold off investing in any more huge capital-in-

tensive energy schemes for some time. Instead, the state should rely on its existing hydro schemes, the electricity from which would become cheaper and cheaper over time as the initial cost of construction was paid off. Some of this savings would be passed onto industries like Comalco and Pasminco, provided the large energy-users did not demand more electricity from the system. Dr. Todd believes that electricity would eventually become so inexpensive compared to other countries and Australian states (which had been busy building new power plants) that companies like Comalco would find it profitable enough to keep its Tasmanian operations open, regardless of the fact that they could not expand significantly. Meanwhile, the state could choose to develop and support sustainable enterprises.

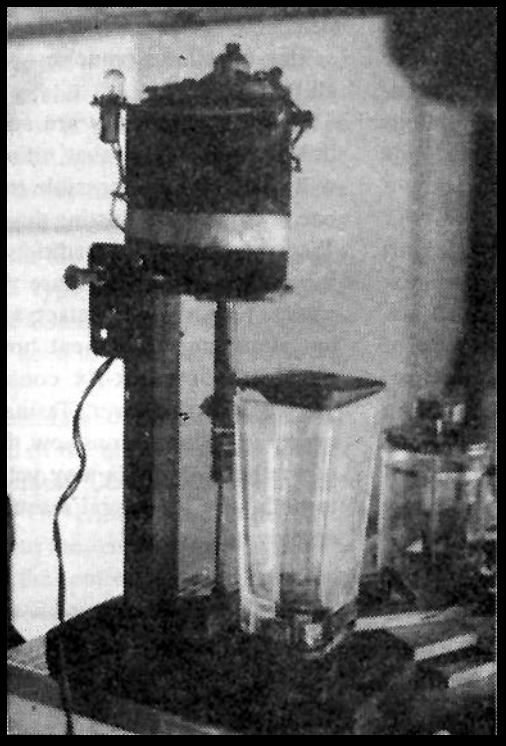
A recent report from Hydro-electricity Commission on energy efficiency in Tasmania by Dr. Fereidoon Sioshansi of the California firm Energy Efficiency Inc. states: "The significance of energy efficiency for the Hydro-electricity Commission clearly goes beyond how many GWh can be saved by using what device. This is a unique opportunity for HEC management to acknowledge the growing significance of demand-side management and energy efficiency options. It is not necessary for HEC to take a giant leap of faith, merely to (be) willing to compare supply and demand-side options on an equal basis - to give demand-side management and energy efficiency a chance to compete."

The Energy Efficiency Inc. report said, "The Hydro-electricity Commission is at a critical junction in its history"; but in fact the entire state of Tasmania is at that junction. Tasmania's traditional industries are no longer job banks, and some, like the wood-chipping industry, have announced they are in trouble and likely to face what local newspapers euphemistically refer to as "a shake-up" - more unemployment. Most of, these traditional businesses are what economists refer to as "mature industries" - meaning that they offer little prospect of more jobs in the future. Despite this, Tasmania is having trouble moving on to new industries. Mr. Harries summed up the Tasmanian perspective, "There is a view that by selling off all our crude resources, we still make it."

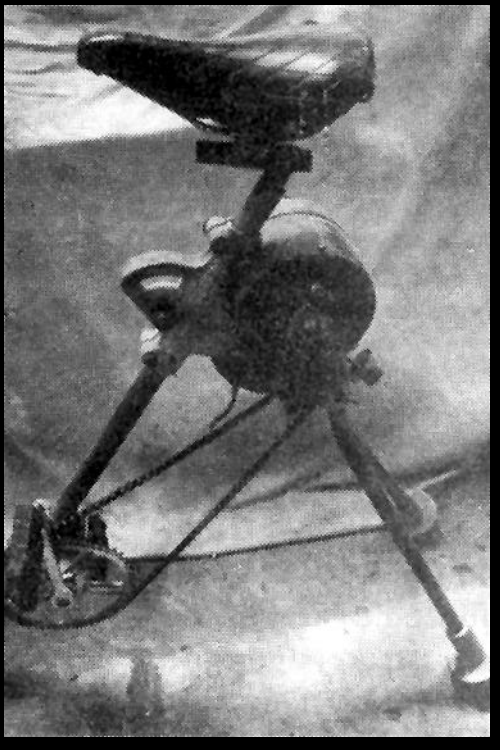
Energy and industry are so closely linked in Tasmania that ultimately it will be virtually impossible to change one without also adjusting the other. If Tasmania follows its traditional route, it will end up in the future with few natural resources left intact, and high, long-term unemployment born from the death of quick-fix construction projects. If, however, Tasmania can make the right decisions now, the Sicily of southern Australia may yet be able to both save its natural resources and employ its citizens.

Mick's Pics

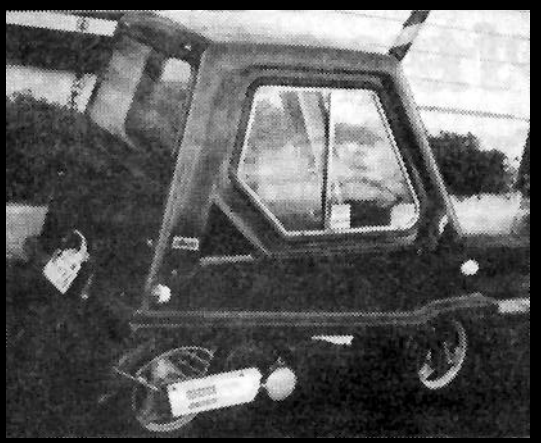
From the chequered past of our beloved executive officer, Michael Harris, comes the pictorial evidence of a life spent in tireless pursuit of alternative technology - some more alternative than others!



The ultimate in making kitchen appliances from recycled materials. A 12 volt blender powered by an old car generator, (which is being run as a motor). It even has two speeds. The switch on the side (an old windscreen wiper to control switch) is used in conjunction with the light on top to regulate the speed. An old spring was used as a flexible coupling to connect the generator (motor) to the shaft of the blender mixer gear box. The blender container and gear box came standard as optional accessories for "Sunbeam" mixers from the 1960's

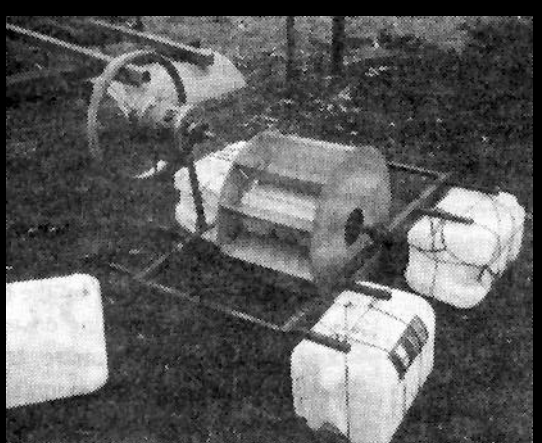


Bicycle generator set, World War Two vintage, with detachable legs so it is easy to carry on your back while marching off to the next encounter. Solid as a rock and built like a brick outside toilet. Amazing the things you can get from army disposals!



A nifty idea from Japan for people who like motor bikes and scooters but don't like dressing up in layer upon layer of warm clothes and wet weather gear.

This Solar Cooker, put together by the Brace Institute in Canada, boils water which heats a cooking pot on top. The pot is actually heated by the steam from the boiling water. It can be used to cook a variety of food and is especially good for cooking things like stews, curries or other slow cooking foods we would generally simmer. It can also work like a low temperature oven. When you go through the list, you find you can cook almost anything with this arrangement.

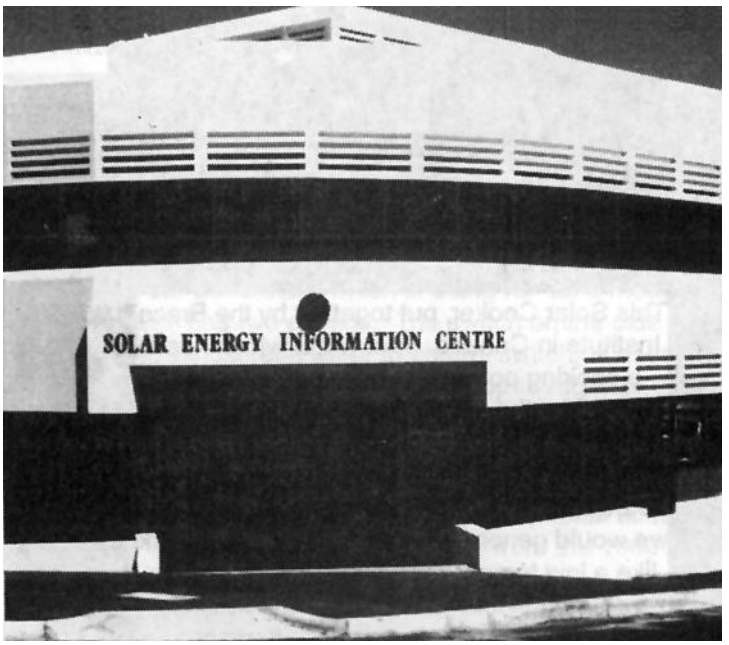


Built around a 4 gallon drum, this would have to be the world's smallest water wheel. It is actually designed to float in a river or creek and turn slowly as the water flows underneath. The slow rotation is then geared up to a more practical speed and used for water pumping or generating electricity. In practice this waterwheel is too small to be used for anything practical. But it does demonstrate the idea and could be scaled up to something more useful.

We know there must be hundreds more photos out there just waiting to be discovered. If you have any pictures of soft technology that you want to share with the world, write us a short note to explain what they're about (on the back of the photo, if you like) and send them in! With each issue we will be giving away a free year's subscription to Soft Technology to the best picture we publish. Please enclosed a stamped, self-addressed envelope with your photos, if you would like them returned.

Perth s state-of-the-art
Solar Energy Centre

It's always great to see people offering help and advice with sustainable energy options, particularly when they practice what they preach. Western Australia's Solar Energy Information Centre (SEIC) is just the place.



What is the SEIC?

The Centre brings together all facets of solar information, manufacture, product display, public education and industry development assistance under one roof.

The Centre offers a free information service to the public, with other services including seminars, mail order bookshop, educational tours, professional energy auditing, as well as an energy advisory service.

Since its opening in November 1989, thousands of people have used the centre to get ideas and seek advice that has assisted them to make their homes and workplaces more climate appropriate and cheaper to run.

The Building

Two things set it apart from other such centres: firstly, the Solar Energy Information Centre is a private enterprise development administered by a private trust. Secondly, the building itself (2000 square metres of office and exhibition space) is an excellent example of solar passive design - so good, in fact, that it is the first building ever to win an Australian Design Award.

In designing the SEIC building, the architect sought to minimise the use of electrical energy and replace it with solar energy systems. The building is oriented with the long axis running east-west. Illumination and the collection of solar (thermal) energy are made possible by the large collector on the north facing roof. Centrally placed is the solar (air) collector and on either side of this are windows. The whole structure is enhanced by angled slat cover that permits the entry of winter sun and heat but excludes summer sun and heat. The solar collector delivers warm air to the building's air-conditioning system. As a further protection against unwanted heat, reflective blinds are installed on the inside of the window (sky-light) part of the collector, to admit winter sun but to exclude direct summer sun.

