THE SAFE ENERGY JOURNAL

SCRAM

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Lords back energy efficiency

Fusion – still out in the cold

Insulation projects fight back

Radiation reviewed

Sustainable development

Uranium mining in Australia

Energy efficient white goods

Torness: Thatcher's Triumph?

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This Journal is produced for the British Anti-Nuclear and Safe Energy movements by the Scottish Campaign to Resist the Atomic Menace (SCRAM).

We welcome contributions of articles, news, graphics and photographs.

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COMMENT

Almost nine months ago we asked "what conceivable purpose is there in reprocessing nuclear waste if there is no prospect of using plutonium for electricity production?"

Walter Marshall, himself, admits not only that "storing spent Magnox fuel in water [was] a mistake," but he also concedes, "we should have put the AGR fuel into dry storage".

Failure to do this, which environmentalists argued for at the Windscale Inquiry, in 1977, means that we are heading for a dangerous pile up of nuclear waste in Sellafield's storage ponds and presumably at all the reactor sites around the country as well.

It gets worse. We have now learnt that a full quarter of the initial 6,000 tonnes to be reprocessed at the Thermal oxide Reprocessing Plant (THORP) over the next ten years has been reserved for overseas customers, who, probably unable to believe their luck, have contracts which do not allow for the waste to be returned. It is ours to keep for ever, and ever.

The costs for reprocessing spent fuel have increased so much (100% between 1978 and 1983) that the pre-privatised generating Boards are starting to get cold feet. Head of CEGB nuclear operations, Brian Mummery, said, "we now prefer dry storage to reprocessing." They plan to build a £220 million (SCRAM 68) central dry-buffer store at Heysham in Lancashire. The cost of THORP increased from £300m in 1978 to a staggering £1,480m in 1989.

As SCRAM has learnt, to its detriment, over the years, the Government and Nuclear Industry are pathologically unable to accept defeat, or even error, and will go to incredible lengths to try and disguise their mistakes. There is no truth in the rumour that they do not learn from their mistakes - how else could they become so good at making them.

Both Torness and Windscale tell a distressing tale of bureaucratic intransigence. When rational argument seems to count for nought and, even when our arguments are totally vindicated, they still continue with the nuclear steamroller.

It is up to the anti-nuclear movement to make sure that the political cost of continuing with nuclear power are too high for any government, of any party.

There is also a lot we can do as individuals to undermine the growth in demand for electricity which the CEGB are using to justify their new nuclear capacity.

Over 21,000 of us objected to Hinkley C. With this Journal you will find a postcard, which you can use to object to Wylfa, but you'll also find a request form so that you can send away for more postcards. Please use both of them - lets make sure that we build an even stronger opposition to Wylfa B. Every single individual has a vital role to play - together we can and must stop them!

Atoms for peace

Recently the anti-nuclear world was abuzz with the feeling that 'privatisation' spelt the end of the British nuclear industry. That was before the Government discovered the greenhouse effect.

Following a Downing Street meeting, a 'teach-in' to which 30 experts were summoned, Mrs Thatcher the arch-environmentalist, "hopes that there will be four new nuclear power stations, subject to planning permissions, by the end of the century." Who taught who?

True-to-form, the meeting was called on 26 April, the third anniversary of Chernobyl. Amongst those gathered to brief the Prime Minister, and eight cabinet ministers, was Ken Currie, the director of the Energy Technology Support Unit (ETSU). His paper, which received considerable press attention, was entitled "Options for Mitigating the Greenhouse Effect."

Hypothetical

Straight away, and understandably, he reduces the argument to dealing only with CO_2 emissions. That is only 50% of the actual greenhouse gasses. He then assumes a hypothetical international agreement to cut CO_2 emissions by 50% , 25% of the contributing gasses, by 2020.

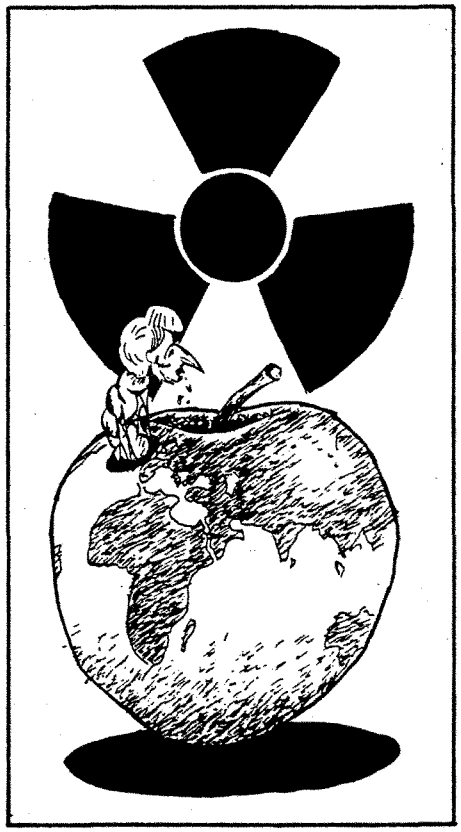
How then can this be achieved? Currie proposes eight options and their possible contribution. Energy efficiency offers the greatest potential, "40% of our target": no great surprise there. What is surprising is the Government's denial of its potential, which is covered in detail throughout this issue of SCRAM.

Renewables are given a nominal 7% of the target. "The technical potential for these are very large, but the basic issue is one of economics," comments Currie. Perhaps it would be fairer to say that the basic problem is one of politics and economic method.

When it comes to nuclear power, the head of Britain's renewable energy agency (sic), suggests that the "construction of 24 new PWRs ...would contribute 23% of the target." This assumes that nuclear power accounts for all base load power, "so that the economics are most favourable." He does, however, admit it faces a "number of problems", not least of which are economic, who will buy a used nuclear industry, who will pay for, insure, a new one? Who will pay for decommissioning and waste disposal?

The other policy options were: reafforestation (2%); energy from burning waste (6%); scrubbing CO_2 from flue gasses (2%).

After the seminar, energy secretary, Cecil Parkinson, echoed the Prime Minister's sentiments: "I believe that it's role [nuclear power] will grow as the environmental argument develops." Michael Oppenhiemer of the US Environmental Defence Fund was disappointed with the politicians reaction: "The attempt made by some in Government to use it as a spring board for nuclear power deflects from the point...It gave the impression that Mrs Thatcher called the meeting to rubber-stamp her nuclear programme."



The nuclear panacea is not only to be applied to global warming, but now the Government plan to resurrect food irradiation, this will be justified by using another great, recent, headliner - food poisoning. Ironically, it was one of the 'first' victims of Chernobyl. It is now believed that attempts will be made at legalising it this summer.

What has food irradiation got to do with nuclear power? Both are 'Atoms for Peace' initiatives, which were promoted by President Eisenhower in 1953.

Cobalt 60 and Caesium 137, the preferred isotopes for irradiating food, are by-products of the nuclear industry. Cobalt 60 is believed to be in short supply, Caesium 137, however, is not, it comes from the radioactive wastes generated by nuclear fuel reprocessing at Sellafield. A major food irradiation programme will give British Nuclear Fuels an excuse to continue the unnecessary reprocessing at Sellafield.

Irradiation is only a way of covering up failure in food manufacturing, according to Dr John Dawson, the head of the British Medical Association (BMA), "I see the possibility that food irradiation could be used to camouflage substandard batches of food." The BMA stress in their new publication, "Infection Control", that the long term effects of the process are unknown, and while it can kill harmful bacteria it is ineffective against toxins that they leave behind, particularly when contamination was high.

Salmonella and Listeria brought fear of food poisoning to the fore, however, neither the soft cheese Listeria host or eggs are amenable to irradiation. Because of the high fat content of both, the process ruins taste.

If food irradiation is controlled properly food should not become radioactive. However it is possible for trace metal elements found in food to be made radioactive. What if it is not properly controlled?

Accidents will happen

The last few months have seen two separate radiotherapy machines, in different parts of the country, go wrong and dispense overdoses of radiation: one in Exeter and one in Dundee. They involved a total of 173 patients. How many people would be involved if a food irradiation machine went wrong?

Mr Dewar, a consultant to the Hospital in Dundee, complained of a national shortage of physicists who are responsible for checking the safety and out-put of the machines and spoke of an "impending crisis in radiotherapy." In the case of Exeter the machine - Telecobalt - had been badly calibrated. The mistake went unchecked for much longer than it should. Government policy is that such devices should be checked once a month, the Hospital's policy was once every 6 months. The main reason for this inconsistency is, Exeter should have at least 4 full-time medical physicists, it has one and one part-timer. Who will check the food irradiation machines?

If overdoses do occur in food irradiation, they will effect far more people than those at the hospitals - can we take the risk?

MIKE TOWNSLEY

Soviet sub sinks

The reactors of the Soviet 'Mike' Class submarine, which sank 500 km off the coast of Norway in April, may have contained up to 20 million curies of radioactivity, according to a study commissioned by Greenpeace. (*)

Independent consultant, John Large, has made a preliminary assessment of the radioactivity which could be released into the marine environment. The submarine's total radioactive inventory when it sank included the reactor components; the fuel core; and the fissile material contained in at least two nuclear torpedoes, acknowledged by the Soviets to be aboard.

