



chain reaction

magazine of
friends of the earth



INSIDE

URANIUM NEWS
CANBERRA BIKE RIDE
WHOLE ENERGY WORKSHOP

vol. 2, no. 2

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The future course of the anti uranium-mining and export campaign will be determined to a high degree by what the Ranger Uranium Environmental Enquiry recommends in its interim report due out at the end of August, and by the reaction of the Government, mining companies, trade unions and environmental groups to these recommendations. We can only hope Mr Justice Fox and the other Commissioners adopt a wise, courageous and far-sighted attitude, and come out unequivocally against the mining and export of Australian uranium.

With all the pre-planning the Government has been doing on exploiting our uranium resources, there is little evidence that its attitude to the enquiry has changed from the time last year when the (then) Leader of the National Country Party, Mr Anthony, said in a press statement (October 29): "The delay in the program . . . is adding enormously to the cost of the project, which is escalating at a rate of nearly \$3 million per month. Even now there will be continuing delays and uncertainty whilst the environmental enquiry lasts *and more and more people get into the act* . . . On top of this the project is also threatened with another enquiry into Aboriginal land rights" (our emphasis) The order of values is quite clear: money before people and their environment.

Underlying the nuclear debate as a whole there is the more fundamental question concerning the desirability or otherwise of continued economic growth with its associated industrial expansion and rising levels of energy consumption. We argue that this growth ethic is one of the root causes of the environmental crisis, that it does not lead to increased well-being and fulfilment for the majority of people, but rather to the increased oppression and alienation of the many, all for the sake of the growing bad consciences of the few who get richer. Furthermore, increasing levels of production and energy

use cannot continue much longer anyway because of diminishing supplies of basic resources, and because there is a limit to the rate at which we can release energy into the atmosphere without causing serious climatic disruption.

Why though has industrial expansion become so compulsive? The fact is that industrialisation has become an ideology — in the sense of an all-embracing set of values and ideas admitting no reasonable alternative. From within this ideology it is almost impossible to see out.

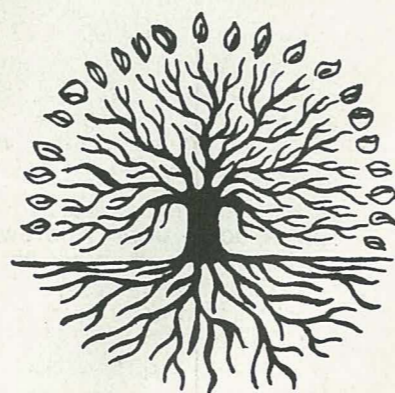
As the anthropologist E. E. Pritchard has said of a similarly all-embracing ideology, the witchcraft beliefs of the Azande tribe: "In this web of belief every strand depends upon every other strand, and a Zande cannot get out of its meshes because it is the only world he knows. The web is not an external structure in which he is enclosed. It is the texture of his thought and he cannot think that his thought is wrong".

We believe that the way out of the ideology of industrialisation is to show that there are viable and much more desirable alternatives for an equitable and ecologically-balanced society. Showing how to satisfy our energy needs using small-scale alternative-technology devices and the renewable energy *income* from the sun, wind, flowing water, biofuels etc., and demonstrating alternative means of production which do not by nature require hierarchical organisation of people, are important parts of this process.

In *Chain Reaction* we hope to help in some small way by devoting increasing space to alternative technology (AT). Our emphasis will be on do-it-yourself construction of AT devices, and in our *Community Technology (COMTEC)* section we hope to encourage participation from readers both in ideas for AT hardware, and in formulating the aims and characteristics of the challenging alternative way that lies ahead.

Winter

*The cold wind brings
Fallen leaves enough
To make a fire*



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Chain Reaction is the quarterly magazine of Friends of the Earth Australia, publishing feature articles and news on national and international environmental issues, and searching for the way towards a sustainable, convivial society which lives in harmony with its environment.

The *Chain Reaction* Collective for this issue: Graham Barron, Woody, John Andrews and Mick Waters, with a lot of help in many different ways from our friends, Neil Barrett, Julia, Jill, John Price, Alan Roberts, Paul Marshall, David Allworth, Herb Fenn, Alistair, Alison, Ray Linnell, Emma, Alan and Bill. Thanks also to Currency Productions for bromide

work, and to Waverley Offset for typesetting and printing.

Original contributions to *Chain Reaction* — articles, news snippets, leaks, photos, drawings, cartoons etc. — are very welcome, but we can only guarantee to return them if they are accompanied by a stamped addressed envelope.

Address all correspondence to *Chain Reaction*, Friends of the Earth, 51 Nicholson St., Carlton, Vic. 3053. Tel. (03) 347 6630.

If you'd like to help us by distributing/selling *Chain Reaction* and earn a bit of money for yourself at the same time, contact your local FOE group right away (see page 40 for addresses).



EARTH NEWS



The California Initiative

On June 8th the vote on the California Initiative on nuclear power was convincingly lost by a two to one majority. If passed, the Initiative would have forced the imposition of sweeping new safeguards on nuclear power plants in California, as well as ensuring that the Federal Government would pay out realistic compensation to any city affected by radiation from an accident in a nuclear power plant.

The imposition of such safety measures would have forced the gradual shutdown of the state's nuclear reactors.

Faced with the prospect of a non-nuclear future in California, the nuclear corporations spent an enormous sum in their efforts to defeat the proposal. The companies, including such well-known nuclear advocates as Southern California Edison, Pacific Gas and Electric, Bechtel, Westinghouse, San Diego Gas and Electric, General Electric, General Atomic, and Standard Oil of California, channelled some US\$2.5 million into fighting the proposals.

The companies won't stop here though, the Californian campaign being only part of a nationwide programme to defeat similar anti-nuclear initiatives in States right across the country. This is likely to

involve the expenditure of another US\$3 to \$4 million on 'PR'.

Sources: *Herald*, 9 June 1976;
Not Man Apart, Mid-April 1976;
Not Man Apart, May 1976.



Another Anti-nuke Resignation

Late last year, Jim Phillips, an associate editor of the American Industry Forum's magazine *Nuclear Industry*, resigned his post in protest against the campaign of misinformation of the public being waged by the pro-nuclear lobby.

Soon after, he dropped into FOE's San Francisco office and here are some of his comments:

"They had no desire to tell the nuclear industry what is really going on. . . I think these guys are living in never-never land. It's like the Vietnam war. You keep hearing these guys saying there's light at the end of the tunnel. You hear them say this week in and week out and slapping each other on the back and never admitting there's any problem".

"They say they've solved all the problems. An example; I put in a story about waste management that claimed that the solution to the problem of waste management is 'close at hand'. I'm not sure if it's

close at hand, but I was describing the AIF position. Carle Walske edited this, knocked out 'close' so that it read that the solutions 'are at hand'. This is nonsense".

Greenpeace Action

In March of this year members of the Canadian Greenpeace Foundation attempted to save harp seal pups from the murderous bludgeons of Norwegian and Canadian sealers. The seal pups are killed and skinned in order to supply the fickle fashion world with fluffy, white furs.

The Northern spring saw the Greenpeace volunteers using their own bodies as shields in order to prevent some seal pups from becoming bloodied, lifeless carcasses littering the ice floes of Labrador and Newfoundland.



An earlier plan to spray the seal pups' coats with green, organic dye, thus destroying their commercial value, was thwarted by the Canadian Government. Special laws were introduced as amendments to the so-called Seal Protection Act which, among other things, made it illegal to use such dyes on the seals, despite the fact that the Canadian Ministry of Fisheries has used the dyes for years in their research programmes.

The protesters were also hindered

by other laws such as the prohibition on flying less than 2000 feet above, or landing less than one half a mile from, any seal. This law made the job of confronting the sealers in action more difficult as the only realistic means of pursuing the sealers was by helicopter.

During the first week in June the second Greenpeace venture disembarked from Vancouver to save whales. They plan to locate and "do battle" with the Russian and Japanese whaling fleets on the high seas.

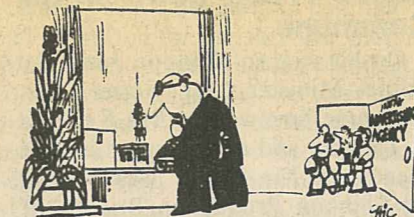
After locating the Russian fleet, the Greenpeace crew will harass them for about a week until they are relieved by another protest boat from California. They will then set off after the Japanese fleet. It is planned that the tactics employed will be similar to those of the last voyage; that is, they will place themselves (in small inflatable craft) between the exploding harpoons and the whales. This tactic was successful on the previous occasion, although the crew experienced a narrow escape from a fired harpoon. (See *Chain Reaction*, Sept. 1975.)

Once the Japanese have been located it will be difficult for them to escape from the protest ship which will be superior in both speed and manoeuvrability.

The whalers have been given orders to avoid a confrontation with Greenpeace and not to fire if interfered with. If they conform with those orders, then it will be very difficult for them to have a successful hunt for the two months that the conservationists intend to hound them.

Source: *Greenpeace Chronicles*, Spring/Summer 1976.

Smog over Melbourne



"CONSUME, damn you, consume!"

Air Pollution

In the US, if you're poor, working class, and black, chances are you will be exposed to levels of air pollution that have been linked with chronic respiratory diseases.

A study of major US urban centres has shown that there is a close parallel between poverty, low-occupational status, segregation and air pollution.

While poor black people are subject to the worst effects of air pollution, they are not primarily responsible for creating it. People with household incomes over \$16 000 a year consume almost twice as much electricity and natural gas as families with incomes under \$7000, and the well-to-do use almost twice as much gasoline.

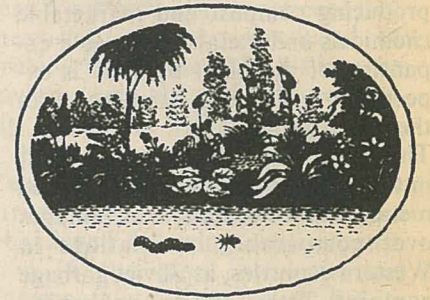
The report also states that, on the average, whites use 19% more electricity and natural gas, and 113% more gasoline than blacks. In fact, poor and minority groups are largely victims of middle- and upper-class pollution because they usually live closest to the sources of the pollution - power plants and industrial installations - and in central cities where traffic density is heaviest.

Source: *Not Man Apart*, May 1976.

Oil Exploration

No one should be surprised that in Houston, Texas, the "Energy Capital of the World", a company wants to drill for oil in the 1500-acre Memorial Park. No matter that the land was sold to the city more than 50 years ago on the condition that it would be used only as a public park.

The would-be drillers gained consent from Ima Hogg, daughter of the former Texas governor who owned the land, just a month before she died last summer. They have procured the permission of every person or group concerned except the City of Houston.



Houston Audubon Society President, Robert Deshayes, pointed out that the issue is not just the violation of a Memorial Park: "More important is the precedent it would set. It would be used as a stepping stone to open up other areas inside cities, across Texas and around the nation, for the same type of exploration."

Brownco, the company that wants the oil beneath Memorial Park, thought it could mollify opponents by pointing out that the two-acre drilling sites are in remote areas, and each site would be fenced and hidden.

Deshayes countered by saying, "The remote areas of the park are

the most valuable. They've had the least human impact. They're the most natural."

Four hundred acres of Memorial Park are considered virgin woods and it is home to many bird species, deer, a few foxes and coyotes, as well as numerous small creatures, including the Houston toad, an endangered species.

Source: *Audubon*, March 1976.

Recycling Reds

Leningrad, population 4.3 million, is the first major city to attempt recycling all of its garbage.

A plant in operation since 1972 handles 580 000 tons of garbage, producing compost and marketable chemicals and metals. A six-fold expansion of the plant by 1985 is expected to enable the handling of all the city's garbage.

The plant, which is paying for itself in the value of compost and recycled metals, has considerable advantages over comparable installations in Western countries, as Soviet garbage contains little or no packaging material. Plastic and other disposable packaging is unknown; almost all paper is recycled, and glass containers have large deposits and are repeatedly reused.

Source: *Environment*, June, 1976.

Garbage Power

The world's first sanitary landfill gas-conversion plant, operated on the Palos Verdes Peninsula by NRG Fuel Company, is now providing enough gas to supply 3500 Californian homes.

One million cubic feet of methane generated by decomposing organic material is delivered daily to the Southern Californian Gas Company pipelines. As the potential of the Palos Verdes landfill is made more efficient, production should increase to six million cubic feet per day.

By means of a sophisticated system, waste gases are drawn off from deep wells, filtered, purified and deodorised. The gas wells are neatly tucked into the rough areas of a golf course located on the landfill. The company is doing similar research and testing in Arizona, Maryland, Illinois and Kansas.

Source: *Audubon*, March 1976.

Squire Fraser down on the Commune

On his visit to China in June, the Prime Minister, Mr Fraser, met commune farmworker Ma Ken Wa at Taiyuan and struck up an instant friendship. Mr Fraser was visiting the Shihkou Production Brigade of Liuchiapao People's commune.

Into the house went Mr and Mrs Fraser and Foreign Minister Andrew Peacock where they and Ma sat on a large bed while pictures were taken.

"This bed is over a fireplace so that it is always warm," Ma explained.

Mrs Fraser quipped: "This is better than an electric blanket."

The commune has a population of 1236. It cultivates about 300 hectares, has 2200 pigs, 150 000 trees, 60 draught animals, 2000 chickens and 3000 fish.

There is a truck, four tractors, three public stations, generated electricity and the people have a common bank account of \$200 000.

They also have substantial food reserves.

Mr Fraser was fascinated to hear production figures. Before the Revolution, the area produced 1100 kg of wheat per hectare; and production is now nearly six times that figure.

Source: *The Age*, 25 June 1976.

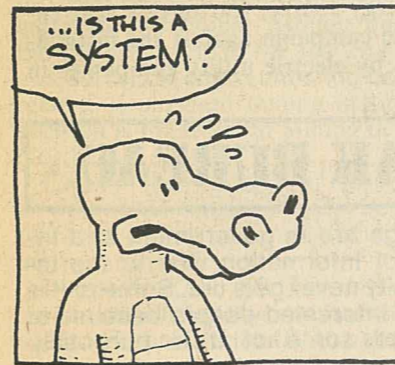


Third World demands its Share

The overdeveloped nations of the western world are apparently feeling threatened by increasing demands by third-world countries for more equitable resource allocation. This was one of the subjects discussed by leaders of the United States, Canada, Britain, France, Germany, Japan and Italy in an economic summit conference held in Puerto Rico in June.

The leaders agreed to help major countries when they fall on hard times. "Now the western world has the chance of continued growth in its grasp, we do not intend to lose this opportunity", read the summit pledge.

The Americans were shocked by the determination with which third-world nations pressed their own radical demands for commodity stabilisation schemes at the Nairobi U.N. Conference on Trade and Development in May. Secretary of State Henry Kissinger is said to have left Nairobi convinced of the urgent need for closer western cooperation to resist what he calls "the trade unionism of the poor".



The underdeveloped nations want, among other things, a common fund financed mainly by rich industrial nations to control the prices of commodities like iron ore, copper, tin, rubber, tea and jute. Most of the western countries, America in particular, fear that this would create cartels like OPEC (Organisation of Petroleum Exporting Countries) which would raise raw-material prices, adding to the inflationary problems of the west, and leading to a transfer of capital from the rich to the poor countries.

At present, American-based multinational companies, as well as many other companies, are shifting their investment dollars back to the United States. Only a handful of countries are receiving increased American investment — South Korea, South Africa and Brazil.

Sources: *Age*, *Australian*, 29 June 1976
Australian, 30 June 1976

Pakistan's Rush to Destruction

Pakistan plans to have 24 nuclear power plants operational by the end of the century. At present they have a 137-MW nuclear power plant at

Karachi, which has been in commercial operation for the past five years. Work on a second nuclear plant, at Chashma Barrage, on the river Indus, 150 miles south of Islamabad, starts in a few months time. The cost of the project is estimated to be \$US527 million. One nuclear plant per year, on average, is planned after the early 1980's.

France is playing a prominent role in this nuclear development, having signed a bilateral agreement with Pakistan that includes the offer of a nuclear reprocessing plant costing \$US150 million.

Source: *Nature*, 24 June 1976.

Polychlorinated Biphenyls

The US Environmental Protection Agency's Office of Toxic Substances has recently completed a "Review of PCB Levels in the Environment".

This report states that "the sheer mass of data supports the conclusion that there is widespread contamination of the environment by PCB's" and "effects are consistent across all media, generally showing greater

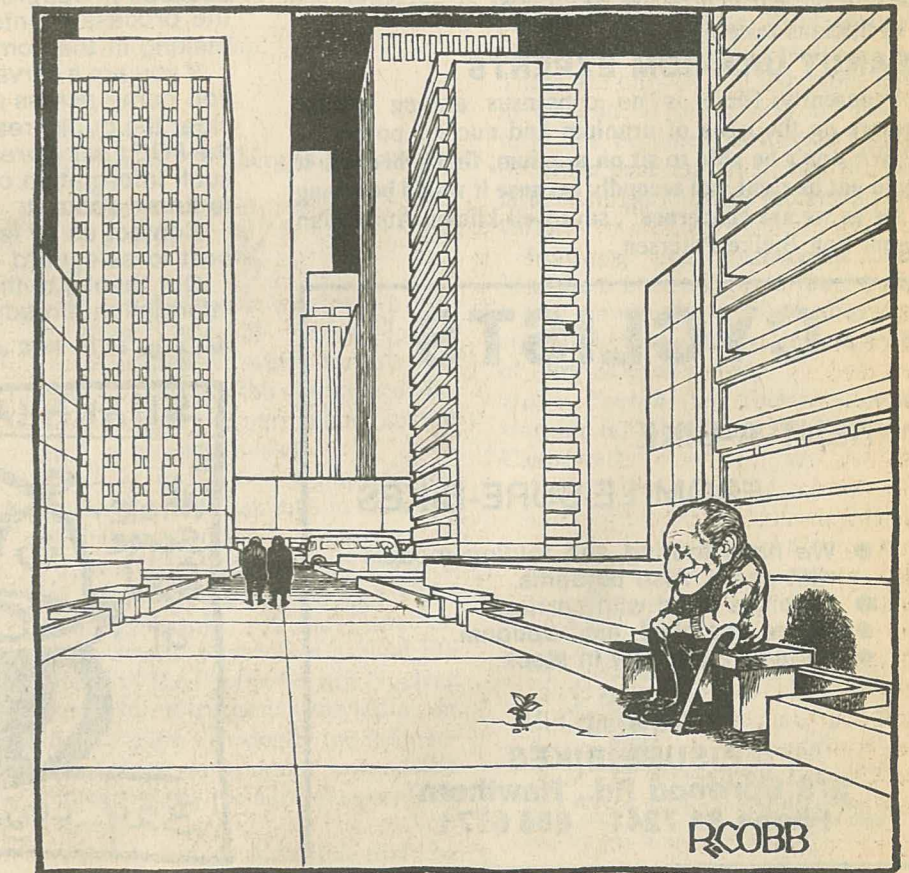
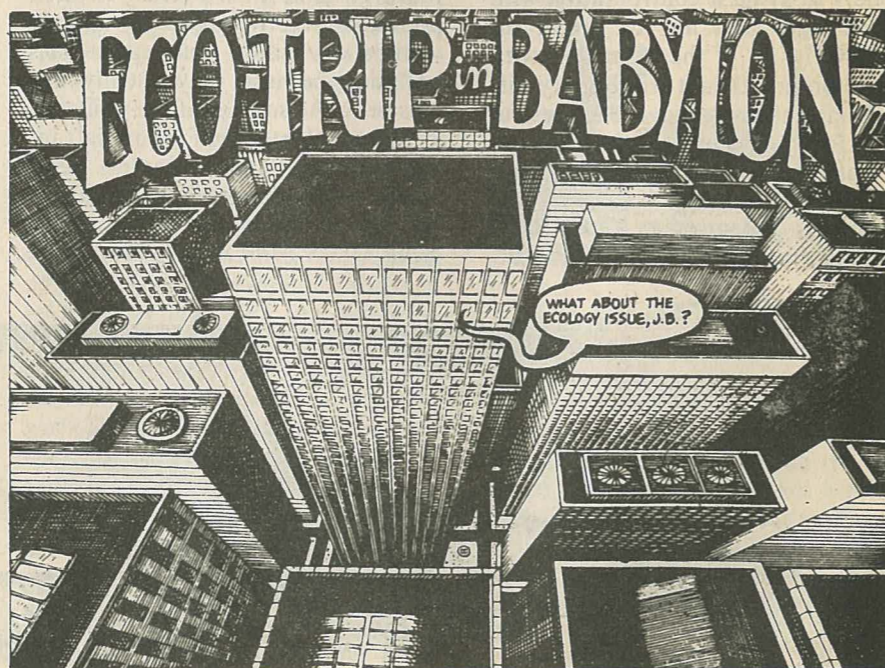
concentrations of PCB's in highly developed areas and in areas of industrial activity."