The building is heated at no cost, either in monetary or environmental terms. Although Perth is famed for its sunshine, it can get (and stay) pretty cold in winter! The building incorporates into its structure both thermal mass and insulation, so even when it is cloudy, the building can stay warm by radiating stored heat for several days. The use of lightweight, insulating concrete in the southern wall of the structure provides a further contribution to the thermal efficiency of the building.

Such cooling as is needed is achieved with a low-energy airconditioner. Cooling is also aided by venting the building at night to exhaust warm air and cool the structure.

To tie it all together, the building is controlled by a computer responding to temperature changes to operate venting and air-cooling systems automatically.

The benefits enjoyed by the building also show in the running costs, which amount to $8 per square metre, as against a more usual $22 per square metre. Capital costs in the building phase were lessened, and the need for electrical supply equipment was also reduced. It just goes to show that economy and ecology do mix after all - now, how do we convince the planners?

For further information about the building, ring (09) 474 2770. The SEIC is located at: 95 Canning Hwy, South Perth WA 6151; Phone (09) 367 1318, Fax (09) 367 1580.

Solar water pre-heater for cooking

One of the most common uses of solar energy is for heating water; and this application can go a long way towards helping to conserve fossil fuels and the environment. Unfortunately, in developing countries, where this saving is even more desperately needed, most people cannot afford solar systems. To help address this problem, Dr Jagadeesh, from the Society of Science for the People, India, has designed a simple heating system made from readily available materials.

By Dr. A. Jagadeesh

During the cooking process, whether fuelled by firewood, kerosene, gas or electricity, considerable energy is required to raise the temperature of water initially - especially in the case of rice, dal, maize, and so on. If we could use water pre-heated to about 60 degrees Celsius, considerable energy could be saved. It was this objective which gave birth to the design for this solar water pre-heater for cooking (the Jagadeeshwar II).

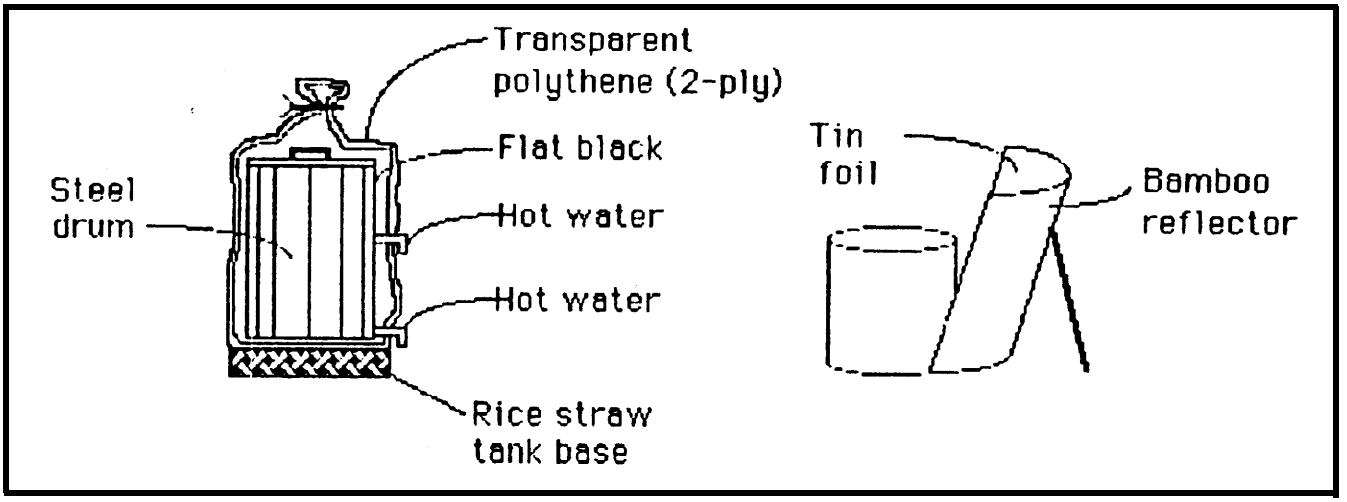
Design details

Vertical and cylindrical solar collectors can be used to obtain hot water. They are easy to construct, low to moderate in cost, good looking and can be effective - as effective as the wallmounted batch collectors. Another advantage is they perform well when the sun is low in the sky and, as such, are good for winter too.

The current design starts with a 50ltr stainless steel drum, painted black, with an opening at the top, and taps fitted in the middle and bottom. (Stainless steel water storage drums are widely used for domestic water storage in India). The middle tap facilitates drawing water of higher temperature since, due to natural convection, hot water rises to the top. The bottom tap is installed to allow all the hot water in the collector to be drawn, if needed.

The black painted steel drum is covered with two layers of thick, transparent polythene sheet, to reduce radiation, convection losses and to shield the absorbing surface from wind. The polythene covering also helps to protect the paint on the drum from vagaries of weather. A curved reflector, made of bamboo plastered with mud (to make it smooth) and covered with tin foil is placed behind the collector. The rear portion of the bamboo reflector is covered with polythene sheet to protect the bamboo from rain. The reflector stands on a supporting stick, so it can be oriented according to the position of the sun. The collector is mounted on an insulated base (rice straw enclosed in polythene bags) to reduce heat losses.

The storage system consists of a 75ltr mud jar which is coated inside with a thin layer of cement to arrest pores. The exterior of the mud jar is covered with a 10cm thick layer of rice straw,



The collector; a: side-view of the collector, b: reflector

and again with a black polythene sheet, to ensure the whole system is air-tight. On top of the clay lid is placed a bamboo basket covered with thick rice straw, and this is again covered with polythene sheet, to minimise heat losses at the opening. A similar arrangement is provided to cover the tap at the bottom of the tank when not in use.

Operation

The collector is filled with potable water at around 8 am and covered with the lid. The polythene covers are closed with the help of the clip provided. Hot water drawn from the outlet either at noon, or at 4pm, is transferred and stored in the mud jar. This hot water can be used for cooking, or making hot beverages, either in the afternoon, night or next morning. Tests revealed that in 15 hours of storage a drop in temperature of 5 degrees Celsius was observed in the water stored in the insulated mud jar. To quicken the boiling process further, pre-soaking of maize, dal, rice beans etc., will help to reduce the cooking time, which means less fuel consumption. Water is a better conductor than air. Wet cotton wool conducts (or absorbs) ink faster than dry cotton wool, for example. Similarly, soaked beans/rice conduct (or absorb) heat faster than dry ones. Also once food reaches boiling point, it can cook by simmering at lower heat.

Performance and cost

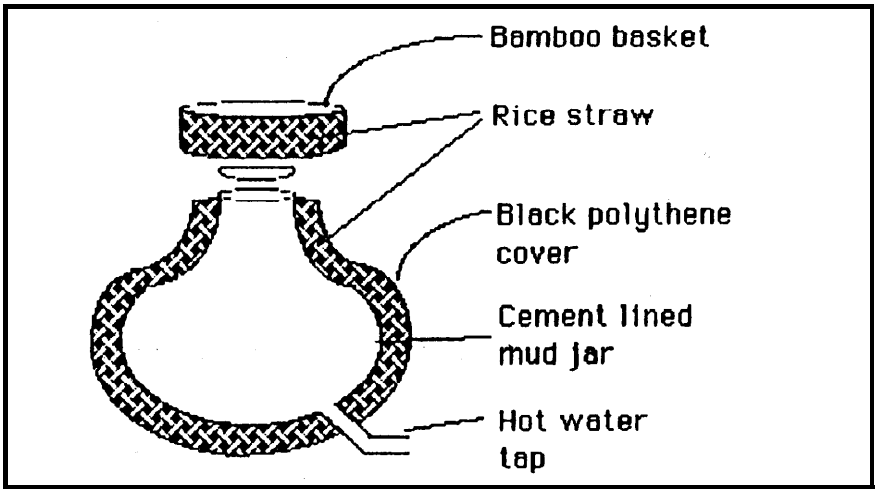
In southern India; hot water up to 70 degrees Celsius is obtainable, depending on the sunshine. The whole system costs Rs.750 (US$30) and can be fabricated with local skills and material. Where water requirements are higher, the size of the collector can be increased as can the storage capacity of the mud jar.

Advantages

1. The pre-heated water will save fuel (firewood, kerosene), in the rural areas of developing countries, and reduce the pollution and environmental degradation associated with their use.
2. It will lessen cooking time.
3. This preheated water can be used in the laboratories in rural schools.

Further information on this design can be obtained from:

Dr. A. Jagadeesh
President, Society of Science for the People
2/210 Nawabpet, Nellore - 524 002
Andhra Pradesh, India.



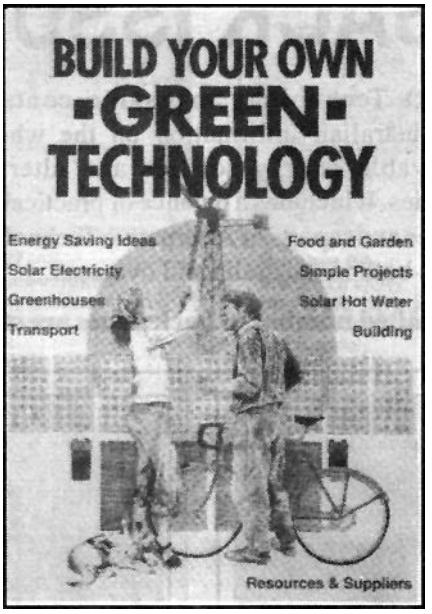
The low-cost insulated storage container

Solar Energy Resources Catalogue

This catalogue has been produced by the Alternative Technology Association (ATA).

The ATA is a community based organisation involved in the promotion of technology which works in harmony with the environment. The group runs a wide range of activities including meetings, film nights, field trips and practical workshops.

The ATA also produces a quarterly magazine Soft Technology and a bimonthly newsletter. It built and manages the Solar Workshop and maintains the Alternative Technology Resource Library. If you wish to contact the group write to the ATA at the address at the back of this catalogue.



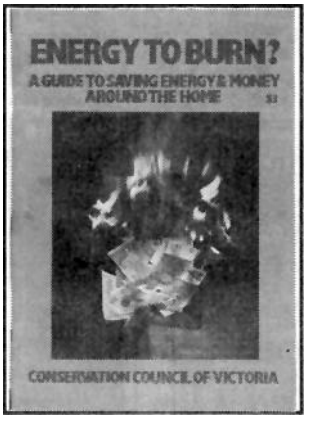
Build Your Own Green Technology

Green Technology is a source of ideas, information and inspiration for all those with an interest in environment friendly technology and energy self sufficiency.

The book provides the reader with a rich supply of practical do-it-yourself projects covering building, natural energy sources, food and garden, transport, home appliances and a special chapter on simple projects.