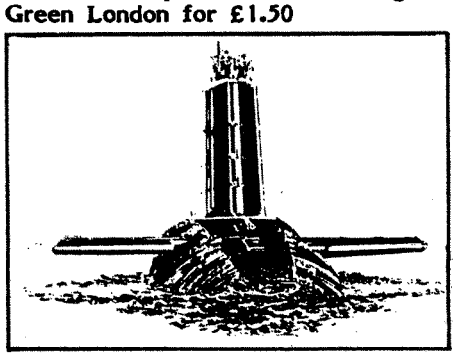
The reactors contain mainly highly active materials which will remain toxic almost indefinitely. The weapons host about 15-25kg of enriched uranium and plutonium each. This amounts to up to 20 times the radioactive waste dumped by the UK, Belgium, Netherlands and Switzerland in the North East Atlantic between 1971 and 1982.

A large proportion of the submarine's activity would be classified as High Level Waste including actinides and alpha-emitting wastes - material it has never been permitted to dump at sea.

Greenpeace have called on the Soviet Union to recover the reactors and accused them of not providing the detailed information required by the 1986 IAEA Convention on Early Notification of Nuclear Accidents, to allow other countries to plan effective countermeasures.

Greenpeace will also be calling on the next meeting of the London Dumping Convention, to be held in London from 30 October to 3 November, to prevent the disposal of decommissioned nuclear submarines and reactor plants at sea. This is currently the favoured option of the UK government for 7 nuclear powered submarines due to be decommissioned over the next decade.

*** 'Sinking of the USSR Mike Class Submarine Boat on 7 April 1989'; Large and Associates Ltd. Available from Greenpeace 30-31 Islington Green London for £1.50**



Naval nuclear accidents

The latest Soviet submarine accident, in April, brings the total number of US and Soviet submarines abandoned on the ocean floor to six.

In 1986, for example, a Soviet Yankee Class submarine sank in the mid-Atlantic after a series of accidents. Breaking with its tradition of secrecy, the Soviet navy has recently published a detailed account of that accident. A nuclear disaster was only narrowly averted by one of the crew members who was sent in to shut down the reactor; he was entombed in the reactor compartment.

There are 48 nuclear weapons lying on the ocean floor, according to a report to be published at the beginning of June by Greenpeace (*) which has already caused uproar in Japan, with the revelation that a one-megaton bomb was lost near Okinawa in 1965 containing 33 lbs of plutonium.

*** 'Naval Accidents' by William Arkin; Neptune Paper No.3. Available from Greenpeace £3.50.**

Emergency plans

The Royal Navy's plans for coping with a major release of radioactivity at any of Scotland's 34 nuclear submarine berths have been criticised as unworkable and inadequate.

There are two kinds of berths for nuclear submarines: X-berths and Z-berths. An X-berth was described in Parliament recently as "designated for frequent and regular use by nuclear-powered warships. . . The UK X-berths are at Barrow-in-Furness, Devonport, Faslane and Rosyth."

Z-berths are "designated for occasional operational or recreational visits by nuclear-powered warships". These are much more numerous and include Cardiff, Liverpool and Southampton. The emergancy arrangements will "include a public safety scheme prepared after discussion with the local authorities and civil emergency services."

These public safety schemes propose the evacuation of a 550 metre area around the site of a submarine reactor accident. However, even the Navy's public safety scheme for the Clyde says "The sudden release of fission products to the atmosphere from the primary containment failure accident could result in a health hazard at distances of up to 5km downwind."

A detailed analysis (*) of two of the Navy's public safety schemes, CLYDEPUBSAFE and SCOTSPECSAFE, by William Peden, points out that "nearly 81,000 people live within a 5km radius of all the berths in Scotland." (excluding Rosyth).

*** 'Nuclear Submarine Berths in Scotland' by William Peden. Available from Nuclear Transport Information Group, 11 Oxford Avenue, Southampton. 90p (incl p&p).**

Radiation monitoring

The Annual Report of the Standing Conference of Local Authorities in the Forth Estuary, compiled by **Edinburgh Radiation Consultants**, has revealed higher than usual levels of Cobalt-60 in samples taken around the Forth in December, January and February.

The geographical distribution of the Co-60 tends to indicate that Rosyth is the source. This could be due to the leak last November of radioactive coolant from the submarine HMS Valiant, but the amount released, as stated by the Rosyth base, is thought to be too small to explain the widespread distribution observed. It could also be the result of stormy weather redistributing bottom sediment, which had been previously contaminated with Co-60, to the sides of the estuary.

A third possible source of the Co-60, which the report does not mention, and which the navy strenuously deny, is that there has been an undisclosed discharge from a submarine at Rosyth.

● 'The Strathclyde Radiation Monitoring Scheme', which also covers the Western Isles, will shortly be joined by Wigtown District Council. As the Scottish local authority area probably most affected by Sellafield the results will be awaited with interest.

Following the discovery, by Greenpeace, of high levels of seabed contamination around the nuclear submarine bases, the Regional Chemist, who runs the scheme, has now agreed to look at sea bed samples. Previous practice was to monitor only the intertidal sediments.

Sellafield slated

British Nuclear Fuels (BNFL) have come under fire for huge increases in their charges and for failing to meet their financial targets, in four out of the last five years.

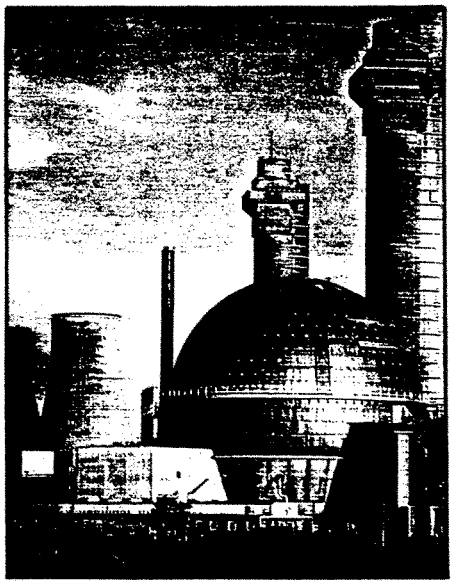
The Commons Select Committee on Energy are critical of the way BNFL are allowed to automatically pass on increases in costs to UK customers, thus maintaining their profitability, but leaving electricity consumers to pick up the tab.

BNFL's current investment programme is expected to cost £5,000 million by the end of the century, with £3,600 million of that being spent on reprocessing and waste management facilities at Sellafield - principally the new Thermal Oxide Reprocessing Plant (THORP). The Atomic Energy Bill currently passing through parliament will allow the Government to increase the amount of borrowing they can guarantee for BNFL from £1,500m to £2,000m.

Like most nuclear projects THORP has suffered from cost escalation. When planning permission was granted in 1978 it was expected to cost £300m. By early 1989 this had risen to £1,480m. The 1983 estimated costs for storage and reprocessing of spent oxide fuel were 100% greater, in real terms, than those indicated in 1978. Originally the plant was expected to start operation in 1987. Now it is expected to start in 1992.

Unfortunately the CEGB's contract for AGR reprocessing is legally binding and the cost of buying out cannot be estimated. However, both the CEGB and SSEB are now talking about using dry storage to "keep their options open." Neither board has any contractual obligations after the first 10 years, and by that time there will be new reprocessing facilities in Japan and France.

It is not just oxide fuel reprocessing which has suffered from cost escalation. During the year 1987-88 BNFL's charges to the UK Boards for other services rose substantially: AGR fuel fabrication (129%); Magnox fuel fabrication (20%); Magnox fuel reprocessing (27%), all due, according to BNFL to reduced volumes. The Committee recommend that the Department of Energy scrutinise, carefully, any future price increases BNFL propose above inflation.



The committee conclude that "BNFL would be right not to show signs of commercial complacency for the prospects for THORP after the year 2000."

The MPs also discovered, the rather disturbing fact, that 1,500 tonnes of the initial 6,000 tonnes to be reprocessed at THORP will be for overseas customers who have contracts which do not allow for returning the waste to the country of origin: the UK "will be saddled with it for ever." The MPs want the contracts renegotiated, but see little chance of success.

A new decommissioning policy has led to an increase of 570% in UK customers' liability for the cost of decommissioning BNFL plant. The SSEB were forced to pay a very substantial sum to withdraw from its contract to buy electricity from Chapelcross.

The committee were very uneasy about the way BNFL is using money it has put aside for decommissioning to fund part of its investment programme. They assume this money will grow in real value over the 50-100 years before final decommissioning takes place. "Using discounting to shift the burden of costs to future generations," complains the report "has little to commend it in economic or accounting theory or moral principle, particularly if the burden so shifted is a very substantial one."

The MPs are suspicious that BNFL's decommissioning policy is designed simply to boost short term profits. They want the Nuclear Installations Inspectorate to examine the arguments for postponing decommissioning longer than 20 or 30 years.

They are critical of plans to fly plutonium from Prestwick Airport to Japan and want safety and security to be the overriding criteria in choosing a mode of transport. "Cost should be a secondary factor." In the wake of the Lockerbie disaster, the MPs say, "the consequences of a similar air accident or terrorist outrage, involving plutonium are too horrible to contemplate."