In Canada, the nonelectrical use of PCB's is to be banned. This decision was announced by the Canadian Environment Minister, Jean Marchand, following the release of a task-force report compiled jointly by Environment Canada and Canada's Department of Health and Welfare.

The report recommends that initial regulations restrict the use of PCB's in new goods to dielectric insulating oils, and that research be instituted to discover less hazardous substances to be used as substitutes. Jean Marchand also announced that measures will be introduced to prohibit the release of PCB's into the environment, through effluent, by air, or in solid waste disposal.

News just received from FOE New Zealand states that plans for the construction of a PCB plant have been abandoned following active opposition to the plant by concerned citizens. (Note: PVC is a PCB.)

Sources: *Air / Water Pollution Report*, Vol.14, Nos. 21 and 25.



LATEST...

Australian Majority Against Uranium Mining

The results of a public opinion poll published in the Age on 29 July 1976 suggested strongly that the majority of Australians are now against the mining and export of our uranium reserves.

57 per cent of people interviewed agreed with the statement that "We should be more concerned about the possible harmful effects of nuclear development on future generations than about selling uranium".

Only 37 per cent believed that "We would be stupid not to earn income from mining and exporting this product".

The Age Poll was conducted by interviewing 2000 people of voting age in every Federal electorate except the Northern Territory.

The results of the poll also showed that the credibility of scientific experts among the public has plummeted. A meagre 24 per cent of interviewees believed that "Scientists can be relied on to solve the problems in developing nuclear power", while 72 per cent held that "We should make sure we have the solution to all possible problems before we develop nuclear power."

A further heartening result for those opposing nuclear power was that 76 per cent of those interviewed believed that "Even if it costs a lot more, Australia should concentrate on learning to use new forms of energy."

Politicians take note!

PEANUT URANIUM EXPERTS

Apparently there is no consensus among peanut farmers on the issue of uranium and nuclear power.

"We won't be able to sit on uranium, firstly because it would not be right and secondly because it would be wrong as far as we are concerned", says well-known Australian peanut Joh Bjelke-Petersen.

CYCLISTS

RENT-A-BIKE

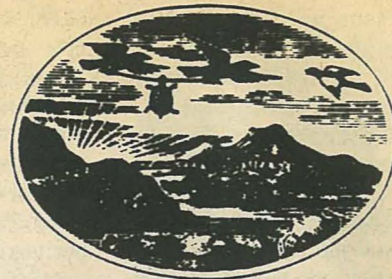
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In the United States, Democratic Presidential candidate Jimmy Carter, a peanut farmer and ex-nuclear physicist, has made it known that he is opposed to nuclear power as an energy source. Carter this year endorsed the Oregon State campaign against the installation of nuclear reactors by electric utility companies in Oregon.

FOE LEAK BUREAU

Given the way things are in government and industry, a great deal of information vital to the interests of the community never gets out. Some of it is simply not noticed by interested people because of limited circulation and some of it is purposely withheld.

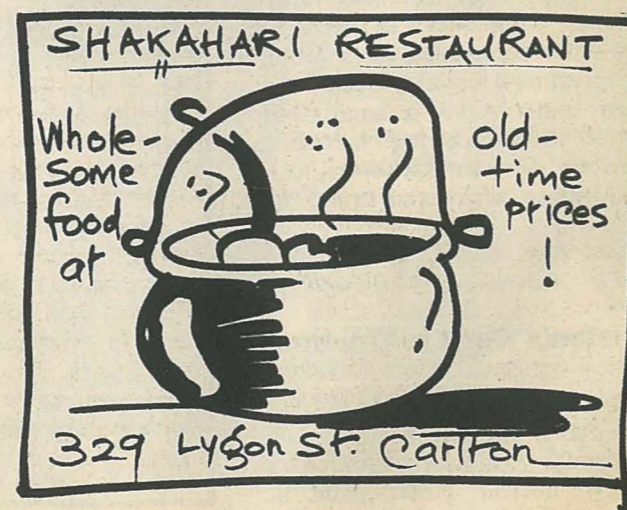
FOE believes that those people who anonymously leak relevant information perform a public service of the first rank. Without their action, bureaucratic secretiveness and corporate self-interest too often succeed in suppressing information, and frustrating the process of informed and democratic decision-making in the community.

If you are a servant of government or industry, and you come across certain information that you consider the public really ought to know about, perhaps the FOE Leak Bureau can be of some help in passing such information on to the people who really ought to know about it.

Contact us by letter or phone and we will do our best to safeguard our source.

Our thanks to the many people who have sent us information already. Keep it coming.

(see page 40 for FOE addresses and phone numbers.)



OPEN LETTER

We support the action taken by the Australian Railways Union over the uranium mining issue.

The policy of the Australian Labor Party is to oppose the use of uranium for other than peaceful purposes.

It is the assessment of peaceful purposes which is still at issue. For this reason, the Commission of Inquiry into Uranium Mining under the Chairmanship of Mr Justice Fox, was appointed to examine the issues related to uranium mining before a decision is made about mining in the Northern Territory.

Clearly the findings of this environmental inquiry will be of relevance to any other uranium mining in Australia.

In our view, the ARU is perfectly correct in insisting that ore treatment at Mary Kathleen should be suspended pending the presentation and consideration of the Fox Inquiry Report.

Trade unionists notwithstanding their financial vulnerability have shown courage, intelligence and concern for the Australian people.

It is contrary to Labor Party Policy and an insult to all Australians to suggest that workers should not be involved with environmental questions which concern their lives and that of their children if not ultimately of human survival as we know it.

We affirm the right of all trade unions and their members to be heard on environmental matters and applaud the continuing activity by working people in Australia in their attempt to safeguard and improve the living standards and environment of Australians.

Clyde Cameron
Tony Whitlam
A. James
H. Jenkins
Les Johnson
Peter Walsh
M. Cass
Peter Morris
Tom Uren
Keith Johnson
Barry Cohen
Laurie Wallis
Jim Cairns
Horrie Garrick

Doug McClelland
Gordon Bryant
A. Gietzelt
Gordon McIntosh
Jean Meltzer
T. Mulvihill
John Wheeldon
Susan Ryan
Cyril Primmer
Geoff McLaren
Ruth Coleman
Jim Keefe
Don Cameron
Don Grimes

LETTERS

Ken Sibraa
Mal Colson
Bill Brown
John Armitage
Ralph Willis
John Button

Ken Fry
Martin Nicholls
G. Georges
J. L. McMahon
Justin O'Byrne
E. Robertson



Thank you for the current issue of **Chain Reaction** and other literature which you have sent to me and which I will study with great interest.

Do hope that my zany letters do not upset you and that the viewpoints expressed are not in conflict with your own. In my view, Lapp is a very aggressive man and is trying to bulldoze Amory Lovins, don't let him get away with it.

You are young and have the strength for a fight; my strength is all used up.

There seems to be considerable promise in ocean wave motion as a source of soft energy, let's keep our fingers crossed.

Keep on with the good work.

Yours in friendship,

Ted Andrew

62 Jukes St.,

Warrnambool.

(Author of **The Energy Crisis and the Wind**)



In 1975 I was awarded a Sir Winston Churchill Fellowship to travel around the world for the purpose of studying the situation of indigenous people, particularly in the area of housing/hostels.

Whilst in Canada I pursued the situation of the Eskimos in all areas of their existence.

I would like to recall my concern on information given me by a high-ranking member of the Canadian Government. It revolves around the effects of the Pacific French Nuclear Tests in Micronesia/Polynesia on the Eskimos. Evidently the radioactive fallout congregates around the North Pole by the natural spin of the Earth.

My informant indicated that the

Canadian Government was very gravely concerned about the effects of this phenomenon on the inhabitants, the Eskimos.

The fallout escapes to the lower atmosphere and settles on the moss which is dependent on the atmosphere for its food supply. The caribou feed on the moss for their food supply. The Eskimos hunt, kill and eat the caribou raw, and consequently become contaminated.

Secret medical tests have been conducted on those Eskimos who venture south or who become ill. Results of such examinations are never revealed to the unsuspecting Eskimo. However, such examinations have been going on since 1966. Results are being kept strictly confidential despite some attempts by the Eskimos to get the Government to come clean.

My concern is for the possible genocide of the whole of the Eskimo race who have come under direct influence of this destructive man-made phenomenon because they occupy the North-Pole area exclusively. There are only 14 000 Eskimos left in Canada. If the effects are long-term and become manifest in terms of future generations, it may be too late when the damage becomes obvious.

Eskimos, like Australoids and Maoris, are members of the fourth world movement and I monitor my concern because this matter could be of international gravity.

Harry Penrith (an Aboriginal now working for Aboriginal Hostels Ltd., Canberra.)



It's perfect, really - it kills every living thing within 200 miles, without otherwise altering the ecological balance.....

THE LONG RIDE TO CANBERRA

by Mick Waters

On a cold Saturday morning in May, the first day of the school/uni holidays, about 350 bicycle riders gathered together in the City Square in Melbourne, ready for the start of this year's Long Ride to Canberra in support of a ban on the mining and export of Australian uranium.

We set out around midday through the usual brown haze generated by the dense Saturday-morning traffic — a long column of bicycles stretching from the Square right up to the Ansett-terminal end of Swanston Street.

About a hundred cyclists returned home after accompanying us out of the city, while the rest, including riders from Adelaide and Hobart as well as Melbourne, continued up the Hume Highway towards Kilmore, camp for the first night.

Most people came well prepared this year — they rode ten-speed geared bicycles and were very fit. As our numbers grew along the way, we were surprised at how everyone handled the longer, more arduous sections. We awoke nearly every day to a bright blue sky and brilliant sunshine and this made cross-country cycling very pleasant.

At night, people dosed down in sleeping bags on the floor of the church hall or football club house that we were staying in, or slept outside in the privacy of their own tent. For many it was their first experience of living and working together in such a large group.

Cooking was admirably handled by a collective of people who threw themselves into the mammoth task of producing satisfying nourishing meals based mainly on high-energy vegetarian foods.

Eight support vehicles accompanied us, carrying the luggage, cooking gear, food, bicycle spares and tired or sick people. A bus went ahead each day to prepare lunch and then continue on to the evening stopover to get dinner ready for us.

As luck would have it, there were no serious accidents or illness, apart from a few cases of gravel rash, and although many people were dogged by flu, everyone battled on regardless.

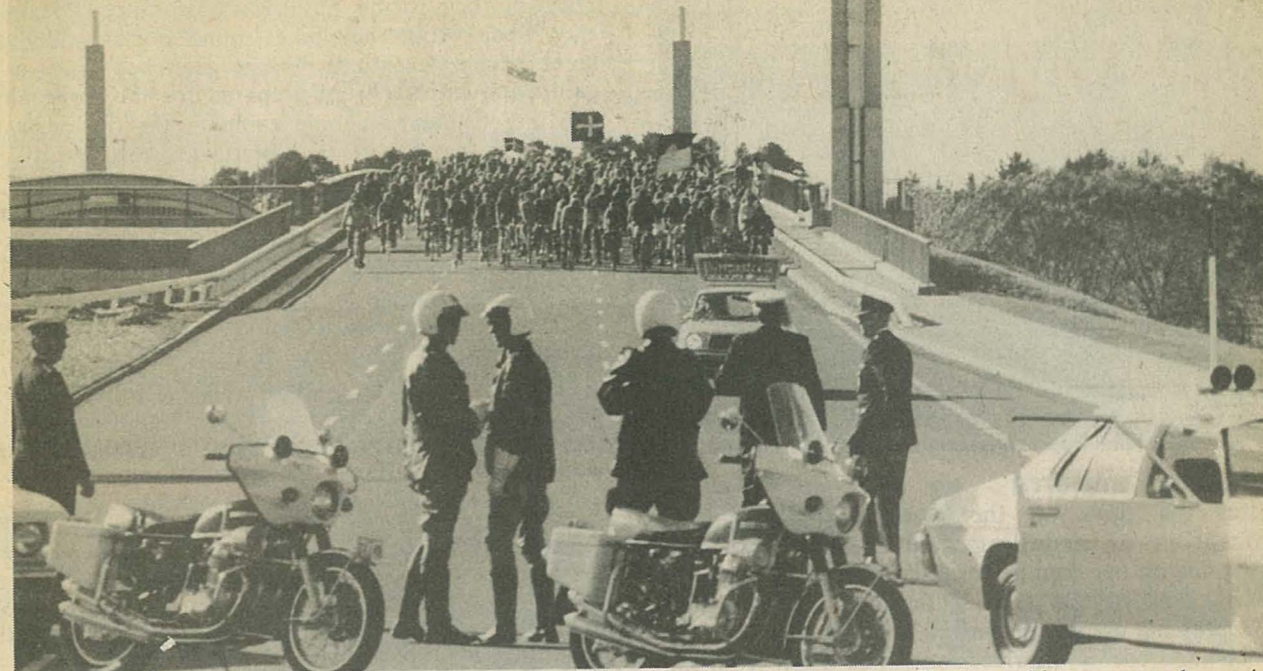
Cars and trucks rushed past us, but we were relying on ourselves to get there, revelling in the freedom of the fresh country air and warm sunshine. With no steel and glass to surround us, all day to get there, and often a kind wind blowing from behind us, the land gradually spread out before us. The hills and mountains, the grass and trees, the rivers and creeks all unfolded as we struggled up hills, raced down again with the wind roaring in our ears, cruised along in conversation with other riders, or pedalled powerfully ahead whenever the mood took us.

We all enjoyed the many detours along quiet country back roads. Once, between Wangaratta and Albury, we climbed 1500 feet, a tiring experience for many, till we got to Beechworth and then we were rewarded with a

The bike riders' camp on the lawns of Parliament House.



Riders come over Commonwealth Avenue Bridge before turning left towards Parliament House.



sweeping downhill run from the mountains to Yackandandah in the valley. Scenic indeed!

A number of public meetings were held at night in the towns we passed through, and we saw films and discussed the issue of uranium mining both among ourselves and with the many local people who came along. We decided that the best way to relate to the people of the towns we entered en masse was to be friendly and smile and wave. This was in contrast to the aggressive, chanting demonstrations that many of us had been used to, and our colourful street theatre was enjoyed by many.

When we handed out information leaflets to people in the streets, a great deal of sympathy for our cause was evident, people saying things like, "Hope you get what you're going for", and "Good on yer", etc.

Meanwhile, in Sydney . . .

. . . another 70 bicycle riders had set out towards Canberra. They came from Sydney, Brisbane and Townsville, and although the numbers were smaller than expected, any disappointment on that score was quickly forgotten as the spirit of the group was so wonderful. We made a closely-knit happy bunch that moved as a united protest, and not just as a random collection of cyclists.

The ride had many highlights to make it a worthwhile and memorable experience. On the way out of Sydney we were hassled by the police who tried to force us into a single file, and they stopped us several times. At Lucas Heights, site of Australia's only nuclear reactors, one of our younger cyclists was involved in an incident with a motorist employee of the AAEC (Australian Atomic Energy Commission). Our witnesses claim the motorist accelerated onto the back wheel of the bike in frustration at being slowed down by a mere cyclist. According to NSW police, the Commonwealth police who witnessed

the incident gave conflicting evidence as to the registration number of the car, but we got his number anyway.

Later that morning everybody descended on the Exhibition Room where the attractive toys of the Atomic Energy Commission display the "clean, safe and efficient" lies of the Commission's hard-sell propaganda. Along with a busload of tourists, everyone cruised from one push-button "Instant deep harbour" machine to another new delight. THEN, Tara tara, the public relations man appeared with a noose around his neck, dragged by Cappo (read Capitalist) accompanied by a chorus of hisses and boos, shrieks and screams, all fall down Dead!! (twit) Street theatre is at its best when everyone is a player — can't work out why the old ladies from the bus didn't join us. Effective and lots of fun and the boys in blue had a ball carrying all those 'dead' bodies out the door.

On to Wollongong where we cycled out to meet the Port Kembla wharfies — the best group of unionists in the land. We exchanged speakers, then gave another street-theatre display for them. Wollongong gave us exceptionally good media coverage.

Riding out of Wollongong, headed for Moss Vale, the steep grade (as much as 1 in 7 at times) and strong headwinds and rain made the going tough.

In Goulburn and Yass we also received really good media coverage by the local papers, and all along the way the riders worked really hard at getting the message across to the local people of the towns we passed through. At Yass we were generously given the Old Soldiers' Memorial hall by the Mayor, and we needed it when the Melbourne riders descended on us the next day. Luckily the hall was big enough to accommodate us all.



The long column approaches the outskirts of Canberra.

And on to Canberra

After ten days on the road, experiencing the exhilaration of pedalling across the Australian countryside on our own power, hundreds of us rode into Canberra towards our goal — the long white building that represents democracy in our country.

Four-hundred bicycle riders streamed down from the hills in a mile-long torrent of colour and shining machinery. Flags flying, bells and hooters sounding, people chanting "Keep uranium in the ground!", the column converged around Mining Industry House.

Leaping from our machines, we swarmed through the glass doors and across the foyer, leaving the watching office workers open-mouthed in amazement as we shook the sacred bastion of capitalist enterprise in a pandemonium of raised invocations against the crime of uranium mining.

Charging up the staircase, we quickly flooded the three storey building with people, and with our cries reverberating we left just as quickly, our calling-cards (green stickers with a message) plastered over anything within reach.

Pouring back onto the road, the procession continued in the direction of Parliament House, through the red lights at intersections, accompanied by police motorcyclists attempting to act like sheepdogs in controlling a determined unsheep-like mob.

Above our leading tandem bicycle flew the Land Rights flag, its black, red, and gold colours flashing against the bright blue sky. And the sun beamed down.

Rolling across the Commonwealth Avenue bridge, everyone spread out over the whole three lanes, and we cruised down the other side towards a police blockade of the road leading to Parliament House. The police had obviously been listening in to our meeting at Yass the night before. They forced us to take to the lawns and we sped over the grassy surface towards the steps, where we were met by a contingent of men in blue.

A group of blacks from the Aboriginal Embassy in Canberra were there to greet us, somewhat astonished at the spectacle, and the tents we carried soon mushroomed

on the lawns around them. Riders quickly formed human chains to move the gear from the support vehicles into the camp. Senior police questioned the ride organisers about our occupation, but it was obvious we had come to stay. People rode their bikes round and around Parliament House. Eventually things quietened down as the camp and kitchen were prepared for the night ahead.

Many Canberra people came to the demonstration held later that afternoon. Speeches were given by Jack Munday of "Green-Ban" fame, Keith Smith of the National Aboriginal Congress (NAC), Jim Keefe, Federal Labour MP from Queensland, and John Price of FOE (formerly of FOE England). At the time of the meeting, a delegation met the Deputy Leader and Minister for National Resources, Doug Anthony, with negative results. Doug just smiled a lot as usual.