It is filled with the practical experiences of people all over Australia drawn from Soft Technology magazine

Price $19.90, (plus $5.00 post and pack)



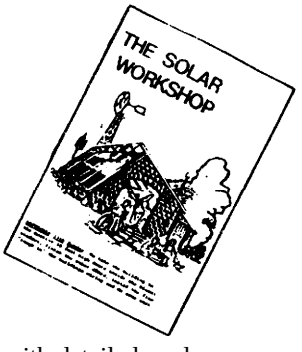
Energy Conservation

"Energy to Burn?: A guide to saving energy and money around the home" is a comprehensive 48 page A4-size booklet giving many hints and information about insulation, lighting, appliances etc.

Published by the Conservation Council of Victoria.

Price: $4.20 posted.

The Solar Workshop



A detailed description of the Solar Workshop including information on the wind generator, solar electric system, water turbines, solar water heating and the building's passive solar design. The booklet includes diagrams with detailed explanations of the various features of the workshop. It also contains details on materials used, their costs and sources.

Price $3.00 posted.

Soft Technology:
BACK ISSUES

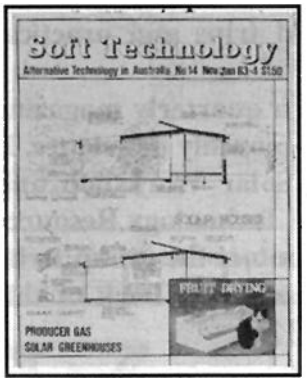
Soft Technology magazine contains current Australian information on the whole range of renewable energy sources and alternative technologies. It includes a balance of practical construction articles and reports of Alternative Technology developments both in Australia and overseas.

A limited number of back issues are still available.

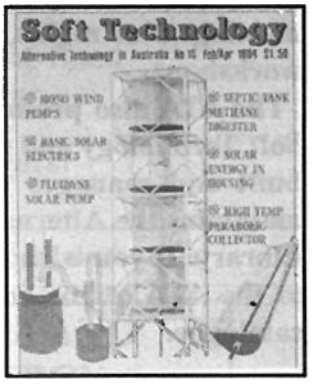
Number 8.
Appropriate Technology.
Methane digestion.
Electric vehicles.
Wind measuring methods.
Electric moped race.
Solar ponds.

Number 10.
Solar mudbrick flats.
storage batteries.
Solar electric fridge.
Solar power station.
Australian Centre for Appropriate Technology.

Number 11.
Build a cheap solar water heating collector.
Wind generator towers.
Human powered vehicles.
Natural cooling for summer heat.
Energy saving checklist.



Number 14.
Producer gas.
Solar greenhouses.
Suburban solar houses.
Blacksmiths bellows.
Solar fruit dryer.
Solar pumping.



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Septic tank methane digester.
Solar energy in housing.
Mono wind pumps
Parabolic collector.
fluidyne solar pump.

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Bicycle trailers.
Nepalese watermills.
Solar electric system in a suitcase.
Siddons solar heat pump.

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Building a solar car.
Darrieus wind rotor.
An electric Go-cart.
Low-tech solar water heater.

Number 24.
Low-tech reaction water turbine.
Clivus Multrum composting toilets.
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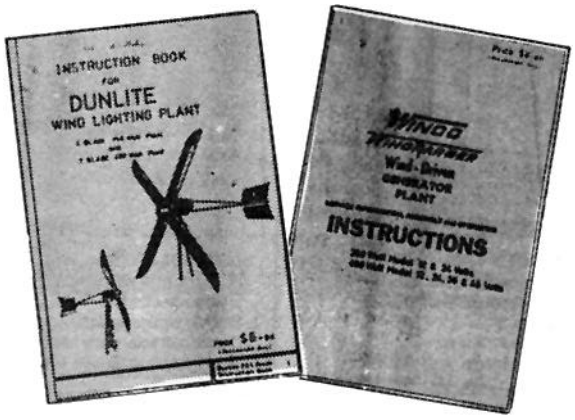
Watch this space for more exciting editions of Soft Technology - the environmentally friendly alternative.

Windpower Information

These booklets give technical details of individual windgenerators. They give information on installation, maintenance and basic repairs. A must for owners or people reconditioning old generators but who have no printed information on the machines. The booklets cover the range of Australian made Dunlite windgenerators as well as the imported "Windco" and "Rutland" machines.



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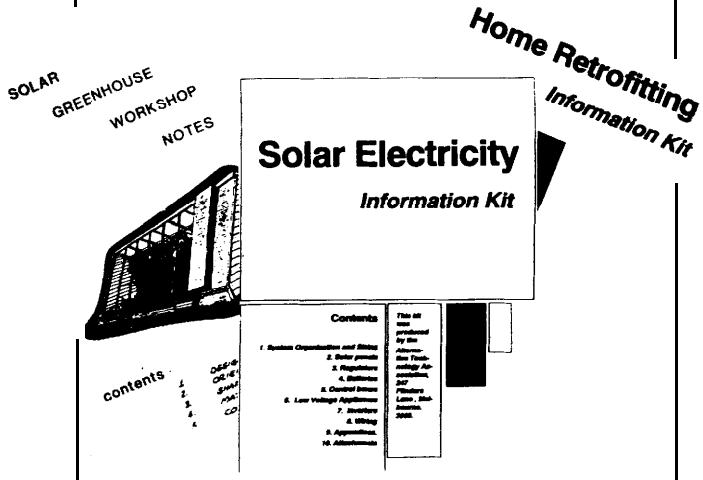

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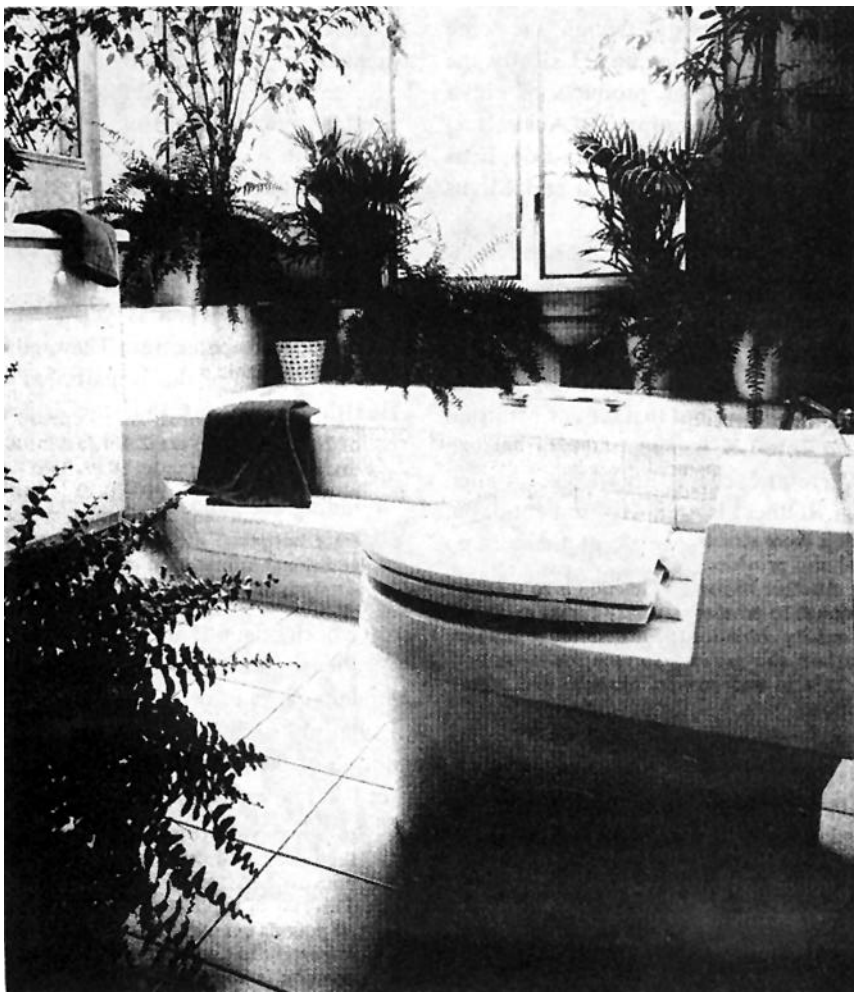
Composting our toilet waste
less water, less waste

By Noel Jeffery



Every time a toilet is flushed 27 litres of good drinking water go down the drain" and "the world is in danger of being swamped by its own sewage" were statements reported in The Age newspaper Saturday November 9th, 1991. They referred to Abby Rockerfeller's championing of the cornposting toilet, one of which she has had in her fashionable Massachusetts home since she took up the Swedish invention, the Clivus Multrum. She believes that with conventional toilets we are not only polluting our seas and rivers and wasting water, but are treating as waste materials which can be used naturally for plant growth.

The cost of treating water polluted by excrement is soaring. $A318 billion is the price of implementing a recent European Commission's directive on Municipal waste water treatment. Can we in Australia, with sprawling capital cities and low rainfall continue to use systems developed in close-packed cities of high rainfall?

In Soft Technology No 24 we ran an article on the Clivus Multrum. In No. 21 there was a review of Leigh Davison's notes on constructing the Clivus Mimimus, a home-built version. Since then, there has been a slow but steady increase of composting toilets and now, with a review of the Australian Standards coming up, it is time to raise the subject again.

The first thing to remember is that there is no maintenance-free sanitation system: no matter who disposes of the end product. The sea, out from landfalls, the smell of sewage farms and rivers after floods bear witness to this.

To overcome this, many local government authorities have extensive by-laws; e.g. in N.S.W., if a sewer is available, connection must be made to it. Housing Authorities are often reluctant to give permission for composting toilets, as a change of ownership may lead to careless new owners whose interest in sewage disposal does not go beyond pressing a button and an occasional wipe with a toilet brush. A "No water" toilet may be fine, but what happens to the sullage (greywater) from laundry, kitchen and bath? The relevant authorities often have insufficient time and staff for the less than one percent of the population who wish to go down a different drain. Many local Health Inspectors have little experience of waterless systems and are reluctant to give approval to new ones. To be fair, though, some are quite help ful.

Approved Types

The levels of approval for composting toilets, and even the authorities under whose jurisdiction the matter falls, vary widely from State to State. As far as types go, though, the same names keep coming up. Basically, the names are all the products of either Environment Equipment Australasia (who make the Biolet, Rota-Loo, Ecos Soltran and the Bio-Loo) and Clivus Multrum.

In Western Australia, the Environmental Health section of the Health Department is the authority. They informed us that, as yet, no composting toilets had been approved for general domestic use, but that Clivus Multrum and Rota-Loo had applied for approval. There are several Rota-Loos installed on Rottnest Island, off Fremantle, but this case was special, as there is no water supply to that end of the island, apparently! As I understand it, in the case of such public facilities, the toilets can be approved. In a place as dry as WA it certainly makes sense!

The Public Health Department in the Northern Territory informs us that the Clivus Multrum has just been approved for general domestic use as appropriate - meaning that the individual still has to seek approval to install one.

In South Australia it is the local council which has the say about what is allowed. According to the Environmental Health Dept. officer we spoke to, some councils are quite flexible, while others won't allow them at all. There aren't any general rules about type, but it seems reasonable to expect that the products of the two manufacturers mentioned above would be acceptable.

The Environmental Health Dept. Queensland has approved three types for domestic use: the Ecos Soltran, the Clivus Multrum and the Biolet.