The second body to criticise BNFL were the National Audit Office. They describe BNFL as "less accountable to Parliament than other government-owned bodies." They have failed to meet their financial targets in 4 out of the last 5 years and the rate of return made on capital has failed to keep pace with the general performance of British industry.

Legal actions

On 2 October, legal history will be made when two Cumbrian hill farmers, Christopher and Christine Merlin sue BNFL for contaminating their former house in Ravenglass, thereby reducing its market value.

In 1977 the NRPB approached the Merlins and asked if they could put an air sampling machine in their garden. Christine Merlin decided to do some research of her own and had the contents of her hoover bag analysed. It was found to contain plutonium.

The Merlins decided to move, but were forced to sell their house by auction. It was eventually sold to a BNFL worker for half its value. A cruel irony is, the Merlins' new home was hit by Chernobyl, and movement of their sheep stock is still restricted.

● The Solicitor acting for the Merlins, Martyn Day, a London based specialist in radiation cases, is also acting for the parents of children living near Sellafield who have contracted leukaemia.

Eighteen out of thirty families who have contacted Day have been awarded legal aid, and will begin proceedings in the middle of June, but it will be 2 or 3 years time before the cases get heard in the High Court.

● Greenpeace Ireland have presented a brief prepared by international lawyers to the Dail, the Irish Parliament, urging the Government to challenge the British Government in the European Court of Justice over the environmental threat posed by Sellafield.

The case is not without precedent: the French were recently ordered to reduce radioactive discharges into the Moselle from Cattenom nuclear power station to the lower levels allowed in West Germany, after an action brought to the European Court by Luxembourg and the German State of Saarland.

Unfortunately progress in Ireland has been upset by the calling of a General Election. A meeting scheduled for 27 June with the Minister for Energy can now only take place with the senior executive.

Waste piles up

The nuclear industry faces a "looming nightmare" according to Time Out magazine. A series of leaked documents obtained by the magazine show that by the mid-90s storage space for AGR spent fuel will have run out, and that it is already too late to build new facilities. The only option will be to to shut down Britain's entire stock of AGRs.

It has always been known that Magnox fuel could only be held in water for a maximum of five years, however, the received wisdom is that AGR fuel can be safely stored for at least 10 years. The leaked documents reveal research which suggests that it begins corroding much earlier than previously thought. Tests carried out by the UKAEA in 1986 showed serious corrosion occurring less than one year after the spent fuel elements were placed in ponds. The CEGB are still saying publicly that AGR fuel can be wet stored for 10 years. BNFL say 15 years.

Pond space at Sellafield will become even more congested, because corrosion in the spent fuel elements complicates and slows down dismantling.

One of the documents leaked was a draft letter, written in February 1987, but never sent, from Walter Marshall to the, then, Energy Secretary Peter Walker. Marshall says, in the letter, that those "who initiated the policy of storing spent Magnox fuel in water made a mistake." Adding that it is now too late to retrofit the Magnox stations; the policy should have been reviewed when the Wylfa dry store was built. Friends of the Earth's evidence to the Windscale Inquiry in 1977 is completely vindicated: "We simply underestimated the problems of reprocessing" says Marshall, "we should have put the AGR spent fuel into dry storage."

What Marshall was basically trying to tell Walker was that unless the CEGB is able to build a sizeable dry store there will be severe difficulties in "maintaining our generating capacity in the mid-90s." It is now too late for dry storage to solve the problem. If the Board apply for planning permission this year, they are unlikely to complete construction before 1996. Pond storage space is likely to be exhausted around 1993, so the only option would appear to be closing down the AGRs in 1993.

There has been a great deal of acrimony between the CEGB and BNFL, and the leaked documents reveal a desire by the CEGB to gain the upper hand and demand much more attractive terms from BNFL. A confidential paper, 'The AGR Buffer Store' says, "there has been a continual need to review, on an urgent basis, BNFL's ability to meet CEGB requirements. Current concern focuses upon pond capacity in the period 1989-92 and availability of Magnox swarf disposal facilities from 1989 onwards."

Both the CEGB and BNFL claim that the Time Out story was exaggerated and that any problems were capable of solution. The leak has certainly dealt another blow to the Government's privatisation plans.

Caithness plans

PIEDA, the Planning and Economic Development Consultants based in Edinburgh, were commissioned by the Highlands and Islands Development Board (HIDB), to study the impact of the run down at Dounreay and alternative job prospects. Their report has received a cool response in Caithness for failing to go far enough in pinpointing development prospects.

17% of Caithness people who are in work are employed at the Dounreay Nuclear Establishment (DNE). If there is no alternative employment forthcoming, 2,440 jobs will disappear by 1997 (direct and indirect). This will be significantly greater than anything experienced so far in the Highlands. However, because the Government have decided to phase the job losses over a decade, there is an opportunity to respond positively.

"There is no mistaking the conclusion" say PIEDA, "that the creation of 1,600 jobs to offset the job losses at DNE is a major task, even in the most favourable circumstances."

Development opportunities are identified in forestry; peat extraction and quarrying; certain manufacturing industries; tourism; office development and both nuclear and non-nuclear work at Dounreay.

Caithness District Council convener, John Young, was disappointed that "the report has not addressed the main problem, which is endeavouring to maintain over 2000 jobs in the nuclear industry at Dounreay." Obtaining work which makes use of the DNE staffs' expertise is the area where Young believes efforts should be concentrated.

In contrast, PIEDA's apparent lack of enthusiasm for developing renewable energy sources in Caithness received a critical response from Kerr MacGregor, SNP energy spokesperson, lecturer in energy engineering, and the man who plans to create hundreds of jobs in the County with a wind farm. As far as electricity generation goes, the report only looks at keeping the Prototype Fast Reactor going or converting it to gas-firing. On renewable energy, the possibility of relocating 100 jobs in research and development is acknowledged, but does "not appear very promising, as the Department of Energy does not appear to be planning any major new projects for wind and tidal energy programmes."

However, Scottish Secretary Malcolm Rifkind has given Kerr MacGregor's proposals a cautious welcome and the Chairman of HIDB, Sir Robert Cowan, has promised that "a significant project [should not] fall by the wayside for lack of public funding."

MacGregor recently told the Commons Select Committee on Energy, who were visiting Caithness, that the potential for wind energy in the County was "outstanding" and for tidal and inshore wave energy "excellent". He also believes that Wick is the best location in Scotland for solar energy.

Meanwhile the UKAEA has set up a marketing initiative to sell its scientific expertise. Dounreay has already been granted authorisation to decontaminate North Sea oilwell pipes which become mildly radioactive, and has developed a revolutionary new technique for breaking down highly toxic chemicals such as pesticides and PCBs.

Labour pains

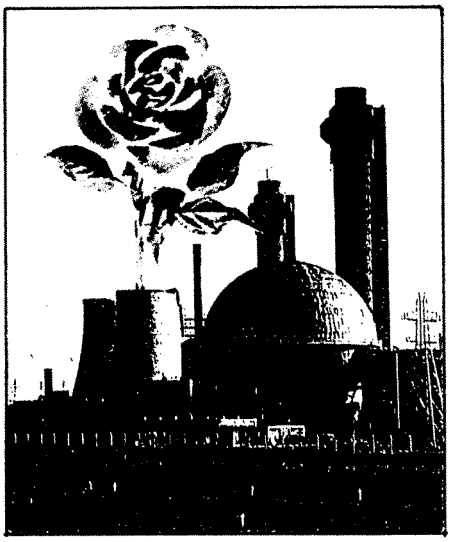
The policy adopted on nuclear energy by the Labour Party National Executive (NEC) means that Britain will carry on generating nuclear power, and therefore nuclear waste, for ever, writes **David Ross.**

The Executive first, on 8 May, voted for a policy which included an amendment by Robin Cook MP, saying that plants under construction would not be completed but the closure programme would not be accelerated. This was sold to the NEC on the grounds that it would mean that we would be free of nuclear power by the end of the century.

In fact there are four AGRs in the course of being commissioned at present (Heysham I and II, Hartlepool and Torness) with a design life of 25 years, which their operators hope to prolong five years. They would be running until 2013 or 2018.

Even that was not enough for Kinnock. A week later, the NEC was dragooned into reconsidering a decision it had just taken. It duly stood on its head and passed the resolution without the amendment. It now means that a Labour Government would complete nuclear power stations under construction. That means Sizewell B and, if the CEGB has its way, Hinkley Point C, Wylfa B and possibly Sizewell C. They are hoping to get approval from Cecil Parkinson to start work on all of them before privatisation.

Why did the NEC weaken in this way? Because it was told by Tony Blair, the Labour spokesman on Energy, that otherwise we would run out of electricity by 1994. This illiterate propaganda of the nuclear lobby had been fed to him by John Cunningham, the MP for Copeland - the Sellafield constituency.



Why was 1994 chosen? Because that is the year when, according to the CEGB, Sizewell is due to be commissioned. Without it, the lights go out! The NEC will not have known that the CEGB previously said that Sizewell would be 'needed' by 1990. That warning was contained in the CEGB's Annual Report for 1981/82. At that time, Sizewell was due to be completed by 1990 so that the CEGB said that was when it was necessary for us to have it. Then the public inquiry lasted longer than expected. The date of commissioning was put back to 1994 and so the CEGB simply changed the date when Sizewell would be "needed" to 1994. This is typical; if they find that facts are inconvenient, they simply change them.