It was getting dark when the street theatre opened up; horrifically masked players, acting the part of mutants, writhing and groaning, in mock premonition of the radiation poisoning of Earth that uranium mining threatens.



Everyone joined in and spontaneously writhed and crawled across the road towards Parliament House, the "blue men" uncomfortably attempting to block the tide of bodies clawing and clutching at their feet. Glowing in the background were our model reactors, burning and exploding in giant mushroom-shaped smoke clouds.

When the demo was over, we lined up and ate dinner, and then enjoyed a concert until the early hours. During the evening some politicians came over to visit our camp. Some riders ventured into the citadel opposite, only to fall asleep in the gallery to the droning of the peoples' representatives. Still, it was warm and the showers and toilets were welcome news. Outside the night was freezing. After all, it was Canberra.

Next day many people visited the House and their local elected Members to do some lobbying, while a brave group lectured the assembled men and women in Parliament on the existence of future generations and what about how long? They were promptly ejected.

Unfortunately, due to problems because of return journeys, only about fifty or sixty riders visited the Japanese Embassy that afternoon. Regrettably the Ambassador was in W.A. talking about uranium mining and waste disposal with Premier Court, so we simply took pictures to show our friends in Japan.



2ND NATIONAL 'RIDE AGAINST URANIUM'

Then we rode around to Mugga Way, where black friends from the Aboriginal Embassy showed us around their recently donated premises. Keith Saunders of the NAC welcomed closer relations with groups like FOE in the coming struggle for Land Rights and he said that blacks were dead against uranium mining taking place. He proposed the idea of a "reserve for whites", somewhere near Arnhem Land, where white people seeking to establish a way of life in harmony with nature could assist the local black people — especially in the field of alternative technology — who are fighting to keep their land and their way of life.

Most Melbourne riders left in the afternoon for the

long train journey home, while Sydney, Adelaide and the remaining Melbourne riders stayed on for another night.

The ride was a great success in terms of publicity generated, as we scored front-page news and TV coverage all around Australia, but next year we could well stay longer in Canberra to lobby more concertedly, unless of course we were actually able to stop uranium mining before then!

And during the ride everyone learnt many things, about themselves and living with other people, about uranium mining and nuclear power, and, of course, about bicycle riding.

A solar cooker boiling water.



ENVIRONMENT BIKE RIDE

TOWARDS ALTERNATIVE LIFESTYLES 'FESTIVAL'

FOE is organising a summer bike ride from Melbourne and Sydney, leaving at the end of November to reach Eden on the 3rd of December. At Eden we will spend two days resting and touring the local woodchipping areas to see how Australian forests are being rapidly eaten away to feed Japanese papermills. Then we will ride up the mountains to Cooma and on to Canberra for the alternative lifestyles conference which Jim Cairns, among others, is planning for December 10th to 14th. By adopting an alternative mode of transport to the conference, which people from all around Australia will be attending, FOE will be making an active contribution towards the development of alternative lifestyles in Australia. We also hope to take some soft technology with us, in the form of solar panels, windmills, bike trailers, etc, to help make the conference a festival. Contact FOE in Melbourne or Sydney for more details.

HIROSHIMA

The world celebrated the 31st anniversary of the atomic bombing of Hiroshima and Nagasaki in August this year. Rallies were held in Australia and all over the world. Millions demonstrated in Japan. But have we learnt the lesson of Hiroshima?

As the nuclear power industry continues to grow uncontrollably, as more and more countries build nuclear reactors and hence gain the capacity for making nuclear weapons, it seems that we may not have.

Earlier this year four former top US Government officials who participated in the early development of nuclear weapons gave an interview to the British TV programme *World in Action*, in which they spoke out forcibly on the dangers of nuclear proliferation.

One of the four was Dr G. Kistiakowsky, a former head of the Manhattan Project, the programme which resulted in the atomic

bombs dropped on Hiroshima and Nagasaki, designer of the implosion mechanism of the bombs, later special assistant to President Eisenhower, and special advisor to Presidents Kennedy and Johnson.

Here is an excerpt from what Dr Kistiakowsky said in the interview:

"What has happened is this. A trade in nuclear technology has gradually developed between the nations that have nuclear power and those that do not. The nuclear 'haves' sold and built some twenty-five nuclear reactors, and some thirty-five or more are under construction in the nuclear 'have not' countries. . . these reactors are also the only means for making plutonium — the prime nuclear explosive material.

"I am sure that you have recognised the common thread in the thinking of those here today: if no action is taken, the spread of nuclear technology will soon advance beyond the ability of human societies to control it. We four are not alone in this conviction. Other scientists, in the US and elsewhere, have been expressing similar views. But more important, many other people, with no special knowledge of nuclear technology, remember what the relatively small atom bombs did in Japan thirty years ago, and feel instinctively that it might happen again and cannot be allowed to.

"Unfortunately, our governments are beset by many problems which they see as more immediate. They are naturally also under pressure of their commercial interests. In their eagerness to see trade expand, governments are not willing to override their short-term interests to gain long-term nuclear peace for the world.

"The present slide of humanity into nuclear war can be stopped only by the voice of the people. And it can be stopped, for nuclear installations take many years to build, and there is still time to act. A broad public movement must tell the governments of the seller countries that present policies of foreign trade in nuclear technology must change. Unless we take these first steps we will have lost the chance of avoiding a nuclear holocaust."

Fittingly this interview was held in the office at Princeton used by Albert Einstein some thirty years ago when he wrote to President Roosevelt pressing for a US programme to develop an atomic bomb before details of this devastating weapon could fall into Nazi hands.

(Full transcript of programme available from FOE)

RAILWORKERS TAKE THE LEAD

from Paul Marshall
in Townsville

On Monday the 24th of May all trains in Australia were brought to a halt as a result of the Australian Railways Union (ARU) policy against the mining of uranium. Both the ARU and the Australian Federated Union of Locomotive Enginemen (AFULE) held a national stoppage, and in Queensland where the trouble started, about 12000 members from the Combined Railways Union (made up from the ARU, AFULE, and sections of the BWIU and AMWU) were on strike.

The strike started over the handling of sulphur destined for the Mary Kathleen uranium mine, but to get a clear picture of the sequence of events we must go back almost a year to the Queensland Trade Union Congress held in August 1975. At that Congress several very strong motions calling on all unions to oppose the mining and export of uranium were passed overwhelmingly. However, a week later, the Executive Meeting of the Queensland Trades and Labor Council (TLC) vetoed the decision and decided that mining should be allowed at the Mary Kathleen mine in north Queensland pending the outcome of the Ranger Uranium Inquiry which had just been appointed by the then Prime Minister, Gough Whitlam.

Many unionists were angered to find that a decision of Congress could be so easily overturned by nuclear proponents in the TLC executive such as Sir John Egerton (then TLC President) and Fred Whitby (General Secretary), but they were powerless to act. Until, that is, in September 1975 when the ACTU Congress was held. At that Congress a strong motion was passed calling on all uranium mining to be banned pending the outcome of the Ranger Inquiry chaired by Mr Justice Fox:

"In view of the danger of global radioactive pollution, the threat of nuclear proliferation, the problems of disposing of nuclear waste, the energy consumption imbalance between the industrialized countries and the underdeveloped third world, and the denial of the legitimate land rights of black Australians, Congress demands:

"That Australia should immediately halt all uranium mining operations pending the completion of a thorough-going public access inquiry into the whole ramifications of nuclear fission technology.

"The Ranger Uranium Environmental Inquiry, currently in progress, may satisfy this demand provided the Australian Government accepts that the scope of that inquiry should not be limited only to the considerations of physical and technological questions.

"That existing Australian uranium stockpiles be used or exported only for biomedical research and, indirectly through the production of isotopes, for medical diagnosis and treatment.

"That uranium exports be refused to those countries engaged in researching or manufacturing nuclear weapons or generating power by nuclear fission or breeder reactors.

"That those existing contracts for the supply of uranium not in accord with these principles be abrogated."

Despite this decision the ACTU executive failed to act to prevent the re-opening and scaling-up of operations at the Mary Kathleen uranium mine west of Townsville. They eventually justified their inaction with expressions of concern about the jobs of 300 workers employed by MKU Ltd, many of whom were workers displaced by mechanisation at CRA's Hamersley mine. Had the ACTU acted immediately the Mary Kathleen mine would never have started.

Many unionists share our concern over the very real dangers represented by the nuclear fuel cycle, and were gravely concerned about the way their efforts to stop the mining of uranium were being frustrated by an unholy alliance between vested interests and a small minority of influential unionists. So, the progressive unionists banded together and from this emerged two very significant developments. A Queensland Trade Union anti-nuclear Lobby was formed — within the Trade Union Movement and separate from, but working with, other antinuclear groups — during April, 1976. And on April 30th the Federal Conference of the ARU extended the ban which they had placed on the shipment of uranium products to cover all products used in the treatment of uranium. They also included a clause which would bring strike action if any of their members were forced to handle any of these materials.

Meanwhile back at Mary K, final modifications were being made to the processing plant which would turn the uranium ore into 'yellowcake' or pure uranium oxide. At full operational capacity this plant would require about 112 tonnes of sulphur per day which would be converted on to site to sulphuric acid for use in the leaching process. Since sulphur stockpiles at Mary Kathleen were very low, more had to be brought in, and in the volumes required it would have to come by rail.

This is where the strike started. On Wednesday the

19th of May, Jim Assenbruck, a shunting supervisor at the Townsville railway yards and a member of the ARU acted on union policy and refused to marshal the wagons carrying sulphur for Mary Kathleen. For his action he was stood down, and all the other workers at the yards stopped work in his support.

In an interview Jim described himself as "just a union man". He believes in unionism and in his 13 years membership of the ARU he has faithfully attended union meetings although he rarely became involved in any debates or discussions. He gave an account of the events which lead up to his suspension:

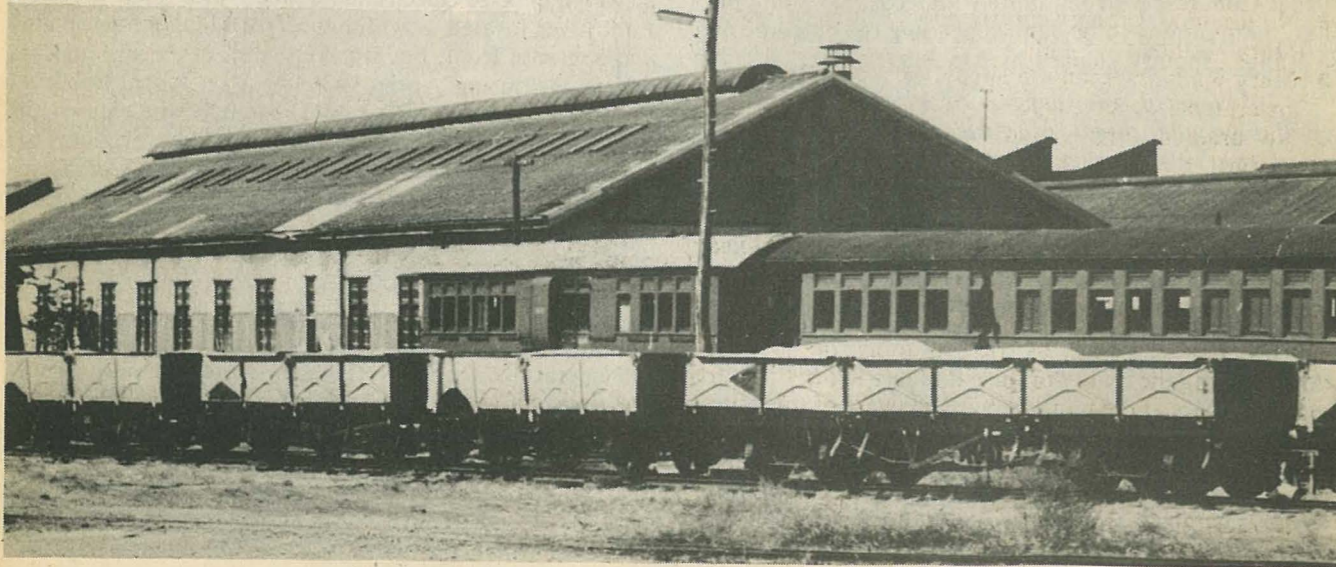
"We'd been told not to handle anything that had to do with the mining of uranium. I just happened to be the supervisor on shift when the boss decided to move those waggons of sulphur. When the assistant station-master told me to organise it, I went and checked with our local union organiser. He said no, so I said no. The assistant station-master called in a witness, asked me again, and I had to put my refusal down on paper. Then he gave me my suspension orders."

By Thursday the strike had spread to cover all of north Queensland where the railway workers stayed out for a total of five full days.

Negotiations with the Queensland Railways Commissioner, Mr Lee, were unsuccessful in meeting the unions' demands and a special meeting of the ARU Federal Executive, held in Sydney on Thursday, unanimously agreed on a 24-hour strike on the issue starting from midnight Sunday. The demands put forward by the ARU were for:

- Jim Assenbruck and all striking workers to be returned to work without loss of privileges.
- and for the waggons under dispute to be moved to a neutral siding and no further demands be made on railway workers to handle waggons which in any way contribute to the mining or preparation for mining of uranium.

Sulphur wagons wait in the Townsville shunting yards.



The unions rightly claimed that the mining of uranium at Mary Kathleen was preempting the findings of the Ranger Inquiry.

Typically, Sir John Egerton sided with the Premier, Bjelke Petersen, in condemning the action and claimed that ACTU policy allowed for the mining at Mary Kathleen to continue. It should be noted that Sir John was not present at the ACTU Congress when the policy was decided on, but was attending to his duties as a Director on the board of Mary Kathleen Ltd. Sir John also claimed that the Ranger Inquiry was of little or no consequence in regard to Mary Kathleen.

A mass meeting of railway workers, held in Townsville on May 24th and addressed by several speakers, indicated strong support for the action. Tom Barton, state organiser for the AMWU, spoke at length about the dangers of nuclear power. He told the meeting: "What does a few jobs mean when millions of lives are endangered. Talking about the jobs of the miners is like talking about saving the jobs of the German workers who built the Nazi gas chambers."

At the end of the meeting a motion calling for action from the ACTU was passed overwhelmingly. A motion for the ARU to dissociate itself from the movement against uranium mining failed to get a seconder.

Following the national strike a settlement was reached which, although resulting in the supervisor's reinstatement, also resulted in the sulphur being shipped to Mary Kathleen. The following is the resolution released by the National Executive of the ARU in Sydney on May 25th:

"That this meeting congratulates the membership of the two unions [ARU and AFULE] throughout Australia on their highly principled stand in support of a policy which, by their actions, has won the acclaim and support of wide sections of the trade union movement and the community.

"We express our warm thanks to them for the

hundreds of encouraging telegrams and other messages, and urge them all to take every appropriate means to support the campaign for the success of that policy in the new circumstances.

"Our success in having the shunting supervisor reinstated without penalty is an important gain, but the need still remains to ensure that Australian uranium remains in the ground, and to see that the means to mine it are withheld.

"While the ARU will continue to play its full part in this, it is our opinion that it can only be done successfully by the united action of all trade unions concerned in the operation, supported by the ACTU, interested public bodies and people of good conscience in all parts of Australia.

"We look to the ACTU convened meeting of unions to take a resolute stand on already determined ACTU policy in the matter, and call upon them to continue the fight so capably commenced by the membership of these two unions.

"In the meantime, we appeal to the trade union movement of Townsville to ensure that no further supplies for the Mary Kathleen mine are permitted to be presented for rail or other transport to the mine.

"Realizing that public awareness is a vital prerequisite to any further action, we now determine to step up greatly the issue of educational material in all necessary areas and seek the participation of environmental groups, student bodies and trade union organizations in the preparation, distribution, and financing of these methods."

The ACTU conference to discuss the handling of uranium and the ARU and AFULE action met on Friday the 4th June at Trades Hall in Sydney. During the five-hour meeting motions put by the ARU (in favour of a complete ban) and by the Australian Workers Union (in favor of mining) were debated at length. Both motions were eventually withdrawn and replaced by a third motion which was passed unanimously. It involved the following demands. That:

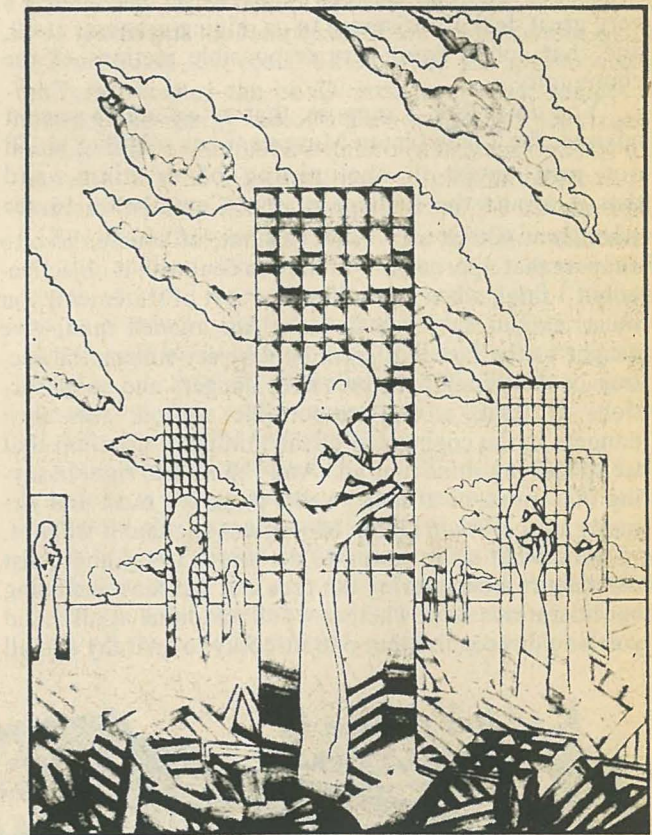
- No uranium mining ventures should proceed, except Mary Kathleen.
- Mary Kathleen uranium should be stockpiled under government supervision.
- No uranium ore should be exported, except for medical purposes, pending reconsideration of the trade-union position after publication of the Ranger Inquiry.
- No nuclear waste should be imported and no nuclear reactors should be built in Australia.

This did not represent a victory for Sir John Egerton and his clique as the press tried to imply, but is rather that of facing the reality of the situation — that there are many workers at the mine who are unaware of the issues. The next step must be to take the issue to the rank and file workers at Mt Isa and Mary Kathleen, with a call on them to act in the interests of all Australians. These workers must either be offered alternative employment within the mining industry or must receive proper com-

pensation for their loss of employment. But the effort to bring mining to an end at Mary Kathleen must not be relaxed.

Postscript

Shortly after this article was received, the Mary Kathleen controversy blew up again when on Monday 28th of June another meeting of trade unions decided to reaffirm the decision of the June 4th ACTU conference. The meeting was called to decide whether a minor contract between Mary K and the US utility, Commonwealth Edison, for 40 tonnes of uranium oxide should be honored. The resulting decision that the company should use up part of the 150 tonnes it has stockpiled in Europe since the early sixties was greeted with howls of anger from the media.



"... IF YOU'VE GOT NO ARMS OR LEGS IT'S A PRETTY SERIOUS DEFECT"

Dr. William McBride

EXTRACTS FROM THE RANGER URANIUM ENVIRONMENTAL INQUIRY

Page 7626, a.m. 22 April 1976.

Mr (Billy) Wentworth, Federal M.P.: "Well Sir, the Government is in a position to - whatever the Government may decide, and it's not for me to say what the Government's going to decide. But whatever the Government may decide, it is in a position to enforce its decision. And the great thing we should be doing now, and I'm sure, is not to be arguing about whether we're going to save \$2 a ton, or \$3 a ton, or \$10 a ton, what we should be arguing about is the cutting down of the \$25 million per sitting day that this Commission is costing the economy. And the sooner it can - the companies might, perhaps, see it in their interests to shorten these proceedings."