In New South Wales, the level of approval varies for different products. The Clivus Multrum is approved for use in public facilities (national parks and the like) but not, apparently for domestic use yet. This will probably change, as the Rota-Loo is already approved for domestic use, and the Biolet is under consideration. The Environment Department handled our queries.

Since the transfer of authority to the Environment Protection Authority (E.P.A.) in Victoria from the Health Commission in 1990, there have been no new type approvals. The approved types are the Clivus Multrum, the Rota-Loo, the maxi Rota-Loo and the Biolet.

Tasmania's situation is yet another variation on the theme. The Public Health Branch of the Department of Health informs us that the Clivus Multrum, the Rota-Loo and the Biolet are all approved for domestic use - but building regulation prohibit their installation inside a house. They have to be at least 1.8m outside the building. We are informed that the powers that be are working on this anomaly.

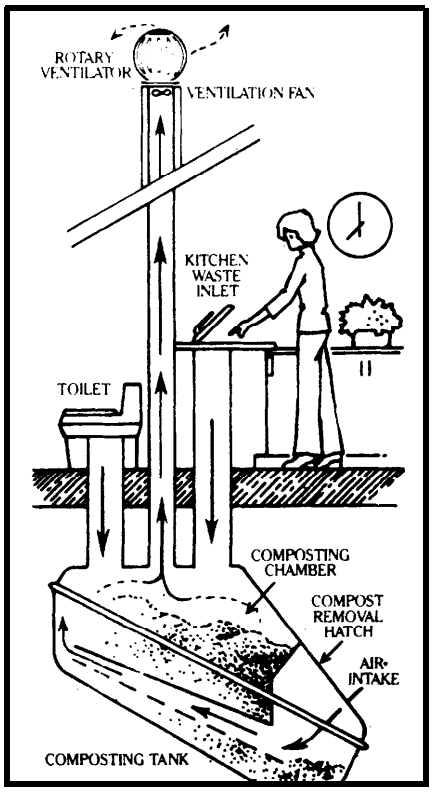
* Please note that there are several models of some of these toilets (particularly the Clivus Multrum) and that not all of them may be approved - or, for that matter, available in your state. The contact details for the companies are at the end of the article, or check with your local authority.

The Clivus Multrum

There are some 500 of these in Australia, many in National Parks. They are made in Australia and follow the Swedish/U.S. pattern. The cost is some A$3,400 for a domestic model. The only energy input needed is for a small 14 watt fan.

The unit consists of toilet and kitchen waste chutes, the large cornposting chamber of fibreglass situated under the floor, and a vent pipe and exhaust fan. Approximately 2 metres are needed for clearance, vent pipe and fan.

To use the unit, the sloping floor of the cornposting chamber is first covered



Clivus Multrum

with a layer of moistened bulking material e.g. woodshavings and a little good garden soil or leaf mould to start the cornposting process. Anything organic can be put down the chutes: kleenex, sanitary napkins, grass clippings, kitchen waste, kitty litter, shredded newspaper, grease and food waste. Cellulose materials, like vegetable scraps, leaves, sawdust and shredded paper help decomposition by absorbing water to prevent waterlogging and giving the pile a looser structure. This helps to keep a good aeration-moisture balance and the carbon/nitrogen ratio at about 20:1. An access door is provided to enable anything dropped down the chute inadvertently to be recovered.

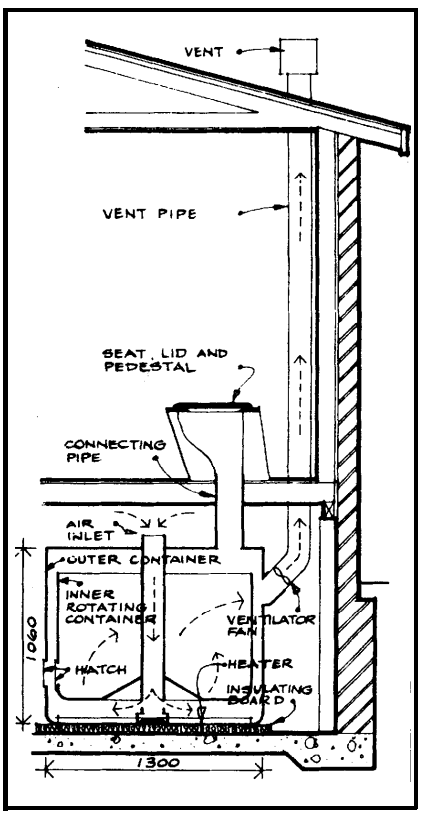
Aerobic decomposition reduces the volume of the organic material by some 90% and prevents the formation of anaerobic bacteria, which breed in air-

less conditions and give the smell of rotting material. It takes 4-5 years of general domestic use before the compost moves to the storage outlet. The inbuilt insulation helps to keep the temperature high enough, and the time in the chamber is sufficient to kill all pathogens present. About one and a half cubic feet (0.03 cubic metres) of compost is produced per person per year, if the unit is the sole repository for toilet and kitchen waste. 4kg of the compost is the equivalent of 1/2 kg l0-10-10 N.P.K. fertiliser.

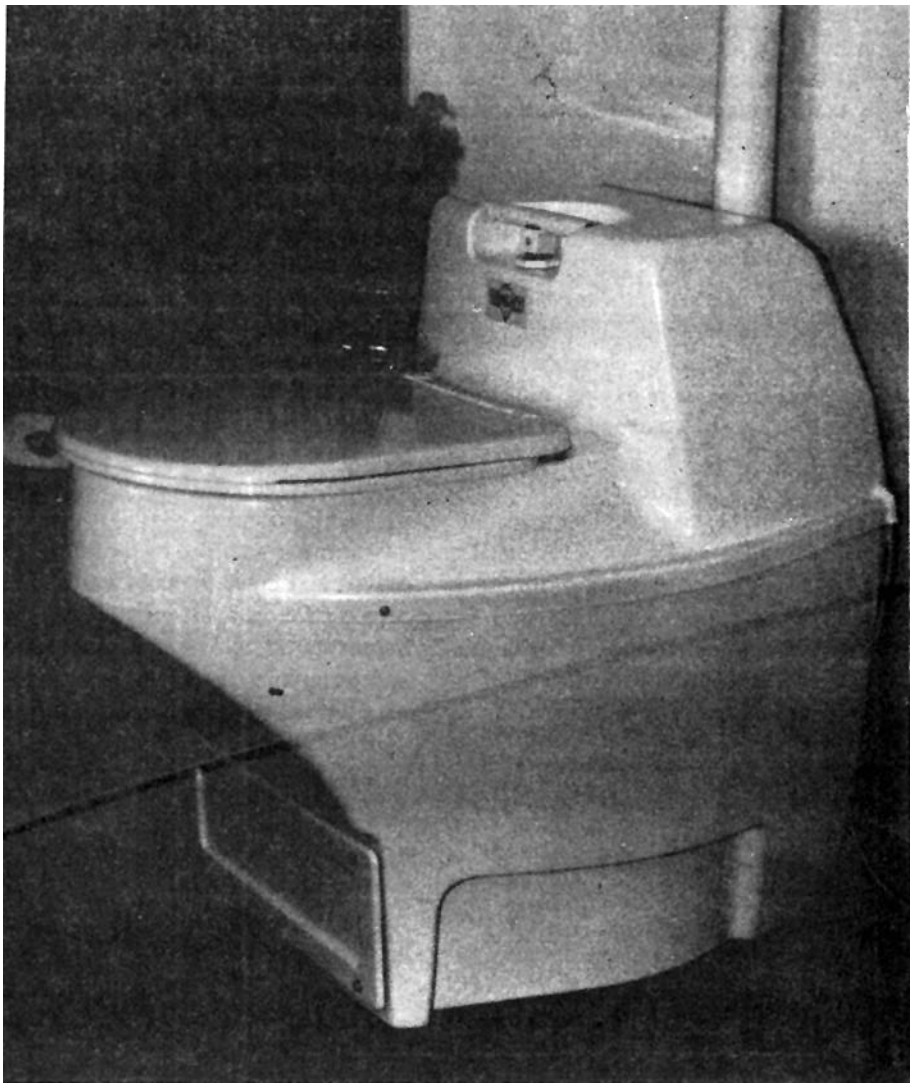
The unit provides for 4-6 adults with a saving of some 180,000 litres of water.

The Rota-Loo

The system is manufactured in Australia and is about the same price as the Clivus (i.e. approx. $3800). Like the Clivus, it is situated under the floor with a toilet chute, vent pipe and fan. The waste falls into a round, four-chambered waste collection tank below the toilet room. As each chamber is filled, the tank is rotated to bring the next chamber into use. A small heater in the bottom of the tank evaporates liquid wastes and the resultant vapour is drawn out into the atmosphere by the fan.



Rota-Loo



The Australian-made Biolet

When all four chambers are full, humus in the first chamber is removed and buried, usually with a 20 cm covering of soil. (Good for preparing your vegetable garden for planting, one would think.) The system is designed for five to six adults for year round use. It is emptied every one to three years, depending on use.

The fan uses 20 watts and the heating unit 200 watts. The heater is used only when the excess liquid needs to be evaporated (indicated by a liquid level indicator), but the fan runs continually while the house is occupied. For remote locations, a Mini Soltran unit, consisting of a solar air heater with rock heat storage, is used in place of the 200 watts heater and a solar panel and battery drive the vent fan. In cold

climates, the tank and vent need to be insulated if the temperature falls below 18° for more than a few days.

As there is no associated kitchen tube with this unit, to assist the composting process a few handfuls of chopped up vegetable scraps, straw, hay, or grass clippings can be added, perhaps once a week The seat, bowl and pedestal can be cleaned with a little mild cleaner making sure that, like the Clivus, none enters the composting chamber.

Again, there is a saving of some 180,000 litres of water and composting materials.

The maxi Rota-Loo is similar to the Rota-Loo, but has a larger capacity (60,000 uses) six chambered rotating drum. Two waste chutes can be fitted and excess liquid is drained into an absorption trench or tank as no heater is used. If required, a Soltran heating unit can be fitted, and the fan driven by a 12 volt solar panel. A model with a 240 volt AC fan and heater is also available.

The Biolet

This Australian made waterless toilet is designed for holiday homes and for a small household of two adults and a child. It is not recommended for more than three people on a year round basis.

The unit consists of a fibreglass toilet bowl, a composting mixer chamber, heater, fan, thermostat, humus collection tray and a liquid level indicator. Maximum power use is 265 watts. An automatic compost cover opens when the seat is occupied.

Warm air is provided by the fan, helping to break down the solid waste. The breakdown is also assisted by the humus starter (provided with the unit) and by mixing the chamber contents once a week by rotating a handle. The humus is then removed from the bottom tray every three to six months and buried with some 20cms of soil. A transparent fluid level indicator warns of excess liquid which has to be drained off. The unit retails for about $1680.

Next issue we will look at some other systems and home built models.

Contact details

Clivus Multrum
P.O. Box 20
Bentleigh, Vic. 3204
Tel. (03) 577 6943

Rota Loo, maxi Rota Loo, Biolet
Environment Equipment Pty. Ltd.,
1/32 Jarrah Drive
Braeside, Vic. 3195
Tel. (03) 587 2447

Look - No Mortar!