If Labour stands by this policy at the Annual Conference, it will mean that Hinkley will come on stream in about 1997 with a design life of 40 years; Wylfa and Sizewell C will follow soon after and Britain will be committed to generating nuclear power (and nuclear waste) until about 2037-2040, through the lifetime of several Parliaments. This is what Labour is trying to sell to the public as a policy of phasing out nuclear power!

The man behind this policy is Cunningham who dominates the energy field. He is officially the Environment spokesperson but has obtained from Kinnock an assurance that the Energy spokesperson will take heed. On that basis, Dr David Clark did not last long and nor did John Prescott. Tony Blair is obviously trying not to rock the boat.

There are many alternatives to nuclear generation, as well as huge savings to be had from energy efficiency. But none of these will be considered seriously as long as the nuclear lobby dominates. The NEC, through ignorance and weakness, has become its accomplice.

Wackersdorf

Construction work on West Germany's reprocessing plant at Wackersdorf in Bavaria stopped at the end of May, in anticipation of the Government announcing that spent fuel will be reprocessed abroad.

It follows the state owned Cogema's offer to Germany's privatised company, Veba, of a co-operation deal: for supplying 49% of the capital Veba will receive half of the 800t/year capacity of the plant being built at La Hague.

The cancellation after DM2.6bn has been spent brings the total wasted on nuclear research to over DM20bn (£6.3 bn) during the past few years: the closure of the High Temperature Reactor at Hamm-Uentrop was announced in April (DM4.5 bn) and the Kalkar fast breeder reactor (DM7bn), which seems certain never to open.

The German nuclear industry expects to produce 5-600t of spent nuclear fuel per year by the end of the 1990s. BNFL are understood to be hoping to attract a large slice of the German market by undercutting Cogema.

Plutonium flights

Local authorities from South-West Scotland and Carlisle may soon be seeking an interdict to stop plutonium transport via Prestwick Airport.

The proposal by BNFL to transport plutonium to Japan from Sellafield via the Airport would involve transportation by road, and has raised questions of security and vulnerability to terrorist attack.

Kyle and Carrick District Council hosted a Forum of local authorities in April, when councillors agreed to investigate the possibility of an interdict. They also agreed to commission report on the implications of the proposals for Prestwick Airport; an environmental impact study and a disaster impact study. The Forum will also ask the House of Commons Select Committee on Transport to examine the matter.

Canadian Cancer

Canada's Atomic Energy Control Board has decided to broaden the scope of an inquiry into the incidence of child leukaemia in the vicinity of nuclear facilities, because initial studies proved inconclusive. The inquiry was commissioned in response to the discovery of a high incidence of leukaemia near Sellafield.

The initial study covered only children up to the age of 4, the second study will now cover children up to the age of 14.

Noble negawatts

It is not often that the objectives of environmentalism and profit go hand-in-hand, unless you happen to be Anita Roddick; 'least cost planning' is such a case.

The House of Lords are now trying to 'green' the Electricity Bill by introducing measures to promote energy conservation where it is cheaper than new supply, using the greenhouse effect as justification - they would be no less corect to invoke an economic argument.

Least cost planning would allow the, newly privatised, electricity industry to do both. Here ANDREW WARREN argues "It is now common place in north America and Scandinavia to find electric utilities investing in 'negawatts' as energy conservation is termed, in order to obviate the need to saddle themselves with the capital burden of new power stations."

One hot afternoon in May, the House of Lords opted to green the Electricity Bill. By voting to insert substantial new measures which will guarantee energy conservation, their Lordships opened the way for the newly privatised industry to be pitched into the vanguard of the battle to reduce the problems of climate change and the Greenhouse Effect.

The electricity supply industry is at present Britain's biggest polluter. Carbon dioxide (CO_2)is responsible for half the problems of global warining: the profligate generation and use of electricity has meant that this one industry is responsible for 39% of UK CO_2 emissions.

As originally drafted the electricity privatisation Bill contained no measures to reduce the national and international environmental damage currently caused by the industry. Indeed the supply industry itself expected pollution to get worse. According to evidence submitted to the House of Commons Energy Committee by the Central Electricity Generating Board, the demand projections the Board are now assuming will lead to a 25% increase in CO_2 from electricity over the next fifteen years. This is in contrast to the 20% decrease which United Nations-sponsored scientists believe to be a minimum initial target to try to stabilise climate change. At the Prime Minister's celebrated cabinet briefing on the topic last month, Government scientists confirmed that at least half these savings would need to come from the introduction of energy efficiency measures.

The House of Lords amendment was a genuinely all-party issue. It was tabled under the names of former leader of the House, Lord Shepherd, former Tory MP the Earl of Lauderdale, and former National Coal Board chairman Lord Ezra. Few voices could be found to speak against the substance of it, which simply gives the new industry regulator (OFFER) powers to require each of the suppliers of electricity to "make and produce evidence" to demonstrate that it has made "such arrangements as will promote the efficient use of electricity". Effectively this means that each of the monopoly suppliers of electricity to our homes and offices will need to provide action plans detailing precisely what they intended to do to help their customers save fuel - and thus save both money and pollution.

Vague ideas

The new regulator is given powers to direct the supplier "to take specific action in this area", doubtless to ensure that there is no repetition of the mealy-mouthed approach which British Gas now takes.

During the Privatisation of that industry, the House of Lords also succeeded in introducing new duties for British Gas to "advise and inform" customers about energy saving. There has been much disappointment at the very limited interpretation British Gas has made of this requirement. Sometimes this amounts to no more than a typed sheet of paper giving some vague ideas on energy conservation and only available in showrooms under the counter for those in the know.

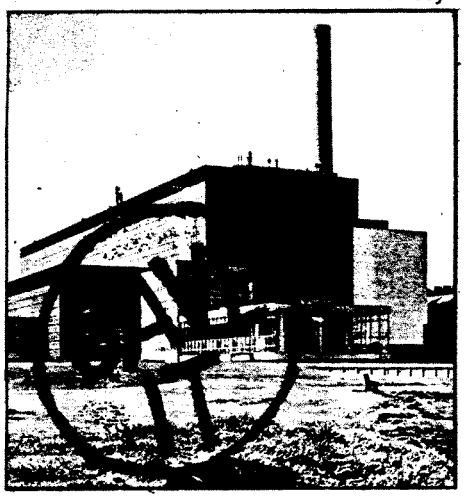
Public Utility Commission

The real sting in the tail in the amendment is the incorporation of powers for the regulator similar to those already enjoyed by the majority of its opposite numbers in America, where each state (except Nebraska) has its own Public Utility Commission to regulate electricity and gas monopolies. The amendment states that the regulator may

"refuse to amend any applications for tariff increases or major capital projects", if the electricity company has not demonstrated that it has not examined the cost-effectiveness of energy efficiency sufficiently seriously.

Lowest cost

This is in line with the development of a concept entitled 'least cost planning', which interestingly is endorsed wholesale in Labour's newly published policy review. This is intended to ensure that the utility



only engages in activities which will deliver the services its captive consumers require at the lowest overall costs. It is after all electricity bills that matter to consumers, not the cost per unit of electricity.

After all such activities can frequently be in the economic interests of the electricity supply industry. It is now commonplace in north America and Scandinavia to find electric utilities investing in 'negawatts' as energy conservation is termed, in order to obviate the need to saddle themselves with the capital burden of new power stations. There is now a decade's worth of evidence to show that frequently the utility can obtain a better rate of return on its capital by promoting energy conservation programmes, rather than conventional supply sources. There is no reason to believe that the economics of British industry would be so radically different.

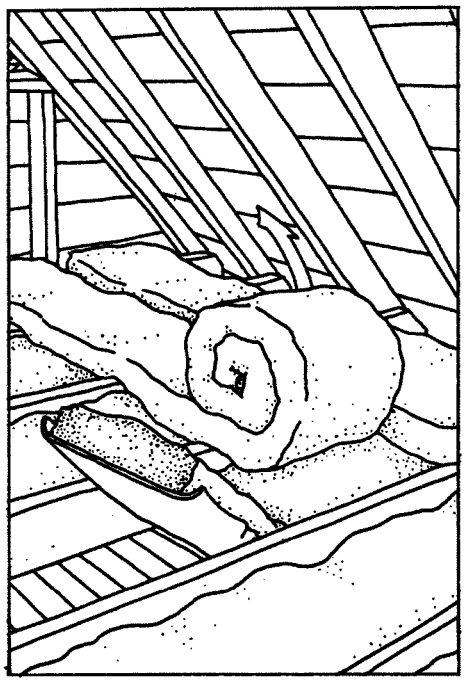
Demand reduction

Utilities can opt to assist their customers in restraining demand, by introducing such simple improvements as insulating lofts, installing radiator controls, improving boilers, and providing incentives to replace inefficient electrical appliances like lighting and refrigerators. To take but one utility at random: Bonneville Power Administration, serving six states in the Pacific North West, undertakes free energy audits for commercial buildings. It offers homeowners up to $1500 million to help fund energy efficiency improvements in existing homes, and the same sum to encourage builders to adopt model energy standards in new homes. To encourage the installation of super-efficient lighting, the utility has been prepared to pay about 85% of project costs.