Later . . . in reply to Mr. Wentworth:

Mr Presiding Commissioner (Mr Justice Fox) : "Well you do realise do you, in that connection, and I don't want to get into a debate and of course you realise it's improper for me to do so, but you do realise that there is a very great deal of resistance to us mining uranium at all, and that comes from very responsible sections of the community.

"You do realise, I suppose, that as we are at present advised, the Trade Union Movement has said that it will not participate in the mining of uranium, and that it awaits the findings of this Commission to see whether it will at all. Now I'm not, of course, here to support that approach. I'm here to deal with it objectively but I think when you make that sort of statement, you must, as I'm sure you do as a fair-minded man, give weight to the fact that seemingly a very substantial section of the population, sees such dangers and some sections at least, a very responsible section, sees such dangers in the connection of the mining of uranium that we should not mine it at all. And I think I'm right in saying that most, or at least, well I think it's most and virtually all the Trade Union Movement has said it will not.

"And what we're trying to do here is to try and assist the country by exploring the pros and the cons, including considerations as to whether we should mine at all. And you would recognise that one sure way to anarchy and all

sorts of other things, is not to let responsible sections of the community, and it may be a majority for all you and I know, have a voice in a question of such dramatic, awesome depth as the question as to whether uranium is such a dangerous substance, proliferation has such dangers.

"And one of our problems, of course, is to try and keep emotions out of it, and if you don't mind me saying so, I apprehend the statement that you made about the cost of the commission and therefore we should virtually scrap it and get ahead with the mining straight away, is the very opposite of the sort of thing we've been trying to encourage; and that is an unemotional approach.

"But this very matter is to many sections of the community a highly emotional issue and our concern, as I've said, is to try to keep that out of the equation. We're succeeding, barely, but particularly those who oppose it, partly I suspect because they know that both parliamentary parties have expressed views favourable to mining, tend to get very upset, worried and concerned, when they feel that they may not be fully heard, that in fact their opposition is apt to be - is in some areas being rubbished.

"And there's been a lot of publicity and this Commission had to comment upon it on several occasions, which gives the impression to some people that indeed the opposition to mining with all its ingredients, and there's some local, some affect the Aborigines, some affect the immediate environment, some are of world consequence. When all that opposition is to be just completely overboard, without any proper consideration, and I'd suggest to you and to everyone else concerned, for that matter, that a major way of handling this situation is by some such Inquiry as this.

"I don't want to say that this is by any means a perfect Inquiry. I didn't establish the legislation, indeed the Commission was virtually established before I came into it. But both parties introduced what is bipartisan legislation, have proposals of government which have environmental consequences explored. In this particular Inquiry everyone has been agreed, without any dissent, that we have to look at what is called the 'World Environmental Situation'.

"Now this to us is a matter of the - of great personal responsibility as I think you might imagine. . ."



CORPORATE ENERGY GRAB

by Paul Marshall

Even a cursory look at the issues — technical, environmental, social, political, moral — involved in the current controversy over uranium mining and nuclear power is enough to set one thinking. It is when we gaze a little more deeply into the nuclear crystal ball, at such things as the projections of economic costs that the growth in energy demand and the nuclearisation of the energy sector would entail, that we are left somewhat astounded. It is quite likely, say some commentators, that the sheer weight of economics alone may be sufficient to bring nuclear power plant construction to a standstill despite the already massive government subsidies to the industry. That is, of course, assuming that the federal government in the US and governments elsewhere do not move to 'bail out' the industry as is proposed. This article will not attempt to analyse the reasons behind the poor economics of the nuclear industry, but will instead look at the proposals of the industry's lobbyists and their impact on the economy.

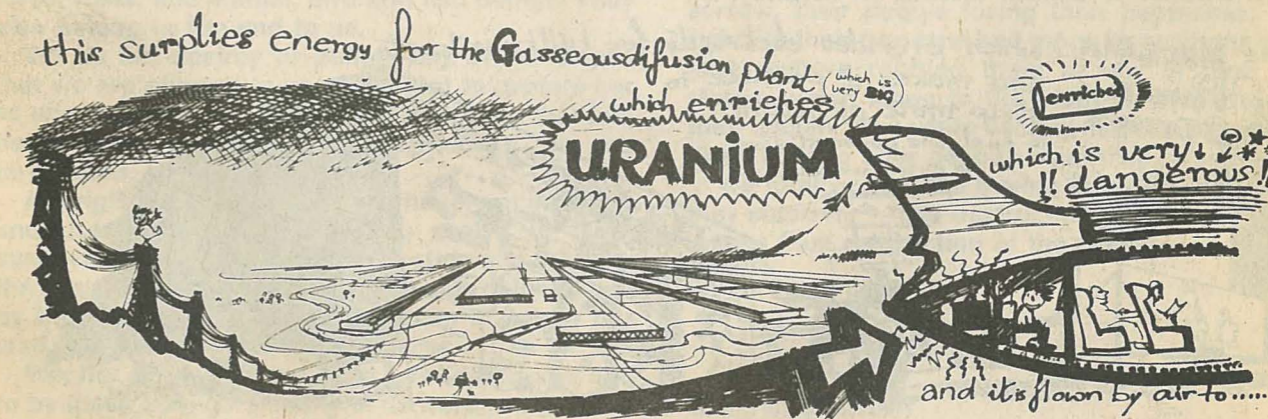
The capital costs of nuclear reactors now run at US \$ 800-1000 million per reactor, and if present projections for the US (200 reactors by 1985) were to be met, this would require between two-thirds and three-quarters of the US Gross Domestic Private Investment going to the energy sector. This fraction compares with around a quarter in the past. Obviously the attempt to achieve energy independence with nuclear power will place severe strains on US capital resources and will tend to draw capital away from more socially-useful applications. Most of the reactors and their components are produced by large corporations under a 'free'-enterprise system of market competition, which in itself creates a tendency for safety to be compromised for economic expediency (i.e. profits). However, as implied above, it is a rather restricted field since companies without assets running into billions of dollars can hardly hope for a sizeable

share of the market, nor risk the investments needed to establish themselves. The large multinational corporations, chiefly the oil majors, therefore tend to dominate the industry.

To the uninitiated observer it appears, at first, that the nuclear industrialists are undertaking a colossal gamble. They are gambling that no catastrophic accident will occur in the short-term, despite the number of accidents and near misses already on record. They are gambling that fresh high-grade ore reserves, or a technically and commercially viable breeder reactor, will be ready on time. They are gambling that the trend towards ever-higher capital costs, and the decline with age in the efficiency of functioning reactors, will be reversed. Or they hope that this trend will be compensated for economically by increased fossil-fuel costs. Finally they are gambling that sufficient money can be diverted from other sources to finance the energy sector's growth. But are they really taking such a gamble? To answer this question fully it is essential to take a look at the emerging structure of the nuclear industry and its competitors in the energy field.

Few industries, even today, are as heavily monopolised as the nuclear industry. When one says "pressurised-water reactor" one says Westinghouse; and "boiling-water reactors" likewise means General Electric. And these two types of nuclear reactor, built by the two giants directly or through subsidiaries and licensing agents throughout the world, account for over 85% of the nuclear component industry.

On a broader perspective, a still vaster oligopolistic structure is taking shape, as the leading oil companies complete their transformation into what can only be described as "energy companies". Already there are at least five major oil companies with across-the-board holdings in all the domestic fuel resources — oil, gas, coal, oil shale, and uranium — and these companies are

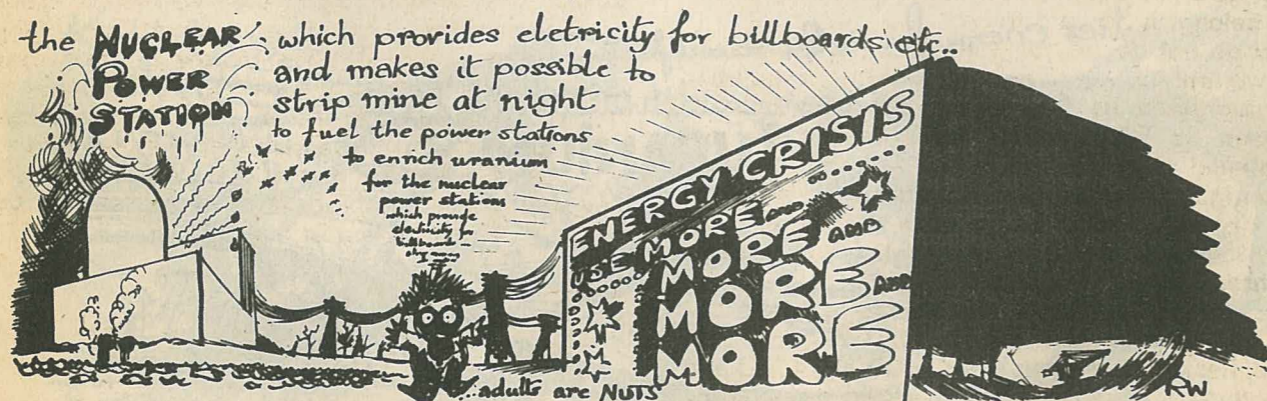


now buying into the alternative-energy technologies, particularly solar. In 1971 these oil giants were responsible for the milling of some 40% of US uranium; their coal production amounted to some 20% of the US total, and their acquisition of coal reserves guaranteed their future dominance in the industry. One major US oil company — Humble — is the nation's second largest coal owner. In the nuclear field, Gulf Oil, with the third largest assets of any oil company (about US\$9 billion), has set up the company, Gulf General Atomic, which manufactures reactors.

Still further indication of the position of big oil companies and their present and potential consolidation within the nuclear industry is given by the following: Kerr-McGee (an oil major) is one of the two companies in the business of converting concentrates into uranium hexafluoride for enrichment and will have roughly one-half of the total US planned capacity. Atlantic Richfield (now merged with Texaco to become ARCO) and Gulf Oil (the latter in partnership with Allied Chemical) will be two of the three companies with capacity to convert slightly-enriched recovered uranium to uranium hexafluoride; and ARCO has the only present capacity for converting highly-enriched recovered uranium to uranium hexafluoride. Five of the thirteen plants processing uranium fuel elements are owned by oil companies or their subsidiaries. Three of the four fuel-reprocessing plants, completed or planned, are oil-company ventures and their combined capacity is 93% of the total. Yet this may be the tip of the iceberg as there are many avenues of control that are not readily traceable. One of these, for instance, is the tie-up between Exxon, Rockefeller and the Chase-Manhattan Bank.

Another important aspect is the interrelationship between these companies created by an expanding system of interlinking directorships throughout the entire energy industry. Space does not permit a detailed analysis but the following may suffice as an example:

The Director of Gulf Oil Corporation, R. K. Mellon, is also Chairman of Mellon NB and Trust. Director of Mellon NB and Trust, D. Brunham, is president of Westinghouse. Chairman of Gulf General Atomic, E. Prockett, is also a Director of Westinghouse. Chairman of Kerr-McGee, D.A. McGee, is a Director of General Electric. Director of General Electric, N. McElroy, is



Chairman of Procter and Gamble (nuclear architect-engineers). Director of Gulf Oil, W. Whiteford, is also a director of Procter and Gamble.

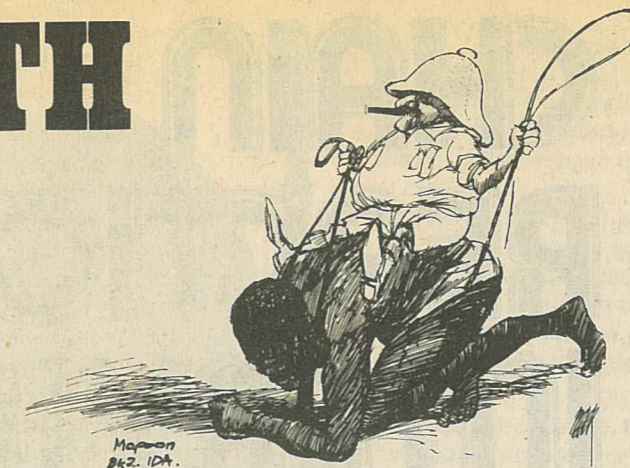
Obviously these corporations view with pleasure the planned growth and the nuclearisation of the energy sector which will double their weight within the economy in a little over 30 years. What these companies are really gambling on — and from their viewpoint it is a rational risk to take — is that their economic, and especially their political weight, in society will be so massive that society would have no option but to make their bets come home. They gamble that if they control the nuclear market and society obtains around 50% or more of its energy from nuclear sources, then not even a catastrophic accident causing massive death and destruction would be sufficient to turn off nuclear power. Nor would failure to resolve any of the other safety questions such as waste disposal.

And what about other energy sources? What if nuclear power reveals itself to be unarguably dangerous, wasteful and uneconomic?

As a Harvard-MIT study, published in *Technology Review* (Feb. 1975), points out: "The price of useable energy from oil, coal, or uranium now has little to do with the marginal production cost . . . Instead, the price of energy . . . is a result of a complicated process of assigning relative values . . . by those who either control or require these resources and technology." Thus, since the same companies are involved with both energy sources, it is only necessary for them to assign higher prices for conventional fuels (and there are many ways of doing this) in order to protect their investments in nuclear energy.

In effect we face a powerful energy industry intent on boosting profits and gaining control of the western-world market no matter what the consequences or risk to the public. Since Australia has the opportunity, and, it may be said, the responsibility to withhold uranium from the industry, this course is not inevitable. Indeed, such an action by Australia may force the adoption of renewable sources of energy such as solar and wind energy, instead of the dangerous and complex nuclear industry. The question is — has Australia the moral courage to reject the foreign earnings and leave uranium in the ground.

EARTH



LINKS

A Statement of Concern for All Aboriginal Australians made to the Ranger Uranium Environmental Inquiry, Northern Territory, June 1976.

The Aboriginal peoples of Australia, which include all the people of Aboriginal and Island descent, remind you that we belong to the Earth Mother.

We love and care for her and always respect her.

She is the source of our true beings, our soul and our life. Our heritage and culture derives from her. From her we have our traditional dreaming places, our most sacred areas and the keeping places of our lore. These are our links with her and because we are all linked with the land, our sacred places in the Earth reinforce our bonds with our Earth Mother. We have an affinity with her. She nurtures and protects us.

The Land is ours.

We would never harm her. Never take more than our share of food from any area, nor use more water than necessary. We never waste any resource that she allows us to have. We always knew and felt the freedom and the joy of belonging with her, living in harmony with nature, and the other ancestral beings, living and supporting each other — the forest trees, and animal, bird and fish beings. They also belong to her and to us.

We do not destroy or pollute any of the places that we are allowed to use. We want to protect her as she protects us. If anything endangers that link between us we all feel threatened. If we are threatened, then so is she.

Aboriginal people have a long history of insulting and degrading treatment being shown to them everywhere. The history of mistreating and neglect, the threats, cheating and robbery since colonisation by the strangers who came to claim and take our land, the gift from our Earth Mother.

We, her children, have been bewildered and lied to by these strangers. Many of us were not to know that people could be so untrustworthy, so deceitful,

so dishonest and so inhumanly cruel. We did not know that people would be killed, driven in confusion from their lands, their sacred areas, their particular Earth links broken — a lost people locked away in compounds, constrained and controlled by repressive legislative Acts by those from the dominant class, who pretended it was for "our protection" while they grabbed the land for themselves for their own purposes. We suffered untold injustices and loss of freedom at the hands of these people.

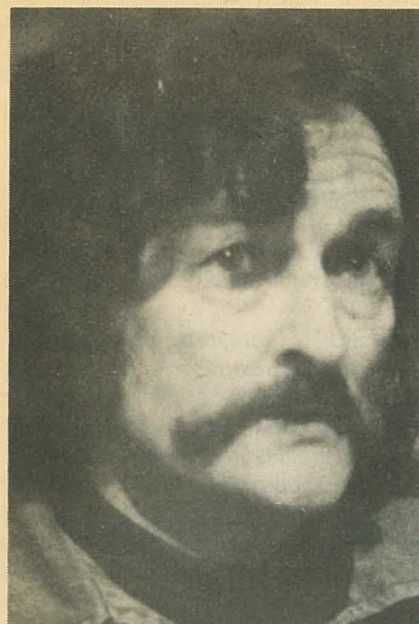
Not satisfied with that even, they now want to take the areas of land that were reserved for our people, and the mining companies and their cohorts have used all sorts of methods to gain ingress to these areas for their own pursuits of greed and ambition, at the expense of our people.

It has been shown time and time again that mining companies in particular have shown complete and utter disregard for our people and the Land, and they are destroyers and polluters.

We do not want these things to happen again. Every one of these places has had only trouble and sorrow, their people losing their happiness, their rights to their own land and more, impositions of the alien culture robbing them of any of their own status, which leads to the ultimate breakdown of their society. The white society has not got a better alternative to offer despite what they have told us.

We totally reject the mining companies and what they stand for — the destruction of the Land which means final destruction of the people.

Ms Vai Stanton
from the Northern Territory



CHAIN REACTION INTERVIEW ALAN ROBERTS

For the *Chain Reaction Interview* this time we spoke to Dr Alan Roberts, a Senior Lecturer in Physics at Monash University. Alan has spoken and written widely on many environmental issues, with particular emphasis on the social and political questions these issues raise. He is well-known around Melbourne for his frequent attendance at teach-ins and seminars on the question of uranium mining.

Alan Roberts' paper, "The Politics of Nuclear Power", first published in *Arena*, is now available in booklet form from FOE, and it will soon be released by the Bertrand Russell Foundation in England. We highly recommend it to anyone attempting to develop an overall perspective of the nuclear debate.

F.O.E. Recently in California a referendum proposal to impose greater safeguards on nuclear power stations (Initiative 15) was voted down by nearly two to one. Apparently the district of San Francisco was the only one to vote "yes" to the proposal. Do you see opposition continuing to nuclear power?

A.R. Most certainly. This was the first time that a full-scale campaign had been made to bring the facts about nuclear power, and its significance, home to a section of the American public. I think that the vote that was obtained was very heartening. Certainly it's only the beginning of the campaign, on a mass scale, and it's a very good beginning.

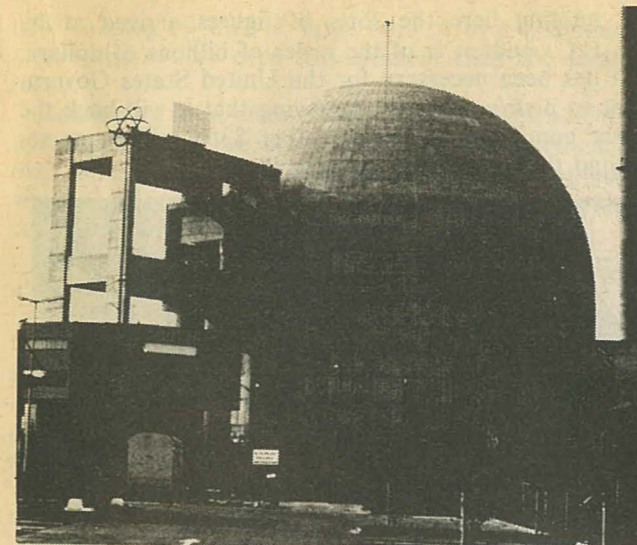
I think the result might have been expected in view of the very large amounts of money spent by the Atomic Industrial Forum and other nuclear lobbies in trying to defeat the Initiative, and I'm sure that the people concerned with fighting for the Initiative won't be downhearted about it and I don't think we should be. We should try to find out the antinuclear people's analysis of the campaign, what issues they found were the ones that caught on most with the public, and in general, the lessons they learnt from it, because this is a battle that is going to be fought over and over again, many times, before we're through.