A new kind of block masonry from California

by Stephen Reardon.

Imagine building a brick house without using mortar - wouldn't it would fall down?

A Melbourne company, LEEOH constructions has done just that. The company claims that their building system is the strongest and most cost effective method of house construction available - and they certainly don't fall down!

LEEOH stands for Low cost, Energy Efficient, Owner-built Homes and that is exactly what they are. The system used to build the houses has been specially developed to suit unskilled owner builders. Instead of using mortar, which usually requires a qualified tradesperson, a special finish is applied to the bricks by LEEOH Constructions after they have been stacked.

The system originated in California, where it was developed to withstand the cyclonic conditions and bushfires experienced there. Now, after nine years of development, testing and modification to suit the Australian regulations and conditions, the system is available here.

Several buildings, including a two storey house, have been built using this method in Australia and judging by the one I saw being built in Wantirna, Vic. they are extremely strong.

Of course, the house is not simply made from stacked bricks, but it is true that no mortar is used between them. The secret to doing this is that the bricks used are the larger concrete bricks about 320 x 140 x 160mm.

Whether the house is supplied as a kit or built by the company, the process follows the same steps, starting with the pouring of a concrete slab.

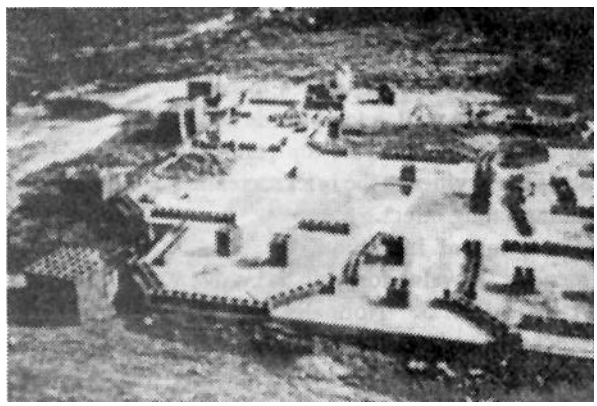
Once the slab is laid, a first course of bricks is laid using traditional mortar techniques. This is essential to locate the walls properly and is very simple to do.

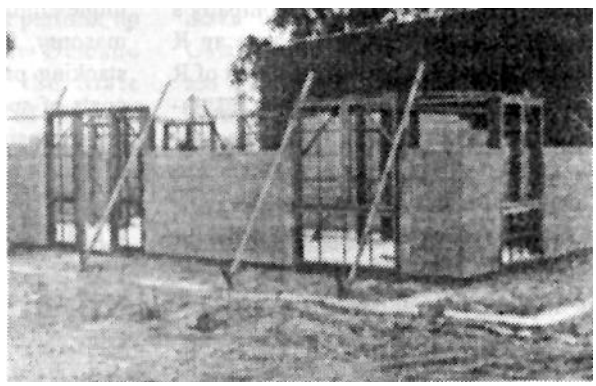
Next, the windows and doors are stood in place and held up with props.

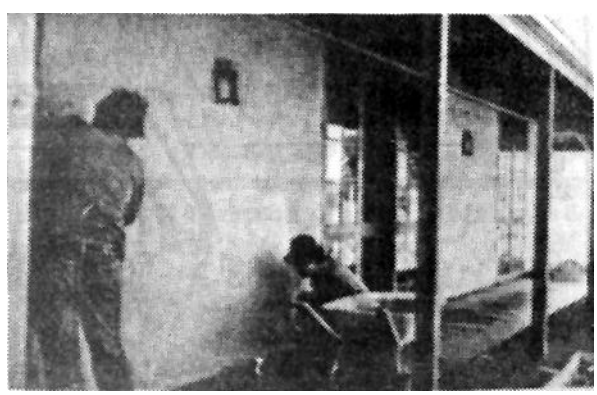
Now the rest of the walls can be built by simply stacking the bricks one on top of the other. Because of the size of the bricks the resulting wall is quite stable, even before the special render is applied.

The special render is usually applied by the building company before the roof trusses go up. If the house is of two storeys, then the render is applied before the second level is erected.

The render itself is the key to the whole operation. It consists of two coats, a structural coat and a finish coat. The structural coat has glass fibres in it to reinforce it and has the appearance of chopstrand fibreglass. The finish coat is much finer and is available in a range of colours and textures. For example, the outside can be made to look like sandstone and the inside to look like plasterboard.







Electrical wiring poses no problem according to the builders. This is because, as the bricks are hollow, the wires can be simply dropped down the cavities. Where a switch or powerpoint is required, a hole is drilled and the wire simply pulled through. Plumbing is all done subslab before the walls go up.

To enable the roof trusses to be attached to the wall, a top plate is bolted to the brickwork. This top plate also seals the cavities in the bricks, creating an insulating effect.

In terms of insulation, the recommended 'R' value for walls is between R1.0 and R1.5. Normally, concrete blocks alone have an 'R' value of 0.2. (Information courtesy of the Energy Information Centre, Victoria.) One way of insulating such walls is by filling the cavities in the bricks with polystyrene granules or blow foam. However, the director of LEEOH constructions claims that due to his company's unique system, their walls have an R value of 2.8. A wall with that sort of R rating would not need further insulation. Of course, insulation in the ceiling would still be beneficial and add to the performance of the house.

Normally, to eliminate the need for internal framing the internal walls are also built using the system. The result is a house with high thermal mass. This means that the high level of mass in the walls and floor can store a lot of heat, enabling the house to have a very stable internal temperature. This would contribute to the insulating performance of the house, especially in areas where there is a high range between day time and night time temperatures.

Proper design to optimise the use of the thermal mass would result in a house which is quite solar efficient.

The roof trusses are supplied in the kit and the roof can be either steel decking or tiles.

The design of the house is very flexible - virtually any shape can be built and it seems any choice of window or framing construction can be accommodated.

The main advantage of this construction method is its simplicity. The technique eliminates the need for framing, masonry, insulation and lining. The stacking part is easy, and the critical coats of special render are applied by the company. This last means the risk of failure is virtually eliminated.

LEEOH Construction claim that there is a 30% cost saving compared to other forms of building. Judging by the simplicity of the operation and the elimination of a number of expensive trades, the cost saving seems reasonable.

Perhaps the most exciting aspect of the technology is its potential in developing countries. The technology is ideally suited to situations where labour is available, and there is a big need for low cost housing. At the time of writing, the manager of LEEOH Constructions was in the African countries of Mali and Mauritania negotiating a technology transfer of the building method. The contract would provide for the establishment of a concrete block building factory, then the building of up to 25,000 homes in the capital of Mali, and up to 1000 houses in Mauritania,

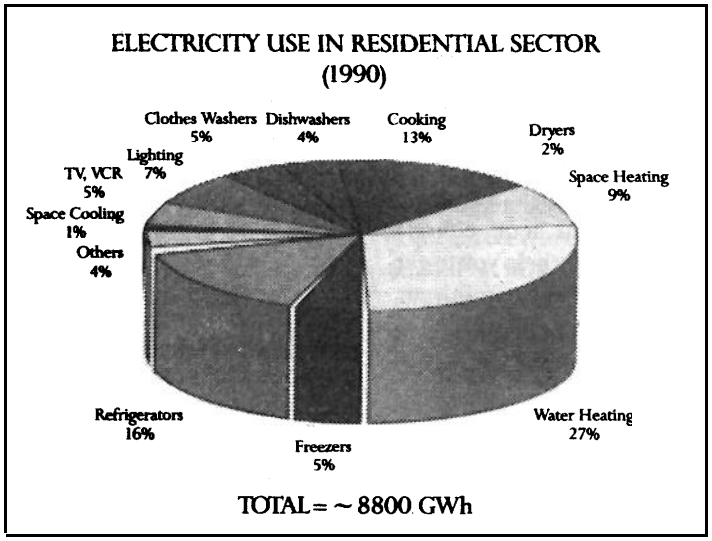
For further information about LEEOH Constructions, contact
Suite 1, 42B Wantirna Rd
Ringwood Victoria 3134
Australia.
Telephone (03) 879 7175
Facsimile (03) 870 4234

Appliances and Attitudes

Energy Efficiency on the Home Front

The author would like to thank the Energy Information Centre (Vitoria), Mr Lloyd Harrington and Mr Greg Culley of the SECV Demand Management Unit, Mr Kevin Poulton, Director of Lighting Services Australia and Mr Don Campbell, of SELDCO Pty Ltd, for their help with this article.

By Therese O Donnell



In a perfect world, we would all run our homes on renewables, and power stations would be obsolete - in the meantime, the energy- wise consumer can save themselves dollars as well as the saving the planet with energy efficient appliances.

The authorities have started to use their influence in support of energy efficiency. The star rating system of labelling for appliances has been around for a while now, and is gaining wider acceptance. In Victoria, star ratings are mandatory on all dishwashers, clothes washers and dryers, fridges and freezers, air conditioners and gas appliances. In NSW, labelling is compulsory on fridges, freezers, dishwashers and air conditioners under 7.5kW output. They are not compulsory in the other states, but as manufacturers realise that energy efficiency sells, more and more appliances display them voluntarily - and the other state authorities are coming around. The relevant ministers are talking about a national approach to the issue - which can only be good news for people wanting to reduce their energy consumption.

Eventually, the aim is to introduce minimum performance standards for energy efficiency in appliances - and weed out those that do not perform up to those standards. The Demand Management Unit of the State Electricity Commission of Victoria (SECV), has commissioned a review of energy labelling, and is currently considering the recommendations which were made. Many of the recommendations are to do with technical issues - ways of testing and so on - which are very important to the reliability of the labelling system. I hasten to add that it isn't unreliable now - the tests are carried out according to an Australian Standard, and with care - but there is always room for improvement.

Other points raised in the report dealt with the sorts of atributes which should be tested, and minimum performance standards. It will be interesting to see what comes out of it.

The simple way to use the star rating labels is to compare the stars - the more stars an appliance has, the more energy efficient it is. More stars also mean that the appliance uses less electricity to achieve the same level of performance as a comparable model. In the SECV's literature, the models achieving the best levels of efficiency are currently awarded a Galaxy Award - many stars make up a galaxy, I suppose! The Galaxy Rating is a useful guide, but I am told that is is to be replaced by an Outstanding Appliance Award. The reason for the change is a recognition by the SECV that while the energy efficiency rating is very important, it really should not be considered in isolation. Factors such as reliability and life are as important to the efficiency of an appliance as it's electricity use.

Which brings us to the other indispensible part the energy efficiency of an appliance. The user. Sometimes the appliance with the most stars. An excellent example of this is the story told by a member of the Conservation Council of Victoria who went to buy and energy efficient fridge. With stars in his eyes (pardon the pun!) he entered the shop and asked to be shown the most energy efficient fridge they had. It was with stars in front of his eyes that he looked at a fridge big enough to re-ice Antarctica if global warming should ever get too bad. Obviously it wasn't for him - so he re-evaluated. After assessing his needs, he eventually

bought a small, bar-type fridge, which although less energy efficient than the monster in the shop, used far less total electricity to do what he needed.