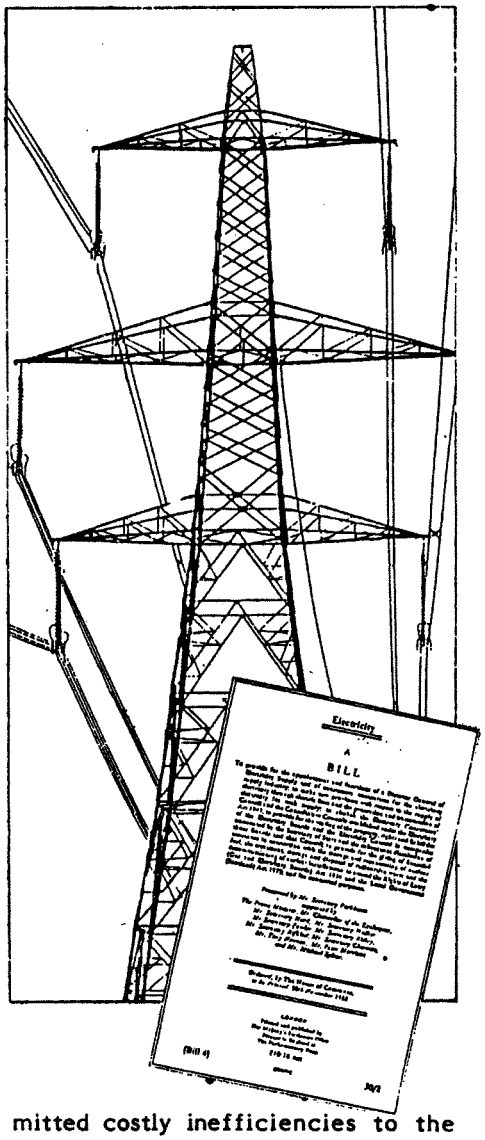
Between 1981 and 1987 BPA invested around $700 million on the development of energy conservation programmes, not as a charitable gesture but as sound business sense. Or as their senior administrator Sue Hickey says: "We are a business. You don't spend $700 million on a passionate enthusiasm. You do it as a good business investment." As the executive vice president of Pacific Gas and Electric, George Manteatis, the world's largest integrated utility has said: "Conservation programmes are considerably less expensive than the cost of adding new capacity, and are clearly less risky from an investment perspective."

Unworkable

Already 'official' voices are to be heard hinting that the Lords' amendment is 'unworkable' and are likely to depress the eventual sale price of the industry. I simply do not accept either of these propositions. Empirical evidence from overseas shows clearly that such requirements can work perfectly satisfactorily for both customer and utility stockholder. It is no coincidence that the American utilities



most involved in energy conservation programmes tend to have the better financial ratings on Wall Street; whereas weak, hands-off regulation of the kind originally espoused by the UK's Department of Energy has again and again permitted costly inefficiencies to the detriment of customers and shareholders alike.



Pollution

Until that day in May, electricity privatisation and the Greening of the Government had appeared to be progressing as if on separate planets. This was despite electricity having the largest single role to play in reducing air pollution from sulphur dioxide and nitrogen dioxide, as well as the main Greenhouse Gas, carbon dioxide. That is no longer true. At the end of May, another Lord, the Earl of Caithness, an Environment Minister, proposed in Nairobi that the United Nations Environmental Programme set in motion steps towards the signing of an international carbon dioxide reduction protocol, on the lines of that adopted in Montreal for CFCs.

When that comes, as surely it will, we shall be grateful to their Lordships for arranging that our newly privatised electricity industry is better equipped to be able to take the lead in ensuring that the quickest, cheapest and most popular option to ameliorate global warming (the curbing of electricity demand) happens.

Claims that the glittering prize of nuclear power - nuclear fusion - has been snatched by two chemists, using their spare change and a test tube, have received a mixed response, MIKE TOWNSLEY investigates.

Fusion - still out in the cold

Don't sell your shares in the oil industry, the test tube alternative is fading fast.

Unlimited clean, cheap, safe nuclear power is still no closer. The claims of Professor Martin Fleischmann and his former student Professor Stanley Pons, after nearly two months have not been vindicated.

Combining palladium and deuterium in an electrochemical cell, they say, by some hitherto unknown process, displays a net energy gain, when a current is passed through. The deuterium is present in heavy water and the electrolyte is a solution of lithium in heavy water.

What happens, they explain, is that when a current is passed between the palladium electrode (-ve) and the platinum electrode (+ve), the deuterium nuclei are absorbed at the centre of the cell by the palladium, which is able to consume 1.5 times its own weight in deuterium, and squeezed so tightly together that fusion occurs.

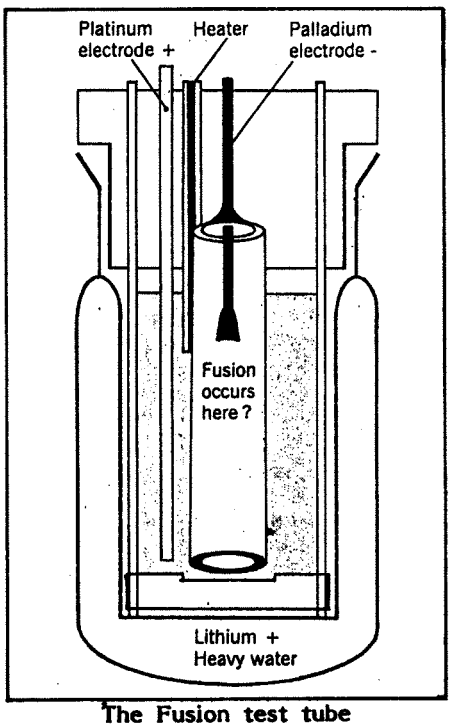
Explosive mixture

Arguably the worlds most eminent chemist, Professor Linus Pauling, holder of 2 Nobel prizes, dismisses the claim: "I judge that under the conditions of the electrolysis experiment of M Fleischmann and S Pons, deuterons beyond this limit are forced into the palladium" forming a chemically unstable compound, palladium deuteride. This deuteride may begin to decompose slowly or explode. The result, all the effort expended on nuclear fusion, may yield no more than "palladium powder and hydrogen gas."

Their experiments, financed entirely with their own money, about £87,000 - "We thought the idea was so stupid that we decided to finance it ourselves," explains Fleischmann - they say yielded four times as much energy as was put in. The elusive net energy gain.

This net energy was measured in heat. This net heat observation has been discarded as the result of sloppy technique. Scientists from the California Institute of Technology, who have tried to repeat the experiment, believe the suspected increase in temperature may be nothing more than a temperature gradient in the test tube, and wonder "just how much the liquid was stirred." Professor Norman Lewis observes, "We have seen no evidence whatsoever for nuclear reactions or for the usual chemical reactions...One thing we have learned during the course of our experiments is just how easy it is to fool oneself into thinking there is an effect when there is none."

All the elements of a good story are present. First Pons and Fleischmann are not nuclear physicists, they are chemists. Second, they did not release their results, in time honoured fashion, by



The Fusion test tube

means of a paper published in a scientific journal. Instead they called a press conference. Third the stakes: with "global warming" still hot on the typewriters of environment correspondents, the discovery of a power source, which is potentially unlimited, 'clean, cheap, safe and reliable' makes good headlines. If Pons and Fleischmann are successful in proving their case they will surely receive Noble prizes.

Many reasons have been given for their hasty announcement, and disregard for convention: pressure from the Utah State university, where the experiments were conducted, seems likely. The notoriety, both financial and academic, brought by holding the patent on cold fusion would be great.

Another team, also from Utah, lead by Professor Steven Jones of Brigham Young University, has been working on cold fusion for over ten years. He was about to announce his results. When he discovered that Pons and Fleischmann were also dabbling in cold fusion he offered to collaborate. According to Jones it was decided that both teams would submit scientific papers to Nature at the same time. Jones is far less sensational in his approach, preferring to describe his work as "scientifically interesting."

The Dynamic Duo, Pons and Fleischmann, jumped the gun. They held a press conference one week before the 24th March date they had agreed to submit a paper to Nature. Indeed they did submit their paper, however, when the team of referees begun querying it, to test its worthiness for publication, it was withdrawn. The duo argued that they did not have time to answer the exhaustive questions. Dr John Maddox, Nature's editor, and one of the privileged few who have read the submission, is sceptical of the claim: "it is literally unsupported by the evidence."

Obscure journal

A paper by the pair has since been published, in the hitherto unknown Journal of Electroanalytical Chemistry and Interfacial Electrochemistry. In which they argue, "it is inconceivable that this could be due to anything but nuclear processes [nuclear fusion]."

Pons insists, "We know how to reproduce these experiments. We are doing our own experiments, and are going to be publishing a lot more in future." It must be asked. 'Will this be in the form of scientific papers or press releases?'

Fusion when it occurs has a distinct signature. Neutrons with a specific energy are emitted, along with

gamma radiation and tritium, a highly radioactive gas with a half life of twelve years. In order to prove fusion has occurred, these by-products must be identified.