F.O.E. During the campaigning for the Initiative, Dr Edward Teller, known as "the father of the H-bomb", reportedly said, "We should have kept the reactors secret". What would you say to that?

A.R. If Teller did say that, I can well understand the way that that gentleman's mind works. I think the most significant thing about Teller is not that he's dubbed "the father of the H-bomb", but that there is a widespread rumor to the effect that he's proud of that title. However, Teller remarked some time ago in a film that is now being shown here (*Energy: The Nuclear Alternative*, available from FOE) that he thought that nuclear power plants should be built underground. His idea was that, in this way, nuclear reactors would be more acceptable to the public and he believed that the extra costs involved, about 10%, would not be that high in view of the extra safety of operation. I think this shows that Teller was aware, sooner perhaps than other pro-nuclear people, of the likely opposition to nuclear power by the public once they got to know some of the facts about it. If he has indeed said that he thinks now that they should have kept them secret, I would find this very heartening, as it shows he is pessimistic and fearful for the future of the nuclear power industry, and I think that when Teller is fearful about the future, this is good news for all of us.

F.O.E. To get back to the basics, can a reactor explode like an atomic bomb?

A.R. It depends on what type of reactor you're talking about. The reactors which are in use at the present time generating commercial electricity are fission-type reactors. These cannot, in fact, produce a nuclear explosion.



The reason is that the fuel doesn't contain a sufficient percentage of the bomb material, the fissionable isotope of uranium (U235), to allow such an explosion to take place. However, the whole nuclear industry is depending for its existence on the development of the breeder reactor. Now this is an entirely different kettle of fish. In the breeder reactor the percentage of fissionable fuel (plutonium) goes up to about 20%, and this is sufficient, under certain circumstances, to produce a nuclear explosion, it would not be as powerful as the Hiroshima bomb or the Nagasaki bomb. Estimates of the actual power that such an explosion could produce that I have seen are mainly between two extreme views, one which says it would be of the order of a few hundred tons of T.N.T. equivalent, the other which says it would be closer to a thousand or a few thousand tons of T.N.T. equivalent. I'm quite prepared to let the two camps argue this out. The important fact, it seems to me, is that it would be of a size very much greater than the "block-busters" used in the second world war. The "block-busters" were so named because they actually blew down a whole city block. They were only equivalent to 10 tons of T.N.T., so the optimists in this argument about the yield from an explosion in a breeder reactor are talking about only 20 or 30 "block-busters"! This seems to me quite big enough.

The fact that the nuclear power industry is pinning its future on the development of the breeder reactor in order to stretch supplies of fuel to the point where the industry can stagger on for perhaps another few decades is itself indicative of the desperate straits and irrational perspectives of this whole industry.

The danger with a fission reactor, which is not of the breeder type of course, is not that of a nuclear explosion but of a chemical explosion. This could be caused by a lack of circulation of the cooling water, resulting in a high temperature which melts down the fuel; this high temperature produces gases which could explode, thus releasing radioactive materials into the atmosphere. This is a sufficiently great danger without the possibility of a nuclear explosion.

F.O.E. The Rasmussen Report, commissioned by the A.A.E.C. at a cost of \$3 million to determine the probability of an accident happening to a nuclear power station, has been subject to much criticism over its findings. What is your opinion of this report?

A.R. There's been much criticism of the Rasmussen report and I haven't seen satisfactory replies to it. Some of the major criticisms can be summed up as follows. First, the Rasmussen methodology suffers from the enormous defect that the only sources of danger which are taken into consideration are those to which a figure can be affixed.

Take, for example, the question of malevolent damage being done to a power station. We can imagine, in some future situation, a person like that chap who went to the top of the tower of the University of Texas some years back, and simply shot a dozen or so people at random, might see greater scope for his homicidal efforts if a nuclear power station were nearby. He, or someone like him, might believe that his name would go down in the history books much more definitely, if, instead of potting a few people with a rifle, he released large amounts of radioactivity over a whole city. And this, of course, could be accomplished by infiltrating a nuclear power station and unleashing a bomb.

Now what is the probability that this will happen? If we are considering the dangers of nuclear power, this is quite a legitimate question. It is not, however, a question the Rasmussen report answers, because it couldn't, and the reason for this is that they were not able to fix a figure on the probability that this would happen and so they simply didn't take it into their calculations at all.

Secondly, the criticism has been made that in calculating probabilities the Rasmussen report treats as independent accidents which are in fact not independent. The significance of this can be seen from a simple numerical calculation.

Suppose your chance of winning the lottery is one in a million. Suppose your chance of being hit by a meteor is also one in a million. Then if we assume that being hit on the head by a meteor has no connection with winning the lottery, we can simply multiply these numbers together to find that the probability of being hit on the head by a meteor at the same time as you win the lottery is one in a million million, or one in a thousand billion.

Now the Rasmussen report makes assumptions about two rare events being independent in this way, which are in fact not justified. This is quite important, because if Rasmussen says that the probability of a certain system in a reactor failing is one in a thousand, and that the probability of some other system failing is also one in a thousand, and then assumes that they are independent, then the probability that they will both fail, which might be necessary for an accident to take place, is one in a million. But if these systems are not independent, then the chances of the two failing might be only one in a thousand, that is that they might both fail because of the same cause.

In the Brown's Ferry fire in March 1975 in the United States, in Alabama, it has been alleged that the systems that Rasmussen treats as independent were in fact put out of action by the same cause, namely the candle that the electricians lit in the cable spreader room beneath the control room. If this criticism is justified, then it would throw the whole Rasmussen report into doubt and put a big question mark over all the probabilities that he calculated, and I haven't seen a satisfactory answer to this.

The figures that Rasmussen finally came up with were of a highly reassuring nature, that the probability of someone suffering from an accident at a nuclear power station were of the same order as being hit on the head by a meteor. According to the report, the public already accepts the possibilities of catastrophes or accidents which are higher than those calculated by Rasmussen. It should be remembered that this report was commissioned by the Atomic Energy Commission.

Something else also left out of account by the report is the unprecedented nature of the risks that arise with the nuclear power industry. It is hard to make comparisons between, for example, the risks associated with meteors or aeroplane accidents and the risks associated with the storage of nuclear waste. The risks associated with nuclear waste storage threaten the whole future of humanity and they go on reverberating down the ages for tens of thousands and even hundreds of thousands of years. No such risk has ever been encountered by the human race in any of its purposeful activities in the whole of history. So it seems to me that comparisons here with what might happen to one person in an accident today are quite beside the point compared with the tremendous historical catastrophe that could ensue from this one aspect alone, the storage of radioactive waste.

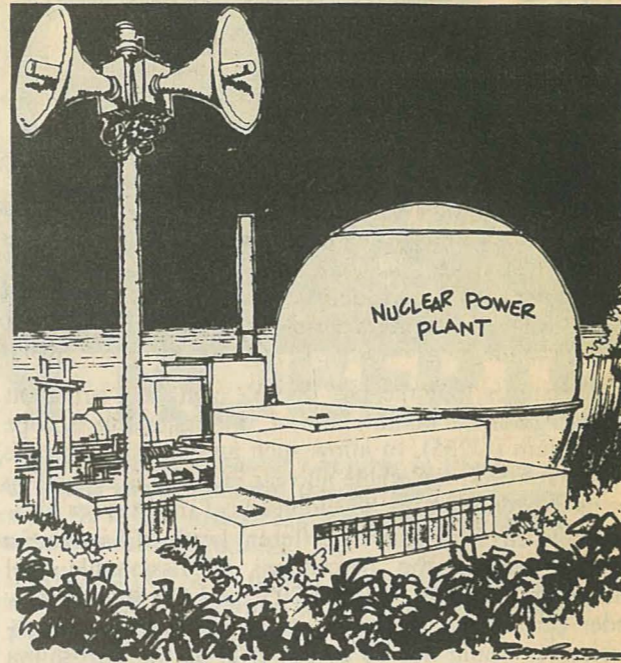
F.O.E. *How do the insurance companies approach the possibility of an accident happening to a reactor?*

A.R. Well, it seems to me that the nuclear power industry is really neglecting its propaganda work here. It has taken a lot of active steps, particularly in the last 18 months or so, to brainwash the general public into believing that nuclear power is hygienic, quite safe, and even good for you! However, it would seem that the nuclear power companies have neglected their brainwashing efforts to one particular section of the public that you would think that they would try to impress, namely the insurance companies. Or if they have directed their efforts that way they haven't been very successful, because the insurance companies are quite determined not to insure to any significant extent nuclear power stations.

At the present time in the United States the insurance companies are limited by an Act of Congress to the extent to which they must back a nuclear power station against damage from an accident, to the comparatively small figure of \$160 million. Now the damage that could arrive from an accident at a nuclear power station, and

I'm quoting here the sorts of figures arrived at by A.A.E.C. studies, is of the order of billions of dollars.

It has been necessary for the United States Government to pick up the tab by saying that it will back the power companies up to a further \$350 million or so. Beyond that, no one is insuring them.



"In case of emergency, repeat after me: Our father..."

Whoever believes the calming message of the Rasmussen report, and the rest of the pacificatory propaganda from the nuclear power industry, it certainly does not include the insurance companies. And I think this is very significant in this respect; as to what constitutes a reasonable risk, I would much rather believe the insurance companies than the people who will profit from the extension of the nuclear industry. This is one case where we ought to use the old maxim of "who benefits?", and when we see that the insurance companies would benefit by extending policies to the nuclear industry in the complete assurance that they would never have to make a pay-out, and since the insurance companies don't appear eager, to say the least, to snatch up what we might suppose to be a very profitable piece of business, then I think we can take it they have very good reasons for believing that the nuclear industry is not as safe as it appears to be.

F.O.E. *What is the economic outlook for the nuclear power industry?*

A.R. I think the indications are pretty bleak. Unless the powers behind it can manipulate normal economic and market criteria so as to produce a verdict in their favour, the indications are now strong that nuclear power stations have nowhere near the same efficiency over their operating life as coal-powered stations. Also, the indications are now strong that the very reactors they are

now building — that is, large ones of over a thousand megawatts — are even less efficient than the smaller ones.

Combining these effects of the drop in efficiency, with both age and size, we would have to predict an efficiency over the useful life of the reactors being built at present which is ridiculously low compared to that of equivalent coal-powered stations.

But this means that all the calculations made to date about the relative efficiency of nuclear power and coal-fired power cannot be extrapolated into the future, because they have been based in the main on comparatively young reactors, and compared to the ones now in use, comparatively small reactors. Simply from this point of view alone, the future health of the nuclear power industry must have a large question mark over it.

There are further considerations, particularly the question of the cost of uranium enrichment. One estimate that has been made by a nuclear official in Britain is that the advantages to the nuclear power industry of the essentially military installations built by the United States Government for fuel enrichment have amounted to a very large sum indeed, and that in fact the industry has been getting its enriched fuel at about half the cost of that it will have to pay once commercial enrichment is the rule.

However, all of this is subject to the proviso that normal market and economic considerations apply. The question really is a political one, that is, just how much weight does the nuclear power industry exert on the economy, in the society, in political life? If it exerts enough weight then it can twist and distort the market criteria, economic values and so on, to make the cost of nuclear power appear to be cheaper than other forms of electricity generation.

A lot of it hinges on the fact that the most important cost for nuclear power is its interest rate on the capital, because its capital cost is so much greater than that of coal-powered stations, so that whether the nuclear kilowatt hour cost turns out to be cheaper or dearer than the cost for the coal-generated kilowatt hour, depends very much on what interest rates you pick for your invested capital. So I think it finally boils down to a political question, whether the nuclear industry can exert sufficient political and economic weight so as to make itself appear cheaper to the public.

F.O.E. *Some experts say that solar power will not be widely available till the end of this century. Why not?*

A.R. I think that it all depends on what preconceptions we have about the forms that energy distribution must take. We can take the view, first of all, that the present pattern of energy production must be continued under any circumstances. By that I mean that we must continue to have large centralised power sources, primarily devoted to the generation of power in the form of electricity. Now, if we stick to this pattern then there is a lot of weight in the argument that solar power, tidal power, etc. can't be developed in the next few decades to supply these large centralised power sources.

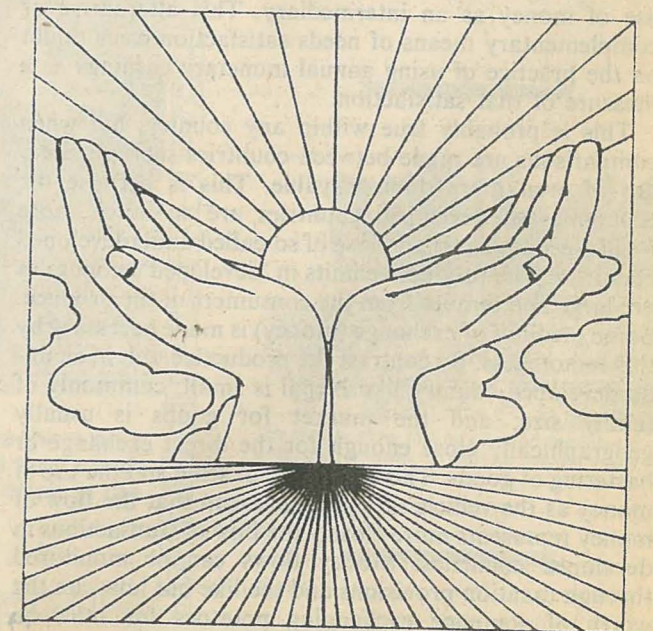
However, suppose we rid ourselves of these preconceptions. Suppose we conceive of a society in which the energy sources are much less centralised, much better distributed and therefore able to be much smaller than they are at present.

I believe that such a society can be envisaged, one which would contain satisfactory features lacking in the present one, that it would fit in with a less hierarchical society, one less centrally administered, one in which the people as a whole had more power and control over their daily lives, over their collective endeavours.

If we envisage things in these terms, then I think the outlook with respect to solar power, tidal power, windmills, biogas generators and so on, will be very different, because generally speaking these are ideally suited to the generation of small quantities of power for a comparatively small region. They don't incur the overheads, the distribution and administrative costs, of the large centralised systems we have at present. They don't require the visually polluting towers and grids that we have at present, they make possible a control over the immediate environment by the people living there, and they would encourage the people's initiative in the running of small-scale industry serving local needs.

I think this is where the crux of the argument lies, and I also believe that the continuation of our present system, depending so much on centralised sources of power, is going to run into more and more difficulties anyway, as the environmental damage becomes more obvious and interferes more and more in people's lives.

For this reason I believe that the prospects for the wide-spreading of a different conception of how society can be organised are very bright, and this would include the appropriate energy sources for such a society, where in the major component is solar power.



THE EXPERT WORLDVIEW — Census or nonsense?

John Price writes for C.R.

John Price is a co-author with Amory Lovins of the book *Non-Nuclear Futures*.

In a recent ABC radio programme, Investigations, Dr. E.F. Schumacher (Founder-Chairman of the Intermediate Technology Group in London) drew different inferences to the usual from the fact that 700 million people live on an average income of less than US \$50 per year. Usually experts use statistics such as this to show us how desperate the lives of such a large number of people on the earth must be — how unjustly inequitable the distribution of the wealth 'cake' is. But Schumacher asked the question: "How do they do it?" Obviously many people among this 700 million suffer chronic food shortages, but the majority survive and many lead more or less happy lives. Their personal level of *economic* efficiency is astounding compared to our own.

To some extent (as any pack-bearing traveller to 'poor' countries knows) the exchange rates between countries are pretty crazy with \$1 buying much more in India, say, than here, but let's assume it buys ten times more (which is an overestimate). That would mean that in terms of purchasing value these 700 million people live on a real income less than the equivalent of US \$500 in the US. Still the question remains: How do they do it? It's very difficult for any of us to conceive of living on such an income, unless — yes unless — we were to provide for most of our needs ourselves and/or we satisfied the bulk of our other needs through barter or exchange and without the use of money as an intermediary. This alternative or complementary means of needs satisfaction casts doubt on the practice of using annual monetary earnings as a measure of that satisfaction.

This is probably true within any country, but when comparisons are made between countries such practices are of even more dubious value. This is because the economies of developed countries are so much more money-economies than those of so-called underdeveloped countries. The productive units in 'developed' economies are large and remote from the consumers of the produce. Some medium of exchange (money) is made necessary by this remoteness. By contrast the productive unit in an underdeveloped country like Nepal is small, commonly of family size, and the market for goods is usually geographically close enough for the direct exchange or bartering of goods. This difference of scale and the use of money as the vehicle of exchange mean that the flow of money represents more closely the flow of transactions in developed countries. Money flows can be monitored through taxation provisions and the like but how can the worth of someone exchanging potatoes for milk be

monitored, let alone assessed, if it is a simple exchange between two small production units? Even in developed countries such as Australia such transactions occur, so people's ability to satisfy their needs is only partially estimable through knowledge of monetary income. Monetary transactions that are not monitored (i.e. untaxed) are similar.

Similarly, comparisons of resource use between nations are misleading. It is easy to compare only the measurable, and the measurable is usually the output of large-scale centralised units of production. For example, oil or electricity consumption can always be compared, but how can you begin to accurately estimate national firewood or dung consumption when the consumer is so often the collector or grower of the fuel? Another example: do central governments or collectors of statistics have any way of estimating the monetary worth or indeed the quantity of food that people grow for themselves?

These sorts of consideration cast doubt on the usual and natural equation of monetary incomes to well-being. To some degree this equation obviously has use — clearly the Indian villager receives less in goods and services than we do, but we know that without statistical evidence. One thing that can definitely be said about monetary incomes, though, is that they do indicate the degrees to which societies use money for transactions; also the higher the average annual income, the more centralised the production and the more necessary is money as an intermediate vehicle of exchange.

When we assume that annual incomes are indicative of well-being it is more likely that we are, in reality, assuming that well-being and centralised production go together — a far more questionable proposition.

Why is it that we slip so carelessly into using statistics to tell us things that they don't and try to form policies on the basis of the erroneous meanings we give them? This arises because it is much easier to look at the interactions of large units than small units. The collection or matrix of large units is comprehensible and rules or patterns of interactive behaviour can be deduced from observation. The common use of money as the means of transaction means that transaction flows can be approximated through monetary flows and observers (i.e. experts) can recommend changes (from their ideological perspective) that will alter the nature of the relationship within the matrix. These skilled observers are employed by governments and the units themselves to advise on the kinds of change which will most closely correspond to

those desired by their employer.

But the observation of these large units only allows for comparison and choice of change of a self-similar kind. Economic efficiency is a useful tool for comparing such units since it has meaning for and between them — it is data, an available fact. But in the alternative non-monetary economy there is no comparable term since in barter no money is paid. The barter economy is one that is not easily comprehensible and its strengths and weaknesses cannot be compared with the monetary economy through the expert approach.

The expert worldview is essentially an overview since it can consider only the measurable — the nature of the

transactions that it 'sees' is monetary and therefore necessarily quantitative in character. The approach is necessarily simplistic and lacks the detail that constitutes the well-being of people at the micro level. The changes that the economist recommends are those of an operator with less to do with well-being than the subtleties of food production for oneself or the qualitative considerations that go to make up a barter deal. These considerations are also fairly simple, though beyond the expert comprehension. But they are the means by which some 700 million people are able to live on US \$50 a year. We have more perhaps to learn from them than the experts who would make their decisions for them.



Father and son carry firewood in Nepal. It used to take them only a couple of hours to gather and carry home the wood they need; now it takes them a day — a symptom of the energy crisis in the 'underdeveloped' world.

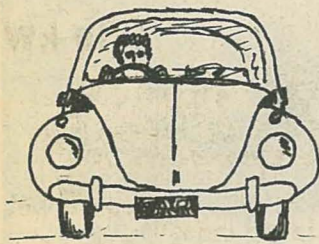
PEOPLE POWERED
PROGRESS
bicycles from freewheel
368 Cleveland Street
Surry Hills 2010
Telephone 698 1306



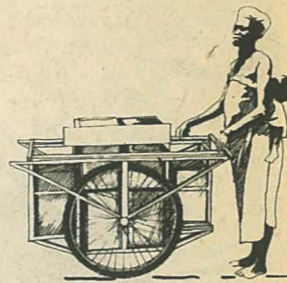
"He likes to show that he's one of them, but not quite one of them, if you see what I mean."