The lesson is clear. If we want to address energy efficiency we need to look at our needs and our use patterns, as well as to technology and manufacturers to provide the answers. (Don't tell the manufacturers that - we don't want to let them off the hook, either!) The following hints may help you to get more value for your kilowatt from your appliances.

Fridges and Freezers.

Do you need an extra fridge? A garage or bar fridge may add up to $100 to annual electricity bills. Also Caravan and camping fridges that can use both gas and electricity cost more to run than ordinary fridges, so use them sparingly.

Plenty of air flow over the coils on the back of the appliance is essential for efficiency. Inadequate ventilation could add up to 15% to running costs. Cleaning them occasionally is also a good idea.

Look after your ice box. Put it in a cool place, and if the motor seems to run all the time, call a maintenance person. You can also help your fridge, and save 5-10% on running costs, if you let food cool before putting it in the fridge, and cover liquids. Try not to open the door for long periods, particularly on hot days, or if there is a power failure, and keep the door seals clean.

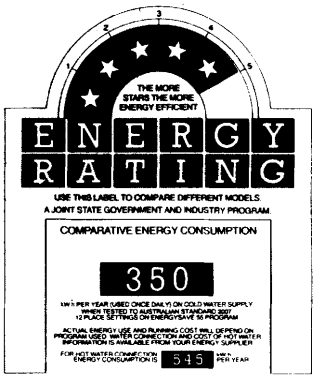
Setting the temperature control lower than necessary increases running costs. A change of 1°C can affect running costs by 5%.

For energy efficient freezing, No more than one tenth of a freezer's capacity should be used for the initial freezing of fresh food at one time, and you should scatter the bundles around while they are freezing.

Regular defrosting of manual defrost unit helps maintain performance and energy efficiency.

Clothes washers and dryers.

Sunlight is a natural killer of bacteria - dry clothes on the line whenever possible.



If you need to use a dryer, make sure that the clothes are well spun in the washing machine before you put them in the dryer, and turn the dryer off when they are dry - overdrying is wasteful and makes your clothes feel like cardboard.

Wait until you have a full load before washing or drying and keep the lint filter clean - especially important in dryers.

The energy consumption figures for clothes washers are based on a warm program. You can make considerable savings if you use cold water for your everyday wash and warm water only for special washes, e.g. whites, soiled overalls etc.

An over-loaded or over-sudsed machine uses more energy and does not clean efficiently. Follow the manufacturer's directions for load weight and detergent usage.

Front loading washing machines are more energy efficient than top loading machines, and they use less water.

Dishwashers.

Follow the manufacturer's loading instructions about load size and detergent. Overloading the machine, loading it wrongly or with too much or little detergent will affect the performance.

As with all washers, wait until you have a full load before running, and use the lowest temperature and shortest running program that will satisfactorily wash the load. Opening the door for dishes to air-dry helps, too.

Clean the filter regularly.

A dishwasher connected to a gas or off-peak electric hot water supply can be switched on last thing at night. This reduces the risk of running out of hot water.

Air-Conditioners.

Think about the design of your house when choosing an air-conditioner. Floor area and ceiling height space to be cooled, insulation, window size and orientation, building orientation, the purpose of the room, number of people normally there, and so on.

When a hot day is expected, turn on the air-conditioner early rather than wait till the building becomes hot and keep all windows and doors that open to the outside closed and curtained.

If the machine has adjustable louvres, they should be directed between 'horizontal' and 'up' when cooling.

Locate the air-conditioner on the shady side of the building.

Follow manufacturer's instructions for filter cleaning and motor maintenance.

Lighting

Lights in houses use less total energy than some appliances, but they have the advantage of being relatively easy and cheap to convert to energy efficiency.

Although not new, Compact Fluorescent Lamps (CFLs) are still the hottest technological news in domestic energy efficient lighting, if customer interest is anything to go by. In previous issues of Soft Technology, we have looked at their cost: now, in we shed some light on the rest of the issues surrounding them.

Characteristics

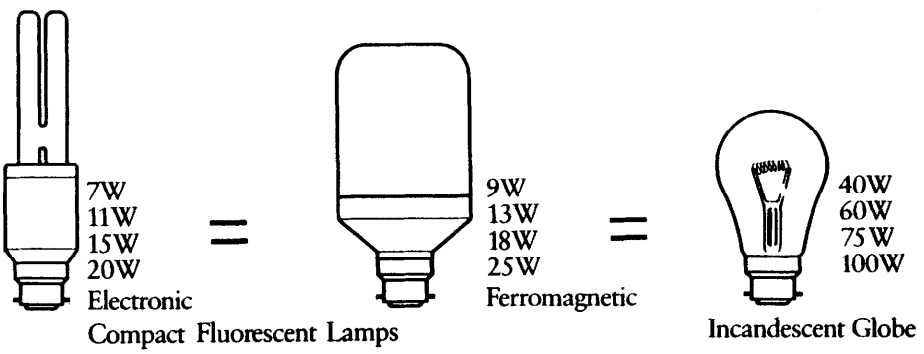
A CFL uses technology very similar to the ordinary fluorescent. The glass tube is filled with mercury vapour and coated on the inside with a phosphor powder. A discharge plasma of rare-earth oxides produces UV light, which is converted into visible light by the phosphor coating. In the most common electronic lamps, the adaptor, or ballast, is some electronic circuitry in a plastic housing.

The arrival of compact fluorescents was made possible by improving the phosphor powders so that they are more efficient and more able to coped with the higher intensity of UV found in a compact lamp. There have also been improvements in the techniques of stabilising the mercury vapour pressure in the tubes.

CFLs need care with shading. An incandescent globe is a "point source" light. That is, light is emitted evenly in all directions - or in the shape of a sphere around it. A compact fluoro is not a point source. It emits light from the long section, but not from the end, so the shape of emission is more like a doughnut. Obviously, then, in normal domestic applications, CFLs are much more effective with an appropriate shade than without. Also, as CFLs are longer and bulkier around the base, than incandescents, not all light fittings can take them.

The placement of fluorescent lights is also very important to their efficiency. Frequent switching burns off the rare earth oxides faster, so CFLs are not suitable or economic in rooms where the lights are normally on for short periods. Living rooms and kitchens are usually good applications, but toilets, bathrooms and bedrooms are not. For the same reason, they are not suitable for use with dimmer switches, occupancy sensors or noise or movement activated security lighting. On the other hand, they are perfect for continuous security lighting or night lights.

Integral electronic ballast CFLs currently on the market generate higher harmonic distortion and radio interference than do the ferromagnetic type. Therefore, some caution may be required if you operate sensitive electrical equipment - computers, radio transmitters/receivers etc. - and you intend to install a large number of integral electronic lamps at the one site. The ferromagnetic lamps are heavier, though, so care should be taken to ensure that the light fittings are strong and



Compact fluoros normally take a couple of minutes to warm up and achieve maximum light output. Once warmed up, they (the reputable brands!) produce a good light level and quality. Most are designed to give a pleasant, warm light similar to an incandescent, but light colour can vary, so it is best to see the lamp in action before you buy. The light colour is controlled by the tube, so if those with the new, removeable tube lamps don't like the lamp colour, they can change it next time they buy a tube.

Compact fluorescents are not at their best in extremes of temperature. Normal room temperature is fine, but if the lamp has to endure extended low temperatures - for example, in outside security lighting - they should be installed base down for maximum light output. Incidentally, positioning these lamps base down will always produce a better performance, but it isn't usually necessary or practical in indoor lighting.

stable enough to take them. The new two-piece electronic lamps are much less of a problem, as they conform to an interim Australian Standard on harmonics.

Efficiency

It has been said that these lamps only seem to use less power - that while they save the consumer money, they don't save the environment, because the money saving is generated by only part of the power they use registering on the meter. This is actually true, and is due to the harmonic currents generated specifically by the CFL. However, it is not the whole picture. For example, the relative size of the problem is dependent on the power factor of the individual unit. All of the factors need to be considered together in order to un-

derstand the efficiency benefits of the lamps.

Most comparisons correctly cite a 15 watt compact fluorescent lamp as being equivalent in light output to the 75 watt incandescent lamp.

The 75 watt incandescent lamp, because it represents a highly resistive load, operates at around unity power factor (power factor of l), whilst the 15 Watt compact lamp operates at near 0.5 power factor. This power factor figure for CFLs is based on an average of the reputable integral electronic brands on the market in Australia. The worst power factors are seen in electromagnetic units - some as low as 0.23. Some manufacturers have managed to improve the power factor and products operating at a power factor of 0.8 are available: notable examples being both of the new two-piece lamps developed in Australia.

Essentially, power factor is the ratio of 'real' power in watts to "apparent" power in volt-amps. In other words, the ratio between true power consumed - equal to the product of volts and in-phase (undistated) amps - to apparent power - equal to the product of volts and total amps.

The poorer power factor of compact fluorescent lamps can be explained as follows:

Short pulses of voltage are supplied by the electronic ballast of the compact fluorescent lamps to cause the phosphors in the tube to emit light. This results in a distorted current wave shape and, although in-phase with the voltage, high levels of harmonic currents (which are not at the fundamental 50Hz supply frequency) occur.

These high frequency currents make little contribution to the 'real' power consumed by the lamp but merely add to the overall current it draws.

Therefore a typical compact fluorescent lamp rated at 15 Watts could consume approximately 30 volt-amps of power.

Taking this factor into consideration the efficiency of a compact fluorescent lamp and its impact on the supply system can now be compared.

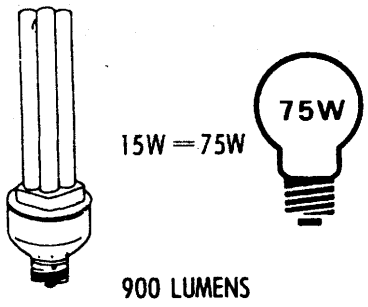
For the 75 watt incandescent lamp at near unity power factor a steady state current of 312 milliamp at 240 volts is drawn from the supply system.

That is: Current drawn by 75 Watt Incandescent Lamp with light output of 900 lumens

$= \frac{75}{240} = 312\text{mA}$

(240 volts supply power)

CFLs do not have unity power factor, which means that a compact fluorescent lamp, say at the poorer 0.5 power factor, will draw 125 milliamps of current, of which 62.5 milliamps is the resistive (fundamental) component; the



remainder being the out of phase harmonic currents.

The meter on the customer switchboard will register only power related to the 62.5 milliamps. Therefore from a customer user and (power generation perspective?) for the same light output, a saving in power consumption of 78% is achieved.

The supply system must supply the total power relating to the 125 milliamp current, however, there is still a saving. The current drawn, and therefore the saving, will vary according to the power factor of the compact lamp used.

For example: for a CFL rated at 15W, with a power factor of 0.8 and a measured voltage (what shows on the switchboard) of 18.7, the current drawn is

$= \frac{18.7}{240} = 78\text{mA}$

(the new Australian two piece lamps have power factors of about 0.8)

For a CFL rated at 15W with a power factor of 0.5 and measured voltage of 32.4, the current drawn is

$= \frac{32.4}{240} = 135\text{mA}$

(the one piece Philips lamps have about this power factor)

Note: Measured voltages taken from SECV laboratory tests.