Pons and Fleischmann claimed to have detected neutrons although a much smaller amount than would be expected, but have since conceded that their detector was faulty.

Gamma radiation was also detected by the pair. However it is being dismissed as no more than would be expected, in a concrete basement in Utah. They mine Uranium in the state and therefore suffer high levels of radon gas which goes with it. Pons and Fleischmann concede to that possibility.

Military potential

The chemists measured the radioactivity of tritium from their experiments. If tritium is created then it is good news for the military. Tritium is a heavy radioactive isotope of hydrogen. it is used to increase the yield of 'conventional', fission based, nuclear weapons. With a half life of 12 years it must be continually renewed.

Hydrogen bombs require large quantities of both tritium and deuterium. They are triggered by nuclear fission - this creates the conditions under which fusion occurs, high temperatures of 100's of millions degrees C and imponderably high pressures. The theoretic destructive power of the hydrogen bomb is unlimited.

Tritium is in great demand, short supply and is very expensive to produce. Tritium for the UK military is currently produced at Chapelcross: lithium is irradiated in one of its so-called commercial reactors and then processed in a separation plant to isolate the tritium.

America is tritium poor. Safety problems at their Savannah River fission reactors have led to them (SCRAM 70) being shut down and the loss of valuable tritium generating plant. The government now wishes to reopen one of the reactors, and build two new reactors at an estimated cost of $7.9 billion. Obviously any method of generating the tritium which is cheaper will be examined - regardless of electricity generating potential.

Commercial applications

"I have always been ready to acknowledge that our experiments may have been faulty. If we turn out to be wrong I will be first to admit it," confessed Fleischmann to an auditorium packed with his contemporaries. Yet a few days earlier, on 26 April, he told the House of Representatives, in Washington, "Our experiment was not just a shot in the dark as people believe. We do feel confident about our results. We think it is entirely feasible to develop commercial applications." Like selling tritium to the military?

Going from test tube power to commercial power is not as simple as building a bigger test tube. No one as yet knows what size such a reactor would have to be. One intrepid scientist ventures that it would require 300 tons of palladium. Since the cold fusion announcement the price of palladium has rocketed to its highest price in 20 years, $4million a ton. It is very rare. Strategically it could be better placed, over 90% of the worlds resource is to found in the Soviet Union and South Africa.

Radioactive waste

Neither would it, as has been suggested, be free of radioactive waste. Any fusion reactor's containment walls would be intensely radioactive, from neutron bombardment. In 1987 the National Radiological Protection Board

The interior of the JET vacuum vessel, 1983

preported that fusion would, at a best guess, produce more intermediate level radioactive waste than existing reactors. They estimate that hundreds of tons of intermediate level waste, in the form of components effected by intense radiation given off during the process, would have to be disposed of each year.

What would appear to be the process' one and only remaining chance to prove its worth lies with the Harwell Laboratories, of the United Kingdom Atomic Energy Authority. They have the world's most sophisticated neutron detection equipment, which is currently being trained on 30 experiments of the Fleischmann/Pons type.

Dr David Williams, head of the Harwell team investigating the claim, observes, "We believe we have duplicated the experiments of Fleischmann and Pons, but using much more sensitive equipment. Given the numbers we have been told to expect, we should have seen something leap out at us by now. This has not happened...We have spotted neither heat nor radiation." Harwell has the added advantage of the full co-operation of Fleischmann, a consultant to the Agency.

No role for fusion

John Collier, chair of the UKAEA, comments, "I don't see a role for fusion power generation in the first half of the next century." If the Harwell experiments prove fruitless, its not back to the drawing board. JET, the Joint European Tortoise, sorry Torus, fusion project, based at Culham, in Oxfordshire, is still there.

It is a far more scientifically humble set up. It follows conventional physics wisdom, which states that in order to achieve fusion it is necessary to recreate heaven on earth; or at least part of it - the sun. Fusion is the power of the sun, at temperatures measured in 100s of degrees celsius and a pressure in excess of 10 to the power of 27 atmospheres, nuclei, which are other wise reluctant to join forces, fuse together, thus releasing the power which drives the earth's biosphere.

Competition

However, after ten years and £600 million, it has yet to come up with a net energy gain. When questioned recently in the House of Commons, about nuclear fusion, Michael Spicer, Under Secretary of State for Energy, replied, "Fusion, like any other new technology, will need to win its place in competition with other sources of energy expected to be available over the next century." How many other sources are being lavished with such an expensive research budget? Not all the renewables put together. Never mind one renewable source.

Perhaps if such amounts of money were to be spent on exploiting the world's only working fusion reactor, which rises in the morning and falls in the evening, we would indded witness a net energy gain - without having the problems of dumping its radioactive effluent.

Sustainable development

While the West concerns itself with the problems of ozone depletion and the Greenhouse Effect, it should not be forgotten that these are global problems which require global solutions.

Many of the measures being proposed in the West ignore the very different circumstances in Less Developed Countries [LDCs].

The suggestion of a massive increase in Nuclear Power generation, for instance, makes little enough sense in a Western context, in a global context it is totally impractical.

The environmental problems we currently face have been brought about primarily by the actions of the industrialised countries; further exploitation of the LDCs by restricting their development is not the answer.

CLARE SMITH details some examples for sustainable development in the LDCs.

When we consider world energy policy it is often easy to forget that the majority of the world's population live in rural areas of developing countries, which are often unconnected to electric grids. For these people 'energy' means wood; straw and stalks; dung and; animal and human labour. Improvements in quality of their lives depends upon access to adequate energy supplies: fuelwood for basic domestic needs, and energy for tasks such as water pumping for irrigation, crop processing, milling and threshing that often involve arduous manual labour.

Development is all too often taken to mean increased Westernization, despite the environmental chaos that is largely a consequence of the energy strategies followed by the West. Developing countries have the opportunity to learn from our mistakes, yet the fantasy image of limitless economic growth, based on a fossil fuel and nuclear energy economy, mesmerizes governments and people to follow the West down this dangerous dead-end road.

Safety standards

Conditions in developing countries are very different from those in the industrialized world, and their energy needs are correspondingly different.

- The majority of people live in rural areas - commonly 50-90% compared with 3% in the UK.

- Economically, a primary objective is to reduce the amounts of foreign exchange needed, particularly in debtor countries; a large percentage of whose debts arose from importing oil and energy technologies.

- Technical expertise and hence safety and environmental standards are far lower than in the north, and institutional/political structures are less likely to have the strength to enforce controls. This cannot be emphasized too strongly in the case of nuclear power, or a nuclear Bhopal could result.

Let us consider two contrasting hypothetical energy strategies: the high-tech 'West is Best' versus self reliant, decentralized, biomass based strategy.

Strategy One

West is Best so lets invest in expanding the electricity grid, and build large fossil plant and nuclear power stations: together with increasing industrial growth consuming more fossil fuels and electricity.

The impact on the Economy - increased imports of fossil fuels and uranium together with imports of technology and the experts needed to run it costs foreign exchange. Government debt increases, and exports must increase - but we hope that the economic growth from industry will be sufficient to pay the bill. No problem, just so long as oil prices stay low (unlikely, given the increasing depletion of limited resources), but interest rates are ever increasing on our foreign debts.

The impact on the Environment - increased fossil fuel burning leads to local pollution, health risks, acid rain affecting the forests, and globally increasing CO_2 to add to the greenhouse effect. Radioactive contamination increases, and with it the risk of major accidents or terrorist attacks. Such luxuries as SO_2 scrubbers, lead-free petrol or 'safe' nuclear waste disposal are beyond their limited budgets.

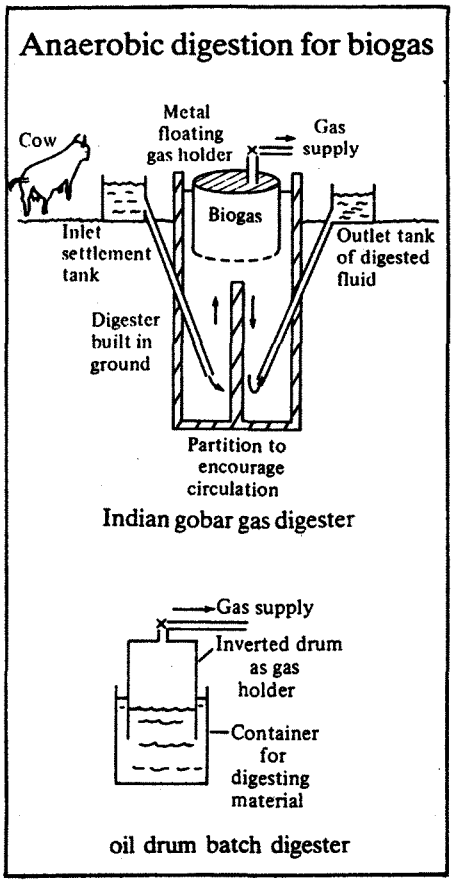
The impact on the People - more and more of the rural poor are forced to migrate to the cities to work in the new industries, increasing the problems of urbanisation as millions live in insanitary and squalid conditions. Incomes may be higher in the cities, but so are costs.