Whole energy Workshop

with John Andrews



"The per capita wattage that is critical for social well-being lies within an order of magnitude which is far above the horsepower known to four-fifths of humanity and far below the power commanded by any Volkswagen driver"
— Ivan Illich, *Energy and Equity*



How much energy do you personally consume? Are you a profligate waster of precious joules, a model of energy thriftiness, or just plain average? . . . But average for where? If you consumed energy at the average rate for Australia, you would be classified as 'poor' in the U.S.A., but unbelievably rich by the four-fifths of the world's population who live in the Third World. So how does your share in the sizeable Australian energy cake compare with per capita consumption in other parts of the world?

The aim of this article is to describe a simple do-it-yourself way of getting some rough answers to these questions. Getting a feel for the energy extractable from various fuels, and identifying and understanding the energy flows in and out of a household, are really useful first steps in planning how to reduce your dependence on non-renewable fossil fuels, and turning instead towards alternative technologies and the energy income available to each one of us from the sun. In addition, seeing how Australian energy consumption compares with that in, say, Ethiopia, India, China and the U.S.A., can give a much more tangible meaning to the level of consumption which Illich describes in the above quote as being "critical for social well-being". Too low an energy consumption all too frequently means poverty, and in many countries even mass starvation. Too high a consumption certainly means rapid depletion of the earth's non-renewable fossil-fuel reserves, environmental degradation of many kinds, and also political problems as a result of the inequitable and alienating social structure it perpetuates. To search for a society which uses alter-

native technology is to look for a Middle Way in terms of energy consumption — a level which satisfies our basic needs for water, food, warmth and shelter on the one hand, and a level which is conducive to a convivial society on the other.

Measuring Energy and Power

Concorde consumes energy at the rate of 10 000 kW but what the hell does this mean? It seems a large number, yet before we can understand its implications we have to relate it to something directly in our experience. So before launching into the per capita energy-consumption calculation, let us look into the units in which energy and power are measured, and into the technical meaning of these two terms, which in non-technical language are frequently used to mean the same thing.

Energy comes in a wide variety of forms: for example, the kinetic energy of a moving object, the chemical energy stored in fossil fuels, the gravitational energy possessed by the water in the catchment area of a hydroelectric scheme, the electromagnetic energy in sunlight, the electrical energy stored in a battery, or the thermal energy of a hot stone. What all these forms of energy have in common, however, is that each, under certain conditions, can be used to perform mechanical work. For example, the chemical energy in petrol can be converted by an internal combustion engine into the kinetic energy of a moving car, plus the unwanted heat energy in the exhaust gases and the body of the engine and transmission etc. All machines, in fact, convert energy from one form to another.

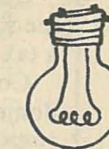
power

20 W



Sitting really still

100 W



Light bulb.

100 W



Running upstairs



250 W

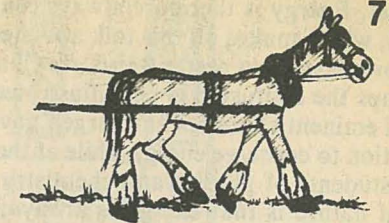
Simple machine tool, e.g. electric drill.

500 W



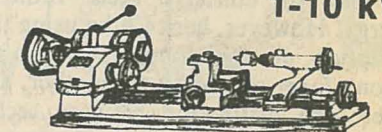
A very fit athlete, peak power, but only sustainable for a second or two.

750 W



A 'classical' horse can work at a rate of 1 horsepower (approx. 750W) but most work horses have a higher output than this.

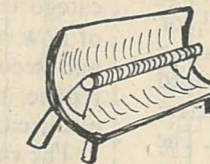
1-10 kW



Power tools of type used in light manufacturing industry.

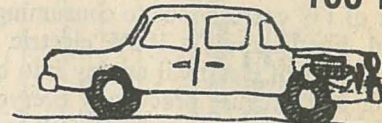
references

1 kW = 1000 W



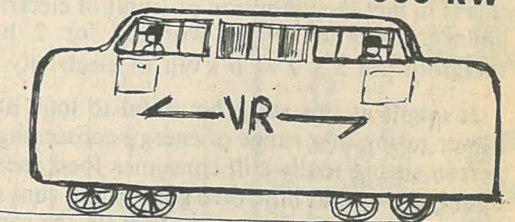
Single-bar electric fire.

100 kW



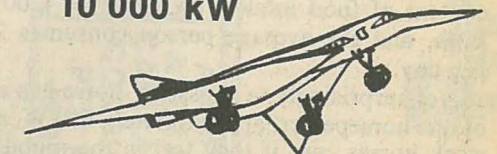
Motor car, typically 100 kW, though only a fraction of this (approx 20%) is available for propelling the car along the road.

500 kW



Railway locomotive.

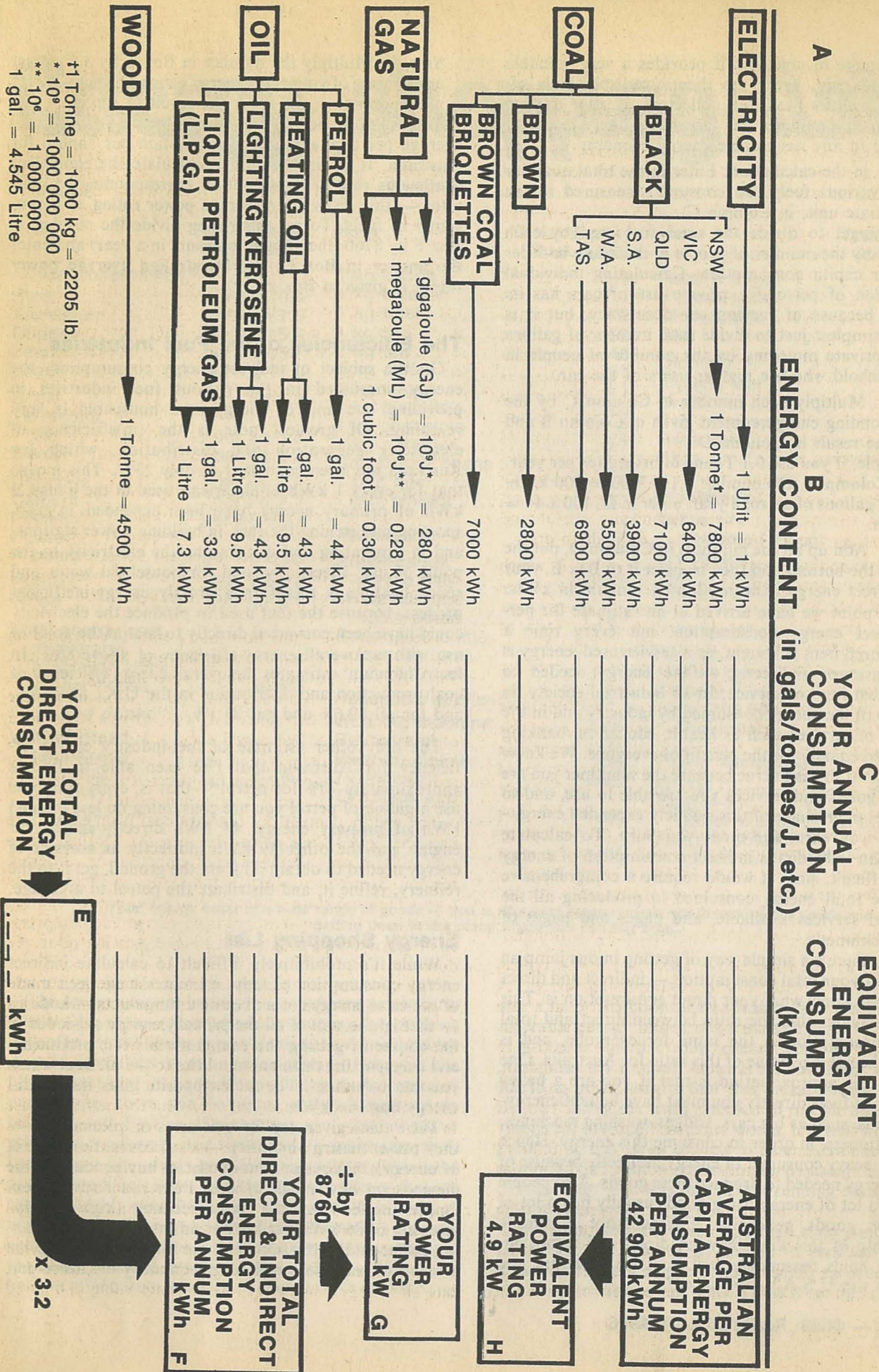
10 000 kW



Concorde

Power ratings of humans, horses and machines

Find your energy rating



Now these conversions take place in such a way that the total energy in the system remains constant — none is ever lost. Energy is therefore always **conserved** whatever you do, which makes all this talk about energy conservation nowadays seem pretty weird. As Chapman³ has said: "Perhaps the confusion is best illustrated by noting that several eminent scientists have urged government to pass legislation to conserve energy while at the same time they teach students of physics and chemistry that one of the laws of nature is that energy is always conserved."

The point is though that certain forms of energy are much more useful than others — for example, the chemical energy stored in a lump of coal is transported relatively easily to a house and used for heating, or to a power station to produce electricity, but the same quantity of energy distributed as heat in the atmosphere is technically useless. Chapman uses the term 'fuel' to mean a source of technically useful energy, so that the aim becomes to 'conserve fuels' rather than to conserve energy. However, here I'll be using the term energy consumption, not fuel consumption, to mean the **conversion** of one form of energy to another, since there are cases where the distinction between technically useful and useless energy sources becomes very difficult to draw.

The basic unit of energy is the Joule (symbol J), which natural gas is now metered in directly in some places. Power, in a technical sense, is the rate of energy consumption, that is the rate of converting one form of energy to another, and it is measured in Watts (W). A power of 1W corresponds to consuming 1J of energy per second. For example a 100W electric light bulb is converting 100J of electrical energy into heat and light per second; and because practically everyone has a feel for the energy given out by a 100W bulb we'll use this as one of our basic 'experiential' units here. We do need another larger unit, however, and the single-bar electric fire, rated at 1kW (1000W) conveniently fits this bill. The 1kW is of course a **power** rating and to get the **energy** consumed in say one hour by the electric fire, we must multiply 1kW x 1 hour to get 1kWh (kilowatt hour) — this is in fact the definition of 1 unit of electricity. An appliance rated at 3 kW working for 2 hours would therefore use 3 x 2 = 6 kWh of electricity = 6 units.

It might at this stage be useful to look at the typical power rating of a range of energy-consuming devices⁴. A person sitting really still consumes food energy at a rate of only 20 W, but if he then gets up and runs up stairs, his power rating goes up to about 100 W, the same as that of a 100 W light bulb. The peak human power output, achieved only by super-fit athletes, is in the region of 500 W, but this is only sustainable for a second or two. (If anyone is interested in relating these figures to the energy content of food intake, 1 Calorie = 4200 J = 0.00118 kWh, and the average person consumes 2500 Calories per day.)

Not surprisingly, a 'classical' horse has a power rating of one horsepower, approximately 750 W, although most work horses can, if they feel in the mood, work harder than this. A simple machine tool such as an electric drill is rated at about 250 W, while the power tools used in

light manufacturing industry range from 1-10 kW. Motor car engines are in the 100 kW power region, but only a small fraction (approximately one fifth) of this power ever gets to the wheels for propelling the car forward. Railway locomotives consume energy in the 500 kW range, and, moving into the big consumer league, Concorde is rated at about 10 000 kW — equivalent to the rate of heat emission from 10 000 single-bar electric fires all going at once.

Filling in the Energy Capital Loss Form

Okay, we're ready to do the calculation at last, and let me say that it's certainly no more difficult than filling in a tax form, while being potentially a lot more rewarding.

Column A of the form lists the principal fuels used for domestic purposes in Australia, and Column B the corresponding energy contents of these fuels per unit quantity — that is, the maximum energy obtainable from unit quantity of the fuel when it is burnt completely⁵. The unit quantities — tonnes, gallons, litres etc. — in Column B should cover all those in which the fuel is purchased from your suppliers so that you can add up how much of each fuel you use per year directly from bills. (If you haven't kept them, make a few educated guesses!) It's best to do the calculation over a period of a year because domestic energy consumption varies considerably between winter and summer, largely due to the differences in use of space heating.

Electricity bills show how many units (kWh) used on the standard rate, for cooking, lighting, appliances etc, and on the cheaper night rate for water heating. We want the total number of units, but the division into these categories is very useful since it firstly gives a rough idea of how much could be saved using solar water heaters, and secondly tells you how much you would need to reduce other consumption in order to satisfy your electricity demand from a wind generator.

The energy content per tonne of coal from each State has been given since as can be seen the heating values vary enormously between coal mined from different regions. Brown coal, which is found only in Victoria, has a very high moisture content (65%) so its energy content is also low. For this reason it is powdered and compressed into briquettes, pellets with a higher heating value, for domestic use.

The most interesting feature about the energy content of petrol — and the other petroleum products — is that it is so high. 1 gallon of petrol can provide 44 kWh of energy, equivalent to the energy given out by 44 single-bar electric fires all on for 1 hour — all for fifteen frustrating miles in dense city traffic! So far as this calculation is concerned, only consider the petrol you use in your own car, including trips to work, pleasure drives etc., but excluding any official use of cars in the course of your work. Everyone who consumes the product of the firm you work for has a share in this latter energy consumption, and this is taken into account in consideration of indirect consumption described later.

And then there's firewood, the only fuel in this list which is renewable over a useful period. Wood, when dry, has an energy content of intermediate value compared

with the range of coals, so it provides a very valuable source of energy. Trees are themselves splendidly efficient, as well as beautiful, collectors of solar energy, and ecologically-minded tree farming is likely to play a major role in any sustainable energy economy.

Step 1 in the calculation: Enter in the total quantity of the various fuels you consume, measured in the appropriate unit, in Column C.

Don't forget to divide the total fuel used by each household by the number of people in the house in order to get per capita consumption. Calculating individual consumption of petrol for private use of cars has its problems because of varying car occupancy, but it is probably simplest just to divide total number of gallons used for private motoring by the number of people in your household who are regular users of the car.

Step 2 Multiply each number in Column C by the corresponding energy content given in Column B and enter the result in Column D.

For example, if you use 0.1 Tonne of briquettes per year, enter in Column D, the number $0.1 \times 7000 = 700$ kWh, and if 100 gallons of petrol a year, enter in D, $100 \times 44 = 4400$ kWh.

Step 3 Add up all the numbers in Column D, put the total at the bottom and then transfer it to Box E, your total direct energy consumption per annum in kWh.

At this point we have arrived at an estimate for personal direct energy consumption, but every time a manufactured item is bought, or a service used, energy is being consumed indirectly — the energy needed to produce that item or service. In an industrial society, in principle, all the energy consumed by industry and in the provision of services such as health, education, banking etc., is used equally for the benefit of everyone. We know of course that this isn't true because the wealthier you are the more goods and services you are able to use, and so you use a larger share of this publicly expended energy — the more you earn, the more you burn. To calculate precisely an individual's indirect consumption of energy is very difficult, since it would require a comprehensive list of the total energy consumed in producing all the goods and services available, and pages and pages of tedious arithmetic.

Luckily there's a simple way of getting in one jump an estimate of your total consumption — indirect and direct — once you know what your direct consumption is. This method assumes that the ratio between direct and total energy consumption is the same for everyone, and is equal to the average value of this ratio for Australia. One basis for this approximation is that if you are a heavy consumer of fuels directly you must have bought energy-using goods, such as big cars, fridges, washing machines, air conditioners, in order to consume this energy. Hence you are a heavy consumer of energy indirectly because of all the energy needed to produce these goods. Also people who buy a lot of energy-using goods usually buy a lot of consumer goods generally. Furthermore a simple relationship of this kind between direct and total consumption holds reasonably well for the various income groups in the U.S.A.⁶ Convinced?

Step 4 Multiply the number in Box E by 3.2⁷ to get an estimate of your total energy consumption — direct plus indirect — and enter the result in Box F.

The value in Box F can now be compared with the average per capita energy consumption per annum for Australia. It is also helpful to calculate the equivalent continuous rate of consumption corresponding to your total — this gives your average power rating as a consumer of fuels. To get this rating divide the number in Box F by 8760 (the number of hours in a year) and enter the answer in Box G. The Australian average power rating is given in Box H.

The Efficiencies of the Fuel Industries

On the subject of indirect energy consumption, the energy consumed in the various fuel industries in providing one unit of energy at a household is very revealing. Of greatest note is the (in)efficiency of electricity generation and distribution, which for Australia has been estimated as only 25%⁸. This means that for every 1 kWh of electricity used in the house, 3 kWh of primary energy have been expended in transporting and mining the fuel, in building power stations, and in generating and distributing the electricity to the point of use. Electricity used for household water and space heating is therefore a grossly energy-inefficient process, because the fuel used to produce the electricity could have been converted directly to heat at the point of use with an overall energy-efficiency of above 80%. In fact Chapman⁹ estimates the overall energy efficiency of coal production and distribution in the U.K., as 95.5%, and for oil 89.6% and gas 81.1%.

The only other estimate of fuel-industry energy efficiency for Australia that I've been able to find is approximately 70% for petrol¹⁰ — that is, every time you use a gallon of petrol you are consuming no less than 63 kWh of primary energy, 44 kWh directly in the car engine and the other 19 kWh indirectly as a result of energy needed to obtain oil from the ground, get it to the refinery, refine it, and distribute the petrol to a garage.

Energy Shopping List

While it's prohibitively difficult to calculate indirect energy consumption exactly, estimates have been made of the total energy costs of quite a range of commodities — that is, the sum of all the primary energy expended in the course of getting the raw materials for, producing, and transporting these commodities to the place at which you can buy them. The table opposite gives these total energy costs in kWh.

The values given are for unit mass or volume etc. — they present energy-intensity — so of course the amount of energy you consume indirectly by buying these items depends on how much of each item you buy. For example, coffee has the extraordinarily high energy-intensity of 86 kWh per kg, but unless you are an amazing coffee addict you will consume much more energy as a result of, say, the much larger quantity of cheese you eat.

Energy shopping list

Item	Total Energy Cost (kWh)	Item	Total Energy Cost (kWh)	Item	Total Energy Cost (kWh)
<i>House Construction</i> ¹²		1 kg bacon	36.1	Record player	525
Steel	per kg 10.4	1 kg chicken	27.1	3 piece suite	5000
Aluminium	per kg 67.5	1 kg beef	22	Dining table	1000
Copper	per kg 15.9	1 kg fish	59	Bed	820
Zinc	per kg 15.7	1 kg tea	42	<i>Clothing</i> ¹¹	
Lead	per kg 14.0	1 kg coffee	86	3 piece suit	475
Brick	per kg 1.3	1 kg sugar	8.1	Dress	110
Terracotta		1 kg biscuits	13.6	Pair of shoes	62
tile	per kg 1.3	1 kg chocolate	17.6	Raincoat	145
Glass	per kg 6.2	1 kg potatoes	0.7	Shirt	54
Concrete	per kg 0.2	Can baked beans	6.8	<i>Miscellany</i> ¹¹	
Cement	per kg 2.2	1 pint beer	3.5	Bottle of	
Plaster	per kg 0.31	1 pint whisky	157	perfume (150cc)	104
Plaster		<i>Packaging</i>		Newspaper	0.6
board	per kg 0.98	Supermarket		Glossy Mag	2.6
Plastics	per kg 9.4	plastic bag	0.055 ¹³	Paperback book	4.5
Wood	per kg 0.1	16 oz nonreturnable bottle	1.76 ¹³	<i>Transport</i> ¹¹	
Total energy cost of average Australian brick veneer house		Returnable bottle (can be used 10-15 times)	2.3 ¹¹	Bicycle	1700
46200		<i>Household appliances, Furniture</i> ¹¹		1000cc car	22500
<i>Food and drinks</i> ¹¹		Washing machine	2100	Railway loco	1.4x10 ⁶
Loaf of bread (ex bakery)	4.4	Refrigerator	1450	Ship (100,000 Dwt tons)	500x10 ⁶
Pint of milk (ex dairy)	2.40	Vacuum cleaner	650	<i>Power Generation</i> ¹¹	
Dozen eggs (ex dairy)	5.76	TV (colour)	6900	Oil rig	2500x10 ⁶
1 kg cheese	13.6	TV (black and white)	1650	Coal-fired power station	2700x10 ⁶
		Transistor radio	430	Nuclear power station	10200x10 ⁶

Total energy costs of a wide range of goods — that is, the total energy consumed in making the goods and getting them to the place where you can buy them.