The saving in current, therefore, could vary between 75% and 57%, and is dependent on the quality of lamp used.

That is:

$\frac{312-78}{312} = 75\%$ and $\frac{312-135}{312} = 57\%$

Power saved is simply the difference between 15W and 75W for the same light output

That is:

$\frac{75-15}{75} = 80\%$

From a supply system point of view this current reduction is most important as losses on the power distribution system vary with the square of the current i.e., if the current triples, the power loss goes up by 9 - if the current goes down to one third, the power loss is one ninth. It can be shown from this analysis that losses on the power system actually reduce significantly when compared with the losses resulting from an equivalent incandescent lamp.

Harmonic concerns

Obviously, the harmonic levels are still of concern to supply authorities. Harmonic currents radiate a lot more than the fundamental 50Hz current, and therefore can cause greater electromagnetic interference with audio radio and other signals. Many people have discovered already that CFLs interfere

badly with AM radio reception. TV's computers and others already generate harmonics, so obviously, any large increase would be undesirable.

For this reason, conventional fluoro's have to comply to an Australian Standard. One of the problems with CFLs to date has been that the integral lamps are classified as "globes', and as such, are not subject to Australian Standards testing. The new two piece lamps are classified differently, and are subject to testing under the interim standard AS3134 - and so have much better power factors. The SECV has told us that there is an in principle agreement with all the states to rectify this anomaly.

The interim standard is looser than the standard for regular fluorescents, to allow for the development of the new technology. It will, though be tightened up over the next two years. Also to be tightened are the requirements about radio reception interference. At the moment, even the new lamps have this problem, but we are told that under the interim standard, the companies have been given some months to address this problem - if they don't do it to the authorities' satisfaction, their approval will be withdrawn. New rules on this are currently being drawn up. Standards Australia is open to comments about AS3134.

Cost/Life

Discharge lamps cost more to make and buy than incandescents. They also take more energy to make. As the demand grows, economies of scale will help to deal with the first, The second problem is already being addressed by the two piece lamps. About 75% of the cost of manufacturing a CFL is in the ballast, which lasts approximately 50,000 hours. The other 25% is the tube, which lasts only 8000 hours. If only the tube has to be replaced after 8000 hours, there is less wasted material and energy - good for the consumer and the environment. The indications seem to be that even with the need for more energy to manufacture, over its life, a CFL will still come out using less energy than an incandescent.

Disposal of fluoro tubes also needs care, as they contain some ingredients which should not go into landfill. A company called SELDCO is the Australian distributor for a lamp crusher machine which removes and separates the inside components and crushes the glass for recycling. There are nine of these machines operating in Australia - most in Victoria, one in Qld., and one in NSW. More of these would be great - recycling the recovered materials would be even better.

Of course the total cost also hinges on the lamp life - a touchy subject for those who have bought inferior quality lamps! For good ones, though, if one 15W CFL cost $25, and gave 900 lumens of light for 8000 hours at 10.22 cents per kWh, the total lighting cost would be $37.26. If eight 75W incandescents cost $8 and gave 900 lumens for 8000 hours at 10.22 cents per kWh, the total lighting cost would be $69.32.

Overall, compact fluoros come up very well as a low-cost way of making the average home more energy efficient.

The literature about star rating referred to in this article should be available from your electricity authority in your state. If not, (or if you are Victorian!) they are available from the Energy Information Centre, Flinders St, Melbourne, Vic 3000. Phone (03) 650 1195.

The Letters Page

To The Editor,
Dear Sir,

Clive Campbell & myself would like to register one complaint in respect of your excellent magazine. In your "Energy Flashes" you quote latest developments from various sources, BUT you don't put date or issue volume for people to follow up.

In particular p.4 Soft Tech. No. 38 "The Non-CFC Refrig". Could you please advise details of the New Scientist from which it is extracted so we can look up at our library or, alternatively, advise addresses of the Indian, Swedish or German firms who are experimenting with same.

Every success for the future.

Regards
Ian C. Hartley.

Dear Ian

Good point! We will try to be more forthcoming in future. The New Scientist you are after is. Ed

To The Editor

I appreciated the articles on fluoro lighting but despite re- reading I was unable to find any details regarding the components & the materials used. I've been told that radio-active material is used in their construction (the starter?) If this is so, is this addition to an already high back ground radiation really justified?

The cost benefit/analysis leaves out the cost/pollution of the extra energy used to manufacture what is obviously a larger & more complex fixture containing more (volume kinds & weight) exotic materials than an incandescent. For example from what is the ballast made - & the starter as well? What is the fluorescing powder made from? And during manufacture, do these, like all other electrical gee-whizery, get washed in C-F-C's? Hidden environmental costs may make compact fluoro fittings fittings of doubtful benefit. More analysis please.

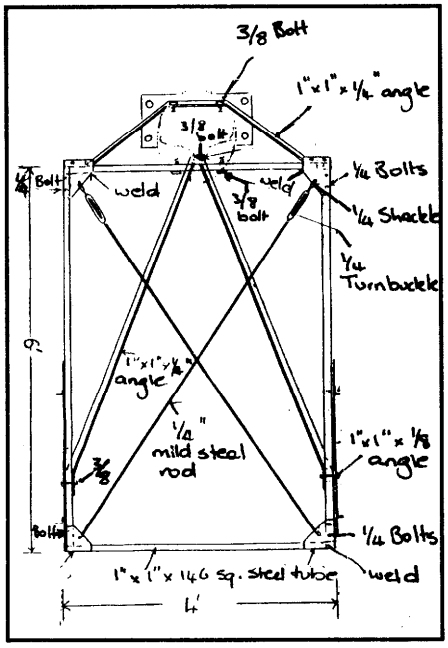
Kind regards
Paul Jury

Dear Paul,

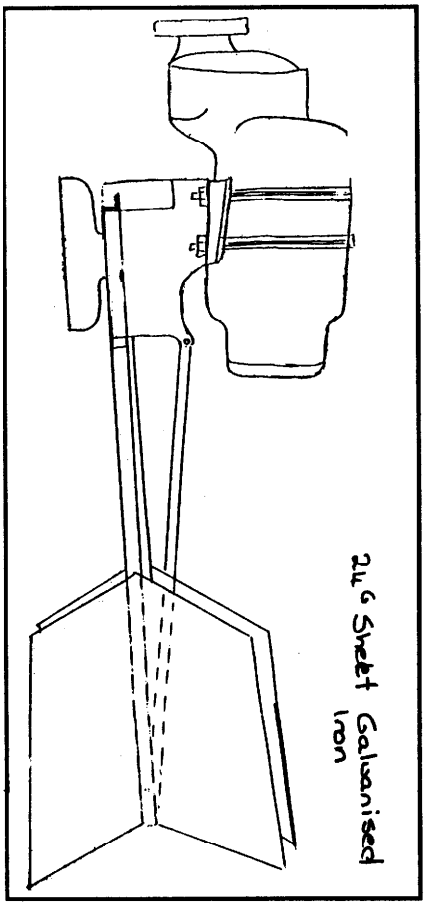
Good questions! Most of your questions have been addressed in our article about energy efficient appliances I hope this is what you were looking for!

It seems there are only two potential health risks with CFLs, and both are fairly minor. All fluorescents apparently give off UV radiation, but a year of exposure is equivalent to only about 20 mins. in the sun. There is also some Electromagnetic Radiation (EMR) given off: We are not aware of any formal tests on this, but informal readings we took showed less than is emitted by the average television or computer screen.

So far; I haven't been able to find out about the CFCs. If anyone else has any information about this, please let us know! ***Ed.***



Diagrams for the wind generator vane adaptation from Jim Gould



Hi Mick

Seasons greeting from Tassie. This is Jim Gould from Penguin and we met last August in the city, while we were in Melbourne en-route to holidays in Queensland. I'm the fellow who is interested in the wind generators.

Several things have happened in the months since our meeting and possibly the most exciting is that I have secured several Dunlite 2kW units plus a quan-

tity of spare parts, this being the results of a tender I placed with the maritime authorities for the remote wind generators, placed until recently, on the islands round Tassie, these being replaced by solar. I had a long discussion with the maintenance supervisor and he showed me a modification to the tail vane which they devised, which decreases "hunting" in some of the wild weather we get. This would, of course, maintain a more steady output, perhaps even an increase, and would mean less wear and strain on these units, with the extra wide track keeping the alignment into the wind spot on. I've enclosed a photocopy for you, perhaps other readers may find it of interest. These recent acquisitions, being 2KW Dunlites are twice the output of my old model 'L' and I'll be letting you know how they work out in due course.

I must congratulate you & Imelda on Issue 37, it was excellent, the article on market surveying inverters was much appreciated: feedback from readers on personal experiences with listed units would be very interesting. Incidentally, the 'Heatshifters' article, we have one of the commercial units installed as per fig 3, and it is marvellous, must be the best $300 I've ever spent. I had previously thought that Issue 32/33 was simply 'the tops', but I can see now you're just going from strength to strength. Regards to the rest of the crew.

All the best
Jim Gould
Dear Jim

Thanks for the compliment and for sharing the vane modification design with us. We, too, would be very interested to hear about people's experiences with the inverters, and for that matter, any alternative technology. ***Ed***

Dear Sir,

Thank you for your letter regarding my thoughts on using tidal power at Port Phillip Heads for the generation of electricity, at least to supplement the main source presently used. i.e. Brown Coal. A finite source.

Regarding publishing my original letter to you, I cannot recall exactly what I wrote as I did not keep a copy.

However, I have written since, another letter to Mr. George Bates the Chief General Manager of the SEC Vic and one more to "The Age" which they did not see fit to publish.

The original reply from Mr. Bates pointed out the difficulties of harnessing this source of power and their preference of Wind Power for supplementary power generation.

When I next wrote I pointed out that we had just enjoyed 3 weeks of beautiful windless weather, during which no power would have been generated by wind power, but that in that period the tides had continued to flow in or out every 6 hours or so as they have for thousands (perhaps millions) of years and would continue to do so for countless thousands more years and also pointed out some interesting figures which I am now going to pass on to you.

However neither Mr. Bates nor the Age apparently consider my thoughts worthy of further comment or discussion.

Now these are the figures I gave them.

The area of Port Phillip Bay is 725 square miles.

1 sq mile = 5280 x 5280 square feet
ie 27878400 sq ft.

725 Sq miles = 20211840000 sq ft.

725 sq miles one foot deep = 20211840000 cubic feet

1 Cubic foot of water weighs approx. 62 pounds

Therefore, approximately 36 cubic feet weigh 1 Ton.

Therefore 20,211,840,000 cubic feet weigh 561,440,000 Tons - say 561 mill ion Tons

Therefore to raise or lower the level of water in Port Phillip Bay by one foot only 561 million Tons of water must flow in or out through the Heads.

The mean rise & fall of the Bay is about 18" or 1 ft. 6" year in year out but even working on the lower figure of one foot these figures mean that every six hours over 560 million tons of water or over 90 million tons each hour flow in or out of that narrow opening at up to 6 or 7 knots.

Over 90 million tons per hour of cost-free, pollution free energy source. No smoke, no pollution. Never Ending. Totally reliable. A source of infinite power.