Strategy Two

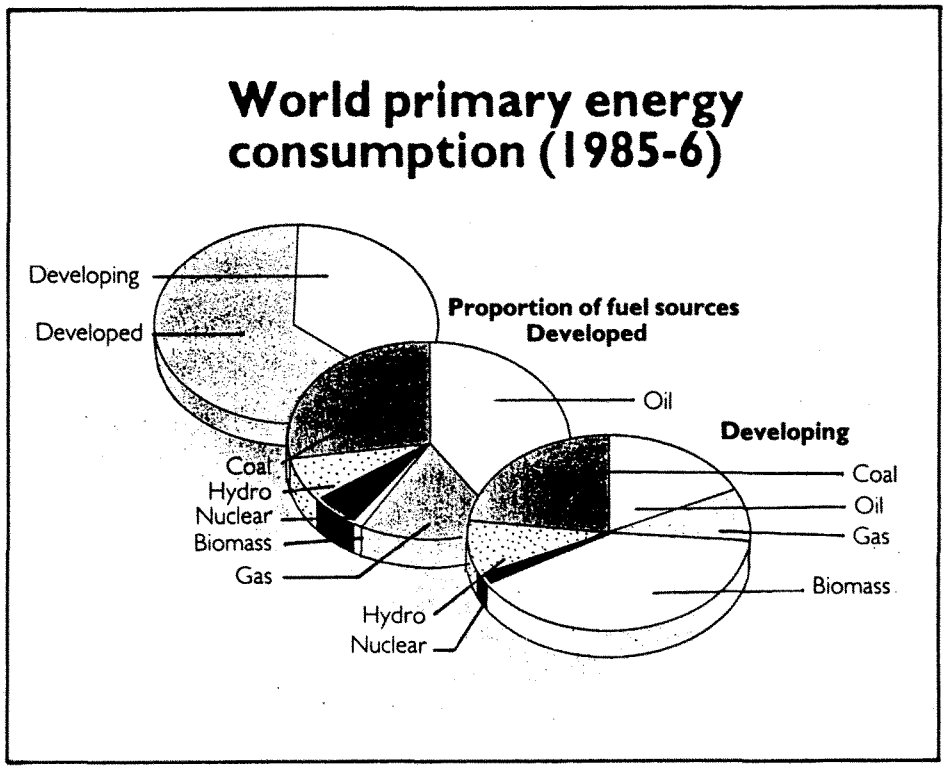
Self- reliant sustainable development means putting the emphasis on energy projects developed by villagers to suit their own needs; relying on local resources of biomass, sun and wind.

New technologies such as improved stoves, biogas plants, windpumps, solar crop dryers and micro-hydro-electric for cottage industries and milling can make rural life less arduous and energy use more efficient, in ways that can be supported by local skills and capabilities.

The impact on the Economy - costly increases in imports of fuels and technology can largely be avoided, and the economy at both local and national levels can benefit Foreign exchange can be spent on investing in stock, rather than being tied up in financing the flow of importing fuel. Fluctuations of world market prices are less devastating to countries that are not heavily dependent on imports or exports of single commodities.



The impact on the Environment - resource management can allow forests to be used sustainably and tree-planting schemes are likely to be successful if local people use their expertise in designing them, and benefit from them. Burning of biomass, either directly or after conversion to ethanol or biogas, produces CO_2, but the overall process is sustainable as it only returns to the atmosphere that which the original plant absorbed in growing. Improved stoves can improve efficiencies and reduce smoke, reducing the health risks to the cook as well as saving trees.



The impact on the People - improving rural living standards and valuing the skills and customs of rural life can help slow urbanization and the infectious spread of Western consumerist culture.

The benefits of a self-reliant path are clear, at both local and global levels. Yet throughout the developing world, countries tend towards the former path. For instance in India, the nuclear programme is advanced; even an FBR is now being planned in technical collaboration with the USSR. The risks are obvious and frightening. The electric grid has been expanded at great cost, so that it now reaches 70% of all villages, yet only 20% of households are connected as most cannot afford this expensive fuel or the appliances that make it necessary.

Local Initiatives

There is also much work being done in India on appropriate technologies and renewables. The Association for Science and Technology in Rural Areas (ASTRA), based in a village near Bangalore, are developing improved stoves, more efficient brick and lime kilns, crop dryers and many other ideas in a collaboration between local people and scientists from the Indian Institute of Science.

Biogas plants are being developed in many places that produce methane from anaerobic digestion of cow dung and other biomass, providing clean and efficient fuel, and a residue that is used as fertilizer, overcoming the problem many people face as they are forced to burn dung-cakes and their soil becomes infertile. In Ladakh, 4,000m up the Himalayas, the Ladakh Ecological Development Group have introduced passive solar heating, reducing fuelwood needs and greatly improving the comfort of people's homes in this harsh climate. Surely the money spent on the government's nuclear/electricity strategy could have been spent on more initiatives such as these.

The most successful energy projects have invariably been those where the major impetus comes from local people rather than having technologies, large or small, forced on them from outside. No two villages are the same, so there is no one single idea that will solve everyone's problems. Energy resources can be put to best use by using a country's greatest resource - the knowledge and enthusiasm of its people.

Bina Agarwal, "Cold Hearths and Barren Slopes - the woodfuel crisis in the third world", Zed Books 1986. (Very interesting, lots of ideas and experiences, well worth reading at £6.95 from Third World Publications, Birmingham, tel. 021 773 6572.)

Clare Smith is studying rural energy planning for a PhD at Imperial College, Centre for Environmental Technology, London.

A disproportionate sum of money is spent on reducing radiation exposure from Sellafield compared with that being spent to reduce exposure from radon, according to the NRPB. PAUL WATTS, co-ordinator of FoE's radiation monitoring unit takes a critical look at the NRPB's 1988 review and points to its inadequacies.

Radiation reviewed

What have televisions, Chernobyl, air travel, Sellafield, smoke detectors and coal burning got in common? They all, amongst other things, expose us to ionising radiation.

In March of this year, the National Radiological Protection Board (NRPB) released their latest review of the exposure of the UK population to all sources of ionising radiation, which has been described as "The British Book of Doses" (NRPB-R227. 1989). They have estimated that the average exposure within the UK is now 2.5 millisieverts per year compared with just under 2.2 millisieverts per year when last reported.

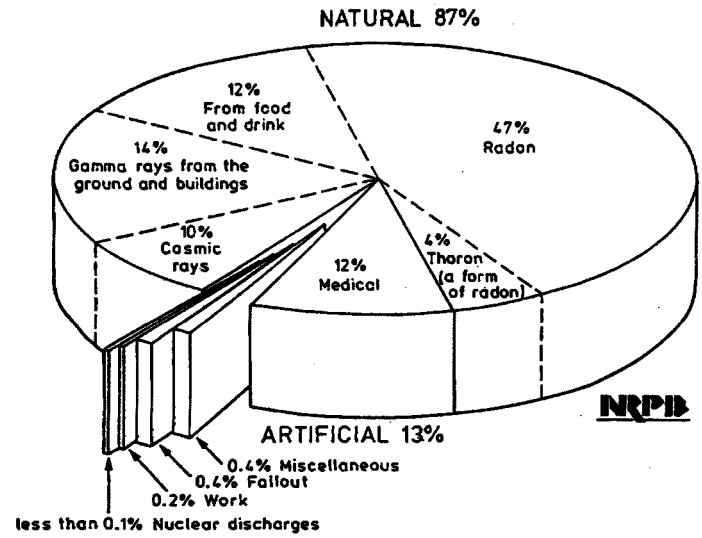
The review contains a wealth of information, accumulated since the NRPB's previous review of 1984. For example, an air traveller who spends 100 hours per year aloft, equivalent to about 5 subsonic return flights between Britain and the west cost of America, could receive a dose of 0.4mSv (recommended annual dose to the public from a single source is 0.5mSv). Another example, the average exposure of miners in non-coal mines, such as gypsum, tin and fluorspar, is estimated to be 14mSv - the average dose at nuclear power stations is about 0.8mSv.

Figure 1 shows the NRPB's 1988 pie-chart of contributions to the average UK population to exposure, in descending order of importance, the contributions are, radon (47%), gamma-rays from buildings and ground (14%), natural activity taken into our bodies with water and food (12%), medical exposures (12%), cosmic rays (10%), thoron gas (4%), fallout (0.4%), miscellaneous sources eg. watches, air travel etc. (0.4%) occupational exposure (0.2%) and nuclear effluents (less than 0.1%).

Radon gas

Radon gas is still the major radiation risk in the UK. It is estimated to account for about half the average UK population exposure, which may be responsible for anything up to 2,500 or more lung cancers. Radon comes from the radioactive decay of radium, which in turn comes from the decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies depending on location eg. high levels are found in granite areas such as Cornwall and certain limestone areas of the Pennines. Whereas radon released into outdoor air is quickly diluted, when it enters into enclosed spaces concentrations can build up, sometimes appreciably.