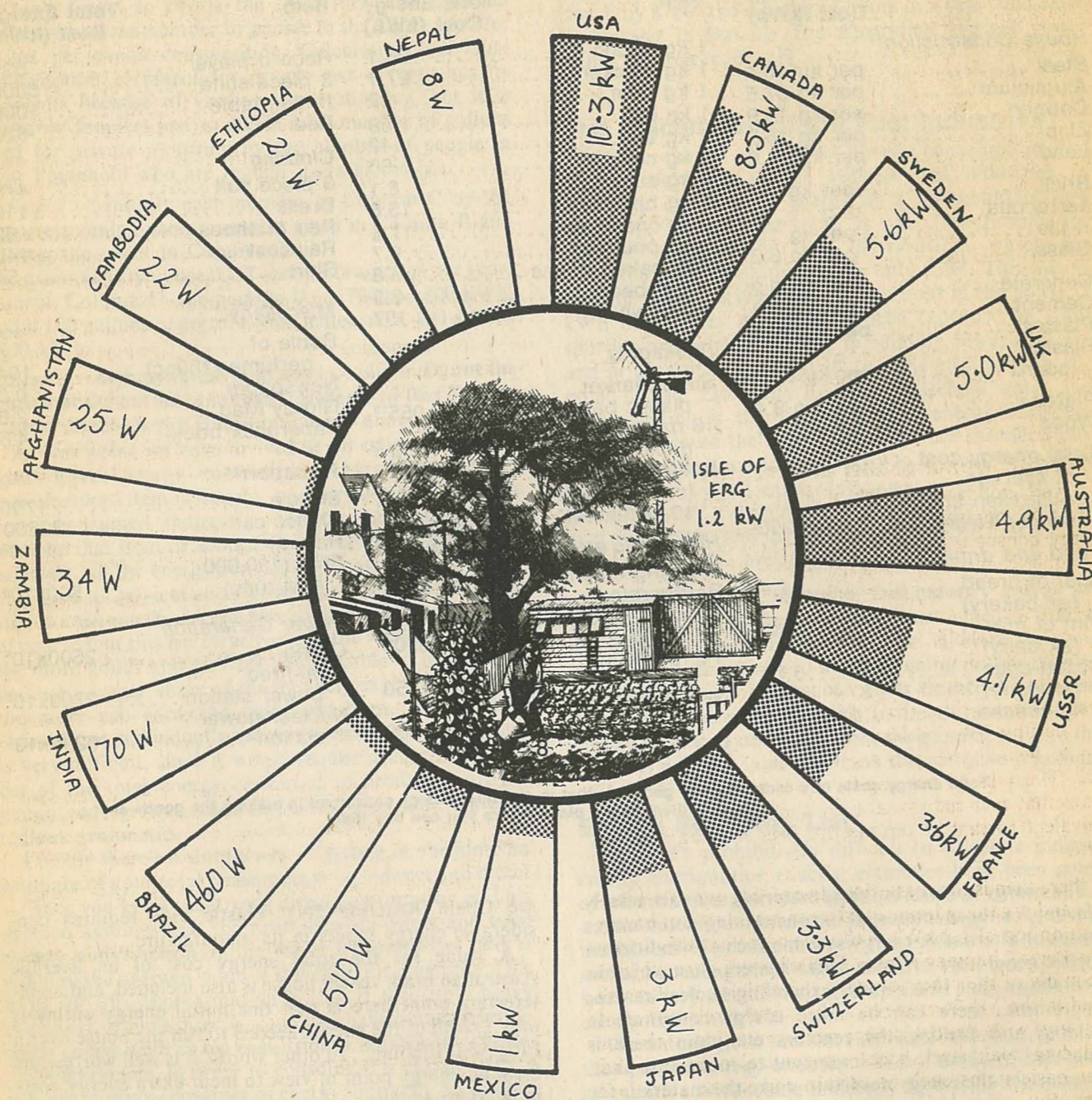
The energy costs of building materials are particularly relevant for those interested in constructing autonomous houses or alternative energy systems such as wind-driven electric generators or solar water-heaters. Just as it has been shown that in a rapidly expanding nuclear reactor programme, there can be more energy consumed in building and fuelling the reactors etc, than there is generated by them¹⁴, it is important to make sure that, for example, the energy needed to make the materials for a wind generator is not greater than the energy that we can reasonably expect to be recouped over its lifetime of operation. As can be seen from the table, metals are very energy-intensive, especially aluminium (not to mention the social costs of producing this metal possibly from bauxite mined from Aboriginal land at Gove or Weipa —

see Chain Reaction 2(1)). Plastic also requires considerable energy inputs in its manufacture.

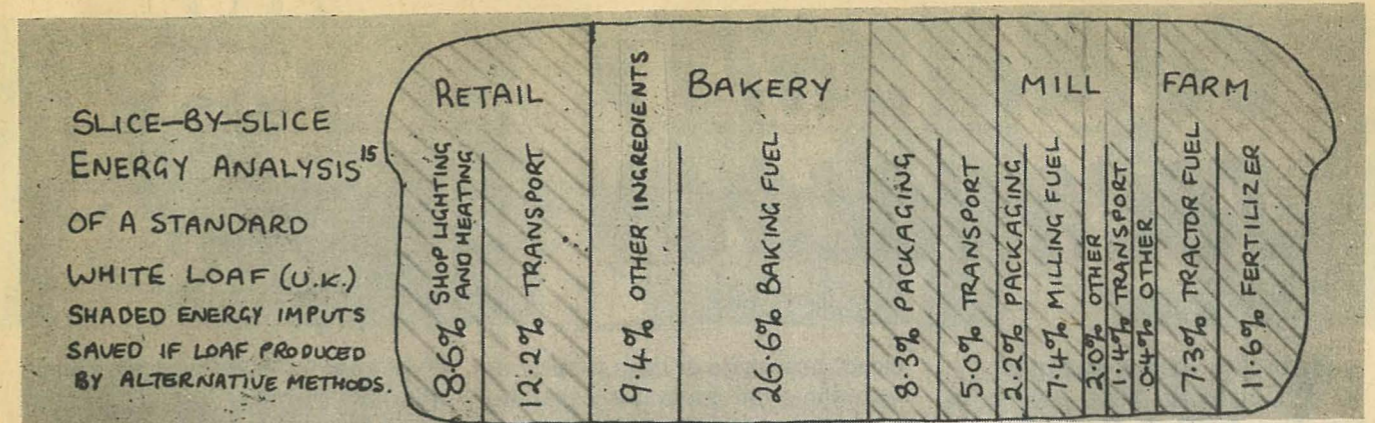
A value for the total energy cost of an average Australian brick veneer house is also included, and an interesting point here is that this initial energy outlay is only 1/20th of the energy needed to run the house over a forty-year lifetime¹². In other words, it is well worthwhile from an energy point of view to incur extra energy costs in building a house — for example, by using thick layers of insulation — if this means that running costs are substantially reduced.

The table also shows the very high energy-intensity of foodstuffs (i.e. the energy needed to produce and distribute them, not their calorific value) as produced by modern agricultural methods. These large fuel inputs are

ENERGY AND INEQUITY



Per capita rates of energy consumption (personal power ratings) around the world.



highlighted in a slice-by-slice analysis of the fuel inputs to the production of a standard white loaf of bread in the U.K.¹⁵. An analysis of this kind is very helpful because it enables us to see how much energy would be saved if the bread was produced using alternative methods. So if this loaf was produced using only organic fertilizers and no tractors, the flour ground using a windmill very near the place where the wheat was grown, the bread baked and sold in the local village bakery, with no packaging being used throughout, only the non-shaded portion of the loaf remains as the fuel input. The energy expended per loaf is reduced by about 65%.

Energy Consumption around the World

If you managed to stick with the calculation, the illustration opposite will allow a comparison of your energy consumption with per capita consumption in a few other countries around the world¹⁶. (The values given refer to fuel consumption only and do not include the energy people consume directly simply by eating. As can be seen, metabolic energy becomes a very significant quantity in countries such as Nepal and Ethiopia.) Australia's per capita energy consumption has multiplied about 20 times since the arrival of the first fleet, and we now occupy fifth position in the energy consumption league, behind the U.S.A., Canada, Sweden and the U.K. The U.S.A. per capita power rating of 10.3 kW means that each individual is consuming energy at a rate equivalent to that of ten electric fires burning day and night.

Where then is the mysterious Isle of Erg, with its windmills and organic gardens, and a per capita rate of energy consumption of 1.2 kW? Well, I've borrowed this dream from Peter Chapman's book *Fuel's Paradise* (to which I owe many of the other ideas for this article). It's a small island in the Mediterranean with a totally self-sufficient economy, with limited government-owned industries for producing coal, steel, some agricultural products, and other basic items such as certain chemicals, glass and paper. But every house has a windmill, a solar water-heating system, a wood boiler, and a large organic garden, and the majority of products are made by local village craftsmen. The level of per capital energy consumption Chapman arrives at is about twice that of China and about quarter that of Australia, and it seems a

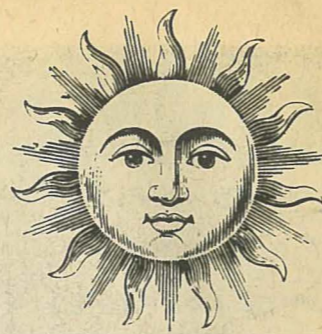
fair estimate of a level of consumption which is conducive both to a sustainable economy and to a convivial society.

Interestingly this 1.2 kW rating corresponds quite well with the value of per capita wattage for conviviality suggested by Illich in the opening quote. His lower value, the typical power consumption in the Third World, is approximately a few hundred Watts, while his upper limit corresponding to the power commanded by a Volkswagen driver, is about 6 kW (40 horsepower engine = 30 kW, 20% efficient). In conclusion, this 1 kW value should not be taken too literally, but it does serve as a rough guide as to the sort of energy level required from the alternative-technology devices which we'll be looking into in future issues.

Notes and Sources

1. *A Time to Choose*, Energy Policy Project of the Ford Foundation, 1974 (Ballinger, Cambridge, Mass.), p.127.
2. See *Tools for Conviviality*, Ivan Illich, 1973 (Calder and Boyars, London), for a full exposition of the meaning of 'convivial' used in this special sense.
3. *Fuel's Paradise*, Peter Chapman, 1975 (Penguin Books, Harmondsworth), p.23.
4. Ref.3, p.38.
5. Values taken from *End Use Analysis of Primary Fuels Forecast 1971-72 to 1984-85*, Petroleum Branch, Dept. of Min. and Energy, 1974.
6. See ref.1, p.127.
7. Average domestic consumption per capita taken as 6100 kWh (ref.12), average per capita petrol consumption as 7330 kWh (10,000 miles per car per annum, 20 miles per gal., 3 people per car), and Australian total per capita consumption as 42,900 kWh (ref.16).
8. *The Electricity Supply Industry in Australia, Year 1972-3*, Electricity Supply Association of Australia, 1974.
9. Ref.3, p.44.
10. *Energy for Australia*, A. H. Corbett, 1976 (Penguin Books, Harmondsworth), p.112.
11. Ref.3, pp.56-57.
12. *Energy Costs of Dwellings*, E. R. Ballantyne, 1975 (available from CSIRO Division of Building Research, Highett, Vic.).
13. *Energy and Food*, Albert Fritsch and others, CSPI, 1975.
14. *Non-Nuclear Futures*, Amory Lovins and John Price, 1975 (FoE, London).
15. See ref.3, p.54.
16. *UN Statistical Yearbook 1972*. The values given refer to fuel consumption only and do not include the energy people consume directly simply by eating. As can be seen, metabolic energy becomes a very significant quantity in countries such as Nepal and Ethiopia. Note: energy statistics in countries which are at a low level of industrialisation are unlikely to take into account fuels like wood which are grown and used locally.

COMMUNITY TECHNOLOGY



How To Get Negative Electricity Bills And Do The SEC A Good Turn

Hans Meyer and his friends at the Windworks commune in the southeastern Wisconsin hills of the USA have come up with an ingenious device for converting the variable d.c. voltage output from a wind generator into stable-frequency a.c. at either 120 or 240 V.

The device, called the Gemini Power Conversion Unit (PCU), is designed for operation in conjunction with a.c. mains power, so that whenever your wind generator is not producing enough power to meet your demand, the PCU automatically draws on the mains to make up the deficit.

But here's the stroke of genius. When your wind generator is generating more than you need, the PCU feeds the excess power back into the power lines, and actually runs your electricity meter backwards!

As Meyer puts it: "The power-distribution network becomes an essentially infinite storage medium, freely transferring power between the d.c. source, the a.c. lines, and the load".

This system therefore needs no storage batteries. Instead you're 'storing' any power in excess of your needs in the grid system. On the one hand, each unit of electricity stored in this way gives you the economic benefit of a lower electricity bill (because the meter has been run back by one unit), and on the other it means that you've saved energy for the electricity commission (because they've had to generate one unit less).

The PCU sets the voltage, fre-

quency and phase of the a.c. derived from the wind generator equal to those corresponding to the mains a.c., so that you can switch from one a.c. source to another in the home, and so that the power fed back into the lines does not mess up the grid system's waveform.

When power company officials in Wisconsin inspected the Windworks PCU they accepted its safety and allowed its use, but they weren't too happy about their meter being reversed because it meant that they were having to buy power at retail rates!

They therefore installed a ratchet

COMTEC

Have you had a brilliant idea for a solar, wind, water, biofuel or other alternative - technology device? Have you built one already, or come up against a knotty problem that you'd like some help with? Then why not write to Comtec and share your experience with others.

And what do you think the characteristics and aims of an alternative technology should be? Should it always be small-scale, is it really an alternative if say solar heaters are mass-produced like cars, what relevance does it have to our cities today, to all those working in process jobs in factories or cubicled away in offices? Can we overcome the problems that exist in our society - environmental, political, psychological and so on - simply by changing the technology we use? We'd like to hear from you on these and other questions and we'll publish feedback in future issues of CR.

to stop the meter reversing, together with another meter to measure how much electricity Windworks were feeding back into the grid.

The question of how much money Windworks will be allowed for the power fed back is now in the hands of the state's power commissioner.

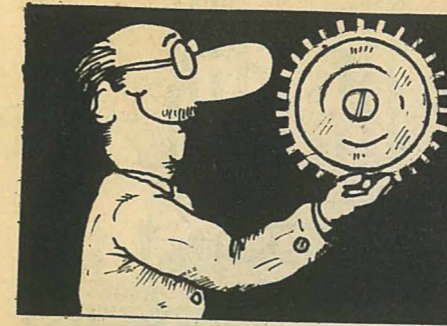
We feel sure the Australian SECs would adopt an enlightened attitude should people start building PCUs here. After all it would mean they could save energy, and not have to build as many power stations, which are not so easy to site these days.

However, PCUs are very expensive - Windworks sell them for US \$1200 a unit. And even though you don't need battery banks, you do need power lines to your house, which is what most people interested in wind power are trying to get away from.

For further info, write to: Windworks, Box 329, Route 3, Mukwonago, Wisconsin 53149, USA.



It's always good to see a wind generator actually working and being used, and here's one with a bright yellow prop that you can see in the back streets of Sunbury, atop Jeff Farmer's Sunbury Auto Electrical Service workshop. It's a 1 kW mill and Jeff uses it for charging auto batteries. The prop blades are hollow, made from tin sheet folded to form an aerofoil section.



WORKERS DO THEIR OWN NOISE MONITORING

The shop stewards at Ford's car components factory at Leamington Spa, Warwick (U.K.) have recently been organising with technology for better working conditions. Their ally in the struggle was a simple noise meter to measure the legality or otherwise of clattering automated machinery.

The convenor using the noise meter was summarily brought to the plant's personnel manager, who charged him with a disciplinary offence - the "possession of an unauthorised device". His attitude spoke volumes - and the convenor informed him that his volume was topping 90 decibels - rather noisy in fact, and could he please calm down. The ensuing outburst registered at over 100 decibels, he was told, quite an 'orrible earful.

Would he like to take this case to national level, and would Ford management claim (but quietly) that workers might not measure the safety of the plant for themselves? Perhaps not.

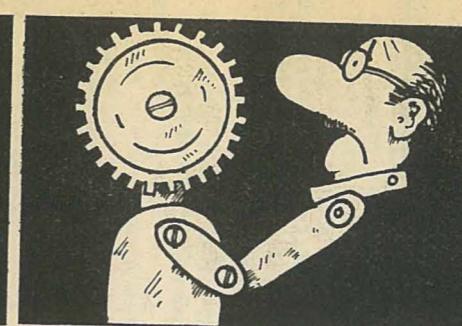
When the noise level on the shop floor was measured, it was indeed found to be over the legal limit of 90 decibels. Ford may be forced to take action to reduce the noise made by factory machinery.

(Undercurrents, No. 12, 1975)

Wind Power and Workers' Solidarity

Farm workers in Kenya have been supplied with a wind-operated water mill for irrigation by a group of workers in Copenhagen, Denmark.

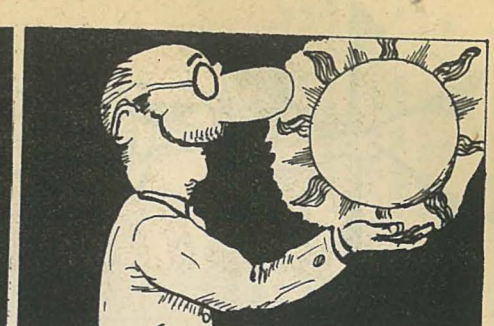
The 13 members of the group, called Folketeknit, developed a low-cost prototype windmill during their



spare time and the technology was transferred to Kenya by one of the workers on his annual holiday. His fellow workers in Copenhagen contributed \$1700 to the project.

"The way the world is run at the moment it's the white countries who decide how much we should pay for the poor countries' materials. But we feel people are one all over the world and we can and should help their conditions", explained Erik Hannerik, one of the group.

Source: *Yes But What Can I Do* (newspaper), 1976.