Surely generating plants could be placed in positions either fixed or moored out of the way of all shipping but in that strong tidal flow.

But no. Apparently the powers that be disagree. Too difficult, too expensive.

You can print that if you like.

Yours faithfully
Howard Elouee

Food for thought indeed. ***Ed.***

To the Editor
Compact Fluoro Problems

Fellow members watch out! The newest electronic fluorescent lamps with exposed filaments (referred to in recent issues) have problems. Their noise emissions affect the a.m. radio frequency band. This is due to the design and compact size of their ballasts which are less effective at sup pressing noise. A.M. radios within about 4 metres become noisy, so if readers fit out their homes with compact fluoros, as I did, they will find their am radio reception has deteriorated to the point of being un-listenable.

Some earlier designs (with glass case surrounding the filament for outside use) has larger copper or iron ballasts which virtually suppressed all noise and were problem-free. It appears that Australia has been flooded with many defective brands of the newer designs before they have been adequately tested and approved.

R. Smith

Dear R. Smith,

This problem is being addressed by the interim standard on harmonics, but is still a problem with all the CFLs on the Australian market at the moment. Please see our article on energy efficient appliances for more info. ***Ed***

To the Editor

Z Axis Drive. In issue number 34 of Soft Technology Terry Jameson kindly replied to a letter I had written (about a revolutionary gear drive) in an earlier issue of the magazine.

Terry sent the material to Alternative Technology and they sent it onto me. I wrote to Terry at the address given with documentation, unfortunately my letter was returned un-opened some time later. I got another address for Terry, with the same result

I wrote directly to the manufacturers of the Z Axis drive in the USA unfortunately with the same result. I hope Terry sees this article and can put me out of my frustration if anyone else can tell me where I can purchase a Z Axis drive from I will be eternally grateful.

I can be contacted by writing to P.O. Box 85 Abbotsford Vic 3067 or by phoning or faxing 419 3013.

- Yours faithfully
Wayne Wadsworth.

Dear Mike,

First, I'd like to thank you, Alan and Ross for your very informative workshop "Power Without the S.E.C." It was very interesting finding out about the alternative energies without the bias of a particular company flogging their wares.

You mentioned the progress of wind energy on Flinders Island. Have you had a chance yet to find out what was most successful and what their problems were?

If our situation would be beneficial to both solar and wind energy, is there one that is easier to run and maintain than the other, or are all the problems basically with the storage of power in the batteries?

Thank you all again for sharing your time and information. I found

it interesting discovering CERES and your information extremely beneficial.

Yours faithfully,
Karen Burgin

Dear Karen,

Solar needs no maintenance, but on a good site, wind is more cost effective. Hope that helps! We are still finding about about Flinders Island - we'll let you know ***Ed.***

BEHIND THE SCENES

A belated happy new year to all Soft Technology readers. After a well earned rest we are back at it. And what a year it is going to be! Soft Technology will continue to get bigger and better, with next issues climbing to the record size of 52 pages. Quite a jump from our old standard of 36.

Also in the publishing area we are looking at some new books, and are plotting to bring one out towards the end of the year.

The energy display trailer is once again on the road visiting schools and community events. Plans for the new improved version are well advanced, with construction to commence shortly. Also on the cards for this year is an increased range of activities for our Melbourne members. Additional courses will be run on wind power, water supply for the farm and home energy saving techniques. Anyone wanting more information can ring the office on (03) 650 7883

We also have some new for those of you based in NSW. We are planning to get a Sydney branch group going this year. If you want more information, or if you live in another state and are interested in forming a group, give us a call on the number above.

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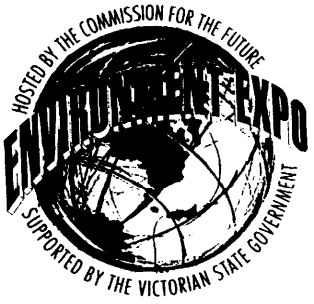

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- **Grow healthy food safely?**
- **Build energy efficient houses?**
- **Use fuel efficient transport?**
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3rd NATIONAL ENVIRONMENT EXPO!

This exciting exhibition of environmentally sound products and services, will be held at the Royal Exhibition Building, Melbourne (Gallery Level) from 18-26 April, 1992.

"Energy 2000" is again a major feature. A wide range of groups will present energy conservation and renewable energy displays and advice, with, (of course!) a special display by the Alternative Technology Association. (Incidentally, if anyone would like to help to staff our display, you can contact us on (03) 650 7883. - You get a free ticket if you do!)

There will be free practical seminars on reducing energy costs in the home, and product displays will bring you up to date on the latest in environmentally friendly gardening products, cleaning agents, paints, and personal care products.

For the builders, there will be displays of mudbricks, recycled timber, safe paints and innovative housing design.

School groups from throughout Victoria will be displaying their "Caring for our Planet" projects, and local councils will be promoting their latest environmental initiatives.

Further information: Graeme Berry (03) 819 0211.

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Melbourne 22-25 March 1992
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If you would like more information and/or would like to help with the conference, please call (03) 670 9911 or write to Ausbike 92, GPO Box 1961R Melbourne.

UN Information Service Assists In Locating Partners In Developing Countries.

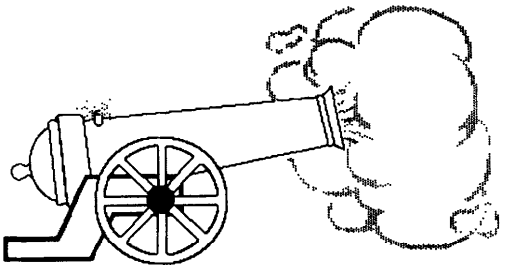
For companies seeking partners in developing countries, TIPS is the vehicle to assist them. An information service of the United Nations Development Programme designed to expand technology and trade transactions of developing countries, TIPS offers daily bulletins in different sectors, and a query service to match supply and demand.

The sectors covered are agro-industries, biotechnology, building materials, business opportunities, chemicals, electronics, energy, fisheries, food processing, machinery, mining, packaging, pharmaceuticals and textiles.

TIPS maintains a database containing more than 35,000 records of South offers and requests. Its national offices, which are in daily contact with companies, are based in countries that represent more than two-thirds of the population of developing countries. Thus, TIPS opens a window to a very large market.

Firms wishing to have their requirements registered in its database and featured in the bulletins can get in touch with the nearest TIPS office or TIPS, via Panisperna 203, Rome 00184, Italy, phone 482 6967, fax 482 8838.

PARTING SHOT



Soft Technology - a sunrise industry...

Eleven and a half years ago, in a cluttered office in Collingwood, Melbourne, a birth took place. The new arrival was a bouncing, black and white, eighteen page newsletter called Soft Technology.

We produced 100 copies of the first issue, had them printed at Walker Press, (the local community based printer) and then stapled the loose sheets together by hand.

Spare copies were sold in the Friends of the Earth bookshop. And you know what.....it was a roaring success. We sold out and had to print another 100 despite the rather high cover price of eighty five cents.

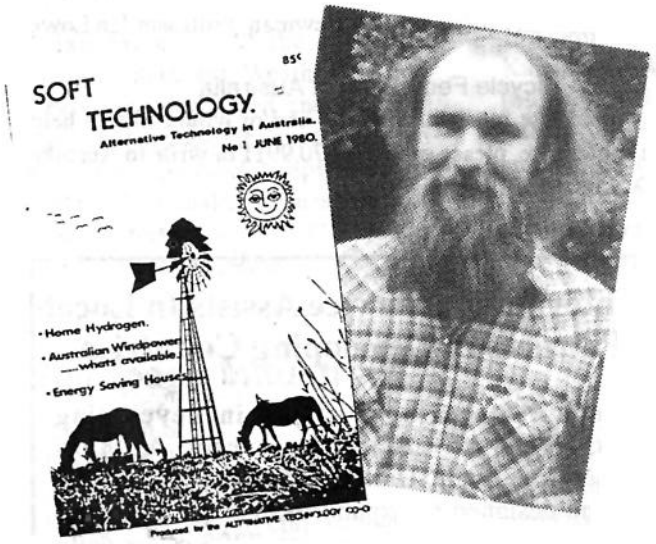
When we first started Soft Technology we used to dream of the day when we would sell 1,000 copies. Dream of the vast riches that such a sales volume would bring and how it would solve all our financial problems.

Well things have changed. At last count Soft Technology's subscription base was 1,311 and growing. But we still don't bring in enough money to not have ongoing financial problems. However that could be about to change. With the May issue we will be distributed nationally throughout Australia, printing around 13,000 copies. What's more surprise, surprise, we are now also being distributed in the United States. We sent off some copies of Issue 38 to a Californian-based distributor who believes we have some promise.

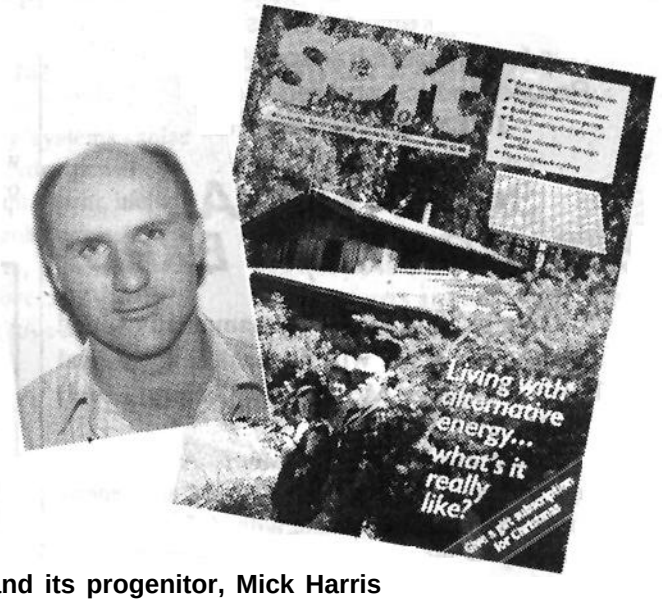
The big risk we now face is that our foray into national distribution may not go as well as we hope. When Issue 40 hits the newsagents in May we will be working hard to let the masses know about our arrival. However we will need all the help we can get. You, our existing readers, can help by letting your friends and contacts know that "there is this great magazine" in the newsagents. This move could make or break us so your support would be appreciated.

Mick Harris

From this...



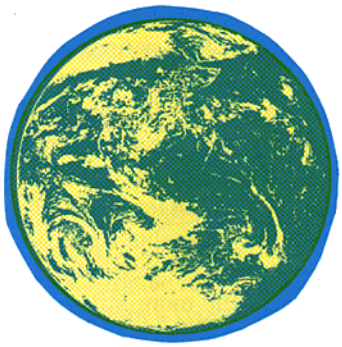
To this!



Changing times: 'Soft Tech' and its progenitor, Mick Harris

Soft Technology is the Australian magazine for environmentally friendly energy and technology.

We will keep you informed about the latest developments with renewable energy, energy conservation and appropriate technology. You will also get the practical, nitty gritty details on how you can harness renewable energy sources, build with natural materials, and create technology which works in harmony with the environment.



We cover the vital policy issues which allow us to maintain a society where our needs are satisfied without sacrificing our planet.

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