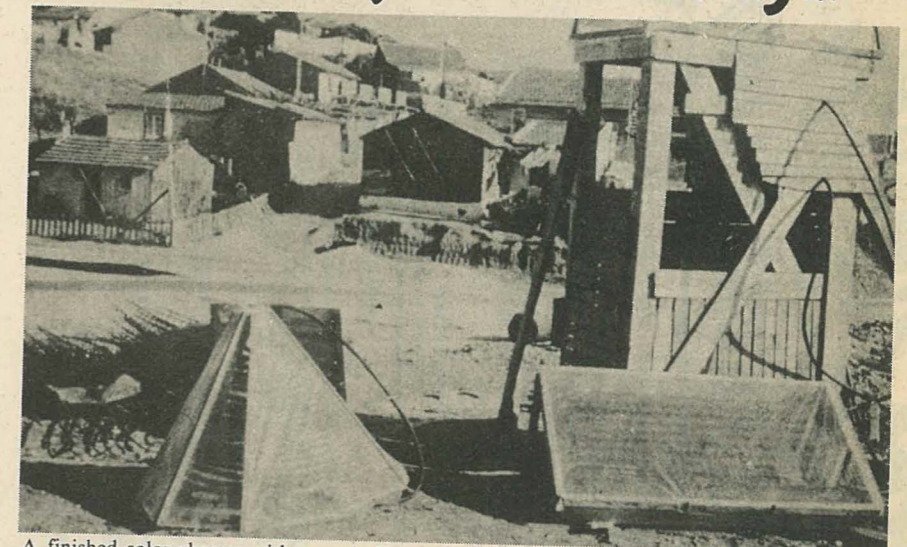


ALTERNATIVE ENERGY FOR NT

The Northern Territory Environmental Council has recently started an alternative energy news bulletin called *Solarwise*. The DIY and other information given is aimed primarily at those living in the tropics, but there's a lot that's of general interest as well.

If you're interested in being on the mailing list for *Solarwise* send \$5 (or any donation you can afford) to *Solarwise*, P.O. Box 4783, Darwin, NT 5794.

Revolutionary heat in Portugal



A finished solar shower with a conical solar collector (left) and a corrugated-steel model (right), built by members of the London-based AT group, Street Farmers, during their three-week participation last year in a village-improvement scheme at Bairro de Liberdade, a shanty village 40 km from Lisbon. Here's how they describe making the conical collector:

"We collected some scrap wood from around the site and began making a pyramid from six 40 mm x 25 mm struts on a flimsy base. We wrapped 15 m of PVC piping around it in a conical spiral and insulated the inside with screwed-up newspaper. We then covered the cone with sheets of transparent

polythene.

"This whole operation had caused considerable interest. To enquiries along the line of, 'What the hell's that?' we were limited to reply by holding the inlet pipe saying 'aqua fresco', performing a spiral motion tracing the line of the pipe, pointing to the sun, then holding the outlet pipe saying 'aqua calor'."

"The actual thing we built is not that important; it is not really necessary that people use it. We intended it as a symbol that technology need not be alienating, that there are alternatives to big centralised systems, that work can be directed to social benefit, and that people from other countries are willing to help" (from *Architectural Design*, Oct. 1975)

BOOK REVIEWS

Confronting the Future

by Charles Birch
(Penguin Books, Harmondsworth, 1976)
\$2.95

Many books have been written about the future since Paul Ehrlich wrote *The Population Bomb*. Some have been in the form of "doomsday writings", others have been bland observations on the folly of Western society.

This book by Professor Birch is not in the doomsday vein though there is a note of urgency that runs through it. In an easily readable style the author points out that the future is now, and if we are not to be overwhelmed by it, there will have to be profound changes in our values and institutions.

Much of what Birch says has been said before, but the strength of this book lies in its relevance to Australia. Much of it is about the Australian condition in today's world and the possibility that this country may be able to exert some leadership in shaping a "sustainable society". To shape such a society there would have to be change, and Birch sees the possibility for change in Australia as perhaps greater than anywhere else.

There are many reasons why this is so: self-sufficiency in food, extensive resources, large land area etc. These factors allow for a degree of flexibility that other countries do not enjoy.

In order for there to be change in Australia and the rest of world there will have to be a revolution in the relationship of humanity to the earth and human to human. The seeds of this new society can be seen today with the quest of small groups towards finding new lifestyles with more humane values, and with the rise of community action groups. This is a grass-roots revolution that must succeed if we are to move away from a society that advocates growth for growth's sake.

A quote Birch takes from Henry Schoenheimer sums up the two choices society has:

"If our children are to survive at all it will be as members of one kind or another of global community: they will inherit either a global fascism, with the affluent technologised and hypermilitarised master races furiously antagonistic amongst themselves... or they will inhabit a universally humanistic earth on which concern for all mankind has been

translated into an era of peace and reasonable plenty. There are no other alternatives."

There are those who say that it is already too late to build a humane and peaceful society and that all efforts to do so will be in vain. However, Birch points out that there is a new world struggling to be born. Whether this new world will be strong enough to survive will depend on the actions of people alive today. If we do not try there is no hope.

That is a message for us all.

Herb Fenn

Losing Ground: Environment Stress and World Food Prospects

by Erik P. Eckholm
(Norton, New York, 1976) 223 pp.
US price US\$3.95

In a new book, *Losing Ground: Environment Stress and World Food Prospects*, Erik Eckholm says accelerated soil erosion, the spread of deserts, increasingly severe flooding, and declining soil fertility are the soft underbelly of world development efforts. They directly undermine the struggle of poor countries to achieve food self-sufficiency and to improve the standard of living of their populations.

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The current trend is toward an emphasis on "soft technology" manuals that are regional (30,000 square kilometers) in scope, research, documentation and sorting that may lead to calendar! or almanac style files that would serve as a basis for a publications program through 79/81, or about that time.

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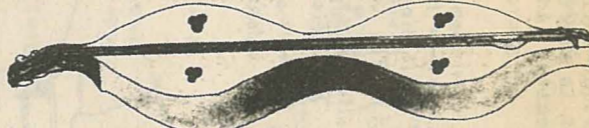
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FOE Melbourne has recently arranged with Morgan Mackay, a well-known maker of handcrafted dulcimers, that FOE acts as a retail outlet for his wares. We are doing this primarily to improve our finances - but we are sure that its the type of product for what Illich calls a convivial society.

The price is \$55.00. (Buyers from other capitals must add on an allowance for packaging and freight: Sydney \$5; Adelaide \$4.50; Brisbane \$5.50 and Perth \$6.20).

In the past, comments Erik Eckholm, a Senior Researcher with the Washington-based Worldwatch Institute, concern for environmental quality has focussed on pollution of the air and water. But he argues that an even more serious problem, with even deadlier consequences, is the loss of productivity of farmlands in poor countries, heading to the possibility of catastrophic agricultural collapses over large areas. These may occur with increasing frequency, causing famines and requiring major international emergency-relief efforts.

As human-caused stress on an ecosystem builds up, the capacity of the vegetation and the land to withstand climatic extremes without major damage is reduced. What formerly would have been a difficult period of low rainfall becomes a period of famine, with abandonment of once productive fields to desert sands. What might have been a serious flood becomes a calamitous one, washing away a year's harvest and a layer of fertile topsoil that took many centuries to produce.

The technical means of ecological recovery are generally known, says Eckholm. They include the control of grazing and herd sizes, improved farming techniques, tree planting, and slowing population growth. The implementation of these solutions — often involving land reform, breaks with traditional cultural patterns, and shifts in national priorities — faces formidable political obstacles.

"Political leaders and development planners at all levels have often failed to place agriculture in its inescapable ecological context. For example, nowhere were forests so much as mentioned in the dozens of resolutions directed to eliminate hunger passed by the Rome World Food Conference of November, 1974, despite the accelerating deforestation of Africa, Asia and Latin America and its myriad effects on food production prospects," Eckholm points out.

The trends charted in *Losing Ground* do not point towards a sudden cataclysmic global famine, he concludes. What appears most likely, if current patterns prevail, are

chronic depression conditions for the fourth of humankind that is economically and politically marginal.

"Marginal people on marginal lands will sink slowly into the trough of hopeless poverty," he says. Some will continue to wrest from the earth what fruits they can, others will turn up in the dead-end urban slums of Africa, Asia, and Latin America. Whether the deterioration of their prospects will be a quiet one is quite another question."

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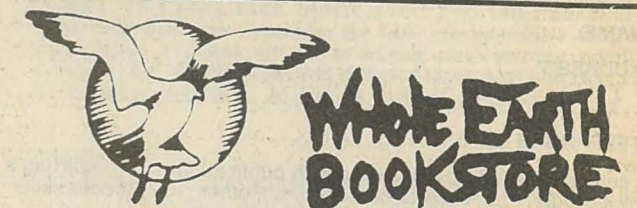
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Melbourne: 51 Nicholson St., Carlton 3053. Phone 347 6630.

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Book 1: The Mapoon Story by the Mapoon People. The history of the invasion of Mapoon on the Gulf of Carpentaria successively by white explorers, cattlemen, missionaries, and now mining companies in search of bauxite — recorded in the words of the local aboriginal people. (\$1.80)

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Book 3: The Cape York Aluminium Companies and the Native People. A penetrating indictment of the policies and actions of Comalco, C.R.A., and of the other companies involved with them in the mining of bauxite on the Cape York Peninsula — how mining has affected aboriginal peoples both in Australia and elsewhere in the world. (\$1.80)

Published by, and available from, International Development Action, 73 Little George St, Fitzroy, Vic. 3065.

URANIUM DEATH WISH

A uranium mining/nuclear-power game. Players take up the roles of uranium miners, power utilities and nuclear-weapons manufacturers and 'generate' as much electricity as possible while maintaining environmental quality. But eventually environmental quality is lost as uranium deposits are mined and as electricity is 'generated'. Available soon.

TOTEM AND ORE

By Sreten Boszic, an anthropologist who has lived with a number of aboriginal tribes in North Australia. This manuscript is a damning critique of the government and mining companies in their operations in Northern Australia — raping the land and decimating the people in order to reap profits for foreign companies and payoffs for a small local elite. With particular reference to Yirrkala (Gove Peninsula) with its bauxite, and Oenpelli with its uranium, this book gives an irrefutable argument for immediate and total land rights for Australian Blacks and a basic restructuring of the mining industry. About 160 pages, including about 40 black and white photographs. Out soon.

URANIUM DEADLINE

Uranium Deadline provides a comprehensive, up-to-the-minute summary of developments in the nuclear debate both in Australia and overseas, together with background information and commentary to set these developments in context. Compiled by FOE staff, it is the only way of keeping fully informed about the multi-faceted and immensely nuclear power issue. All the vital information that has not appeared in the press, or on the radio and TV, you'll be sure to find in *Uranium Deadline*. Individual copies — 50 cents; subscriptions — \$6 per year for individuals and libraries, \$10 for other organisations/institutions.

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PUBLICATIONS

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URANIUM — METAL OF MENACE

This book, published by the Australian Conservation Foundation, is one of the best introductions to the arguments against the export of Australian uranium and against nuclear power generally. It deals with the hazards associated with each stage of the nuclear fuel cycle, theft and sabotage of nuclear materials, proliferation of nuclear weapons, the biological effects of radiation, and alternative energy strategies. Contributors include: Dr W. S. Charters (Chairman, Dept of Mech Eng., University of Melbourne), Mr F. P. J. Robotham (Radiation Protection Officer, University of Melbourne), Dr M. Charlesworth (Reader in Philosophy, University of Melbourne), Dr D. McPhee (Lecturer in Genetics, LaTrobe University), and Dr T. M. Sabine (Head Dept of Phys. Sci, NSW Inst of Technology). Available through FOE for \$1 (postage 20 cents extra).

FOE'S URANIUM STUDY

With the aid of a Federal (Labor) Government grant FOE carried out an intensive study of the major social, political and technical implications of uranium mining and nuclear power. This study was the basis for FOE (Vic.)'s submission to the Ranger Uranium Environmental Enquiry between Sept 1975 and March 1976. Topics covered include the local environmental impact of the Ranger mine, the impact of U-mining in the N.T. on aboriginal communities, reactor safety, waste disposal, nuclear economics, nuclear power and Japan and the Third World, nuclear proliferation, implications of N-power for civil liberties. Compiled by FOE staff and FOE advisers in universities, industry and government. Cost \$12.

WORLD ENERGY STRATEGIES: FACTS ISSUES AND OPTIONS by Amory Lovins. Foreword by Hannes Alfvén

For those seeking responsible energy decisions around the world, and uncertain which experts and which numbers to trust, this is a careful assessment of the constraints upon already inadequate energy resources. Lovins suggests where the merits may lie in technical dispute and shows what energy options exist for the long-term and what short-term actions must be avoided if we are to preserve those options. (Co-published with Ballinger.) 132 pages \$4.50 plus 60 cents postage. (Price to FOE members, \$3.50 plus 60 cents postage.)

NON-NUCLEAR FUTURES: THE CASE FOR AN ETHICAL ENERGY STRATEGY by Amory Lovins and John Price

The authors describe some economic and ethical matters that should no longer escape our attention. The book enables intelligent, concerned people to correct the executive's failure to take notice. In different ways, the authors explain the unattainable amount of capital needed for the nuclear dream, so unattainable as to be ridiculous, yet sought nonetheless because advocates have not bothered to do their sums carefully enough. (Co-published with Ballinger Publishing Company.) 224 pages, \$5.00 plus 60 cents postage. (Price to FOE members \$4.00 plus 60 cents postage.)

RADIOACTIVE POLLUTION OF THE ENVIRONMENT BY THE NUCLEAR FUEL CYCLE by John P. Holdren

The 10 page revised edition of 'The Holdren Papers' — the nuclear fuel cycle is precisely explained, with particular emphasis on the hazards associated with each stage in the operation of the nuclear power industry. 20 cents plus 18 cents postage.

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The story of the yacht FRI, as told by its crew, during the nuclear protest voyage to Muroroa Atoll in 1973. The seizure of the FRI by the French Navy is strikingly illustrated — as is the rest of this book. 138 pages sewn paperback \$5.85 includes postage.

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KOGAI — THE NEWSLETTER FROM POLLUTED JAPAN

Produced by the Jishu-Koza citizens action movement, this magazine is an excellent source for anyone interested in pollution in Japan. \$2.50 for the first six issues from 1973-1974. Subscriptions via FOE: \$2.00 a year for four copies, postage included.

NON-NUCLEAR FUTURES by Amory Lovins

This pamphlet is an excellent summary of Lovins' book. It is a reprint from a *Not Man Apart* 8-page centrespread, August 1975, 20 cents plus 18 cents postage.

THE INCIDENT AT BROWNS FERRY by David Comey

Reprint of *Not Man Apart* centrespread, an 8-page account of the worst reactor incident during 1975. The reactor came very close to a core melt-down. 20 cents plus 18 cents postage.

CHAIN REACTION VOL. 2, NO. 1

Articles on: The Ranger Enquiry, The Pain of Minamata, Conservation in China, The Browns Ferry Incident, and the Chain Reaction Interview with John Price, co-author with Amory Lovins of *Non-Nuclear Futures*. Price: \$1.

IS RECYCLING THE SOLUTION? by Ian Pausaker

This new paperback is perhaps the most comprehensive and hard-hitting book available on the packaging and recycling rip-off in Australia. Full of facts, references and good ideas. Available from FOE at the special price of \$1.20 postage included. 93 pages.

FOOD

An information and ideas booklet put out recently by the RMIT Food Coop Sections on Growing Your Own—Why China Doesn't Starve — Growing Shoots — Foods We Shouldn't Eat — Food to Eat — Controlling Pests Without Eliminating Humans — Recipes — Herb Guide etc. etc. 25 cents each or 50 cents posted. 40 A4 pages.

THE INCREDIBLE ROCKY

The Australian reprint of a U.S. comic book describing the amazing adventures of the Rockefeller family and the operations of multi-nationals in general. 75 pages. 75 cents plus 30 cents postage.

INSIDE MICRONESIA—WHO GIVES A DAMN?

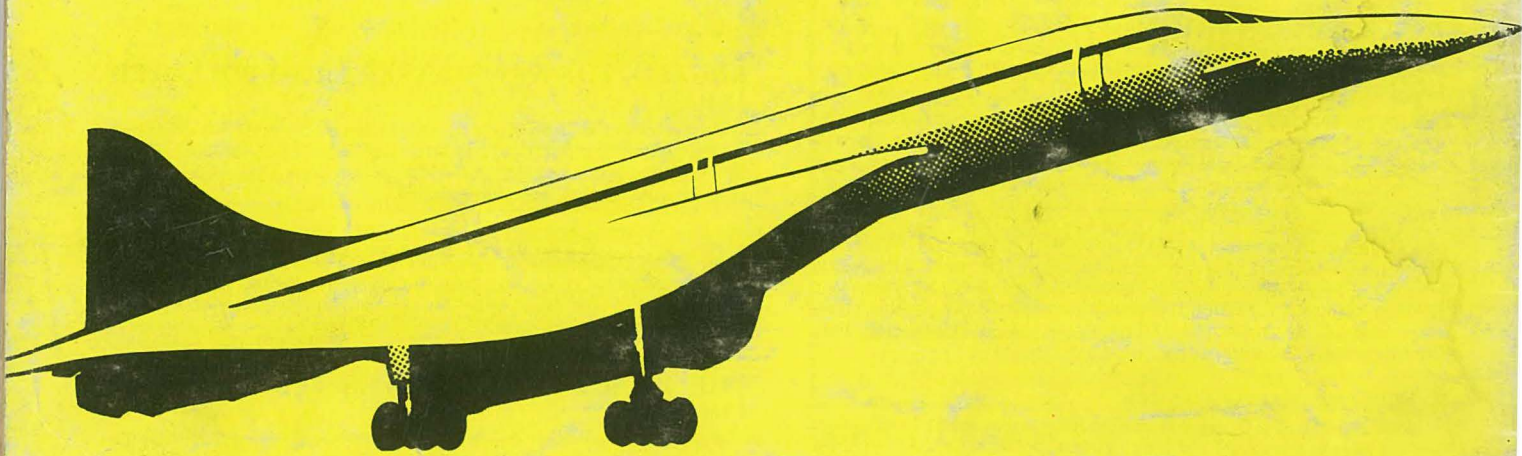
A reprint of a centrespread, this is a review of the new book in the *Earth's Wild Places* series, entitled *Micronesia — Island Wilderness*; The U.S. is trying to annex the North Islands for Military Bases — and will possibly destroy the Micronesian people in the process. 20 cents plus 18 cents postage.

FORESTRY MASSACRE

This FOE tabloid gives a national overview of the ecologically disastrous woodchip and pine-planting industry in Australia. Single copies — 10 cents each plus 18 cents postage. Bulk copies (10 or more) 5 cents each plus 30 cents postage.

RUSH TO DESTRUCTION by Graham Searl

An appraisal by FOE New Zealand of the rape of the beech forests in that country. Sewn paperback, 218 pages with photographs. \$4.25 or \$3.75 to FOE members. 60 cents postage.



IF WE COMPARE the six days of creation in Genesis with the four thousand million years of the earth's age, all day Monday and half of Tuesday is just a construction project. At Tuesday noon a living cell appears and undergoes mitosis. All the rest of Tuesday and Wednesday, Thursday and Friday and well into Saturday, life expands and becomes more diverse, more stable, more beautiful.

At four o'clock on the afternoon of Saturday, the last day of creation, the age of reptiles comes on stage. Just before the age of reptiles ends there are redwoods — and just before redwoods, the pelican (a 90-million-year-old life form now threatened with extinction by DDT and man's urge to usurp the earth).

At three minutes before midnight humanity appears. One quarter of a second before midnight a bearded man comes, antiestablishment, talking of peace and brotherhood, and Christianity is on the planet.

Then, one fortieth of a second before midnight, enters the industrial revolution. It is midnight now, and who will dare to propose that we slow it down? So far, growth- and pollution-addicted nations have been asking for still more speed. Overdeveloped, underdeveloped and normal nations alike believe that some kind of technological magic will stretch a finite earth. There is no such magic. Technology accelerates the liberation of resources, yes, but it is not creating them; it is finding and moving and using them up, then looking for the energy to repeat the process with progressively poorer materials, moving them faster, making them smaller, less recoverable fragments for a diminishing proportion of the earth's growing masses of people. Wisely used, technology should enable us to do more with less, but the change to such use has barely begun. We have not yet learned to ask, before undertaking a vast project, What does it cost the earth?

From a pamphlet by David R. Brower of the American Friends of the Earth.