Figure 1



Average annual dose to the UK population - 2.5 millisieverts overall

DOSES FROM NATURAL SOURCES (mSv/year)		
Source	Mean	Range
Cosmic	0.25	0.20-0.3
Gamma	0.35	0.10-1.0
Internal	0.30	0.10-1.0
Thoron	0.10	0.05-0.5
Radon	1.20	0.30-100
Overall	2.20	1.00-100

The NRPB have calculated that the average concentration of radon in UK houses is 20.5 Bq/m3, giving rise to an effective dose equivalent of about 1 mSv. 2,000 houses are estimated to be exceeding radon concentrations of 1000Bq/m3 (equivalent to 50 mSv). 20,000 exceed the Action Level of 400 Bq/m3, or 20 mSv, and 50,000 are above 200Bq/m3 or 10mSv.

Action level

It is clear that there is a public health risk from radon exposures especially at those levels which are significantly above the average. As a result, the NRPB has published advice on the control of radon levels in houses - an Action Level of 20mSv per annum for existing dwellings and 5mSv per annum as a design level for new buildings. It's worth noting that the Institute of Environmental Health Officers (IEHO) believe that this Action Level is too high, and should be reduced at least to 10mSv/year. However, assuming the 20mSv Action Level is set too high because of the large number of houses affected and the need to prioritise, the worst houses, the Action Level will hopefully be reduced with time down to the IEHO's 10mSv and eventually down to levels of 5mSv and below.

Friends of the Earth consider that the NRPB's 5mSv/year design level for new buildings is too high. There are relatively simple and inexpensive construction techniques for effectively engineering radon out. By incorporating these techniques, there appears to be no reason why the design level should not be reduced to the national average of 1mSv or below.

Compared with the USA, where radon is one of the top issues on the political agenda, the UK

Government, having acknowledged the health risks posed by radon, have not yet addressed the issue of whether they are prepared to offer grants for radon remedies. At present, the owner has to foot the bill and for a house which is privately rented there are no means that can be used to make the landlord take corrective action.

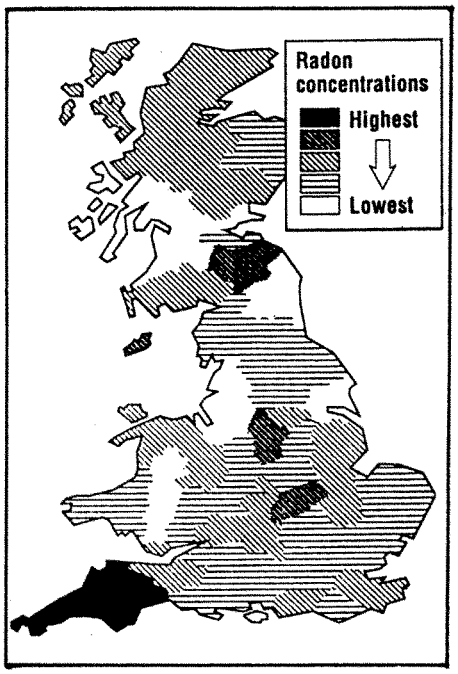
'Value for money'

In the past FoE has criticised the NRPB for producing a pie-chart solely based on national averages which tend to mask significant regional variations. Appreciating this, the NRPB have contrasted the doses received by groups exposed to high levels of radon and high levels of artificial radionuclides with the national figures. The highest doses arise in Cornwall, the average dose for the county is over 3 times the UK average, with an 81% contribution from radon, compared with a national average of 47%.

All the exposure sources of the critical group at Sellafield ie. avid seafood consumers of the local fishing community in the vicinity, have been examined. In 1983, the critical group dose from all sources had been 4.8mSv, close to twice the national average exposure, with nearly 2.5mSv coming from Sellafield discharges. However, their total exposure of 2.9mSv in 1987 is not greatly above the national average, and as a result of reductions in discharges and changes in local habits, only 0.3mSv is Sellafield derived. The NRPB have therefore concluded that people should be less worried about man-made sources of radiation because of the magnitude of existing exposures and they note the large investment being made in order to reduce the Sellafield discharges, in comparison with that being made to reduce indoor exposure to radon.

In terms of value for money, the NRPB have stated that by spending £1000 on radon-protection measures a collective dose of 1 person-Sv can be prevented. The normal price the board has assigned for a collective dose of 1 person-Sv is £10,000, compared with the £100,000 spent by British Nuclear Fuels (BNF) to save the same exposure. Whilst the radon problem certainly requires considerably less investment per unit collective dose than reducing Sellafield discharges, continued investment should still be applied to the reprocessing facility in order to ensure further reductions in the critical group exposure. This is particularly important given the NRPB's latest revisions in the risk estimates suggesting that the current 0.5mSv recommended annual limit per site could be replaced by a dose limit of 0.2mSv (R H Clarke, 1989). This would result in the Sellafield critical group receiving exposures 50% above this suggested dose limit.

In other words, rather than dropping efforts to reduce Sellafield discharges to divert resources to the more cost-effective dose-reductions from radon, as implied by the Board, FoE believes that both sources of exposure should be vigorously tackled simultaneously.



The presence of one source of exposure can not be justified by the presence of another.

There is an additional problem with Sellafield/radon comparisons. There are simple solutions to the radon problem, all it requires is the political will to provide the cash. In contrast, the whole host of isotopes on the beaches, estuaries and farm land of west Cumbria, and further afield, could provide a continuing significant radiological problem thousands of years after the radon problem has been solved.

Fly-ash radiation

Few public debates on the nuclear issue have passed without a smile appearing on the face of the spokesperson from the nuclear industry as they launch into, "Well of course coal-fired power stations are tremendous radioactive polluters." The NRPB's 1988 review should wipe that smile cleanly off the face of the nuclear industry. The Board have estimated that from a modern 2GW(e) coal-fired power station the fly-ash, containing natural radioactivity which is released in coal burning and dispersed into the atmosphere with the combustion products, produces a maximum dose of about 0.4uSv (0.0004mSv). This dose is mostly from the inhalation of thorium isotopes and actinium-227. The NRPB admit that their previous report appreciably overestimated the annual collective dose to the UK population from fly-ash discharges: coal fired power stations are now estimated to contribute about 5 person-Sv in a year.

Smoke detectors

A topic of much debate is the smoke detector issue. Some smoke detectors, which are becoming increasingly popular, contain low-activity americium-241 sources with maximum activity of around 40kBq. The NRPB have estimated that the annual dose to a person 2 metres away for 1 hour a day is about 10nSv (0.000,01mSv). Although when installed the smoke detector provides an extremely low radiation exposure, a satisfactory disposal solution has still to be found. Many ghastly scenarios involving disused smoke detectors can be envisaged, such as a small child breaking it open and playing with the source. FoE believe that the devices should be clearly labelled, providing warning of their hazards and with a return-to-manufacturer condition. In addition, FoE have recommended that the casing should be considerably stronger with a separate external battery compartment.

Whilst NRPB consider that the exposures from the disposal of wastes from existing non-nuclear establishments are negligible compared to those by the nuclear industry, one source of exposures that the NRPB have failed to refer to is that from disused non-nuclear establishments eg. sites in the past that used radiochemicals for the production of gas mantles or luminising dials. One such site in east London, prior to current decontamination, was estimated to expose a child at the recommended annual 0.5mSv limit if she/he spent in the order of 5 hours per week in the most contaminated areas and a local resident without even entering the site could have received an annual dose in the region of 126uSv. The fact that Friends of the Earth know of a number of similar sites, and there may be many others, could mean that in terms of the NRPB pie-chart, these sites could provide a significantly sized wedge.

References

NRPB-R227, Radiation Exposure of the UK Population - 1988 Review; Hughes,J S, Shaw,K B, O'Riordan M C; NRPB, March 1989.

R H Clarke, Current Estimates of Radiation Risks and Implications for Limits, Course Notes from NRPB's Update Course, April 1989.

The durable consumer

1989 may well go down in history as the year of the 'Green Consumer', when a letter writing campaign lead by Friends of the Earth helped force banks to stop funding hydro-electric schemes in the Brazilian rainforest; the Green Consumer's Guide has been on the list of best selling paperbacks for months; sales of eco-friendly detergents have increased dramatically and; sales of aerosols with CFCs have plummeted.

Yet this new green consciousness does not seem to have spread to electrical goods. John Elkington, one of the authors of the Green Consumer's Guide says that "Most retailers still insist that their consumers are not asking them about the energy efficiency of the products and equipment they buy. The time has come to shake them out of their complacency. Insist on knowing the energy consumption of any purchase, whether it is a light bulb or a home. You will be saving money, energy and quite possibly the planet". PETE ROCHE looks at what is available, and offers some suggestions for action.

The role of energy-efficient electrical goods in reducing electricity demand and helping to reduce emissions of CO_2 was covered in SCRAM 67. Mass produced energy efficient white goods often cost little more than energy wasteful ones, but are they available in the shops in the UK?

The simple answer is no. But with the rise in the power of the, so-called, 'Green Consumer' this could soon be changed.

New equipment like dishwashers, washing machines and refrigerators should carry labels which tell potential purchasers their likely running costs. There is at present no national energy efficiency labelling scheme in the UK. However, the Eastern Electricity Board has run a pilot labelling scheme in its showrooms and the John Lewis Partnership labels white goods it sells to tell the consumer how much each appliance is likely to cost to run for a year.

If consumers make a point of asking their electrical dealer for information on the energy performance of new electrical equipment, and buy the most efficient models currently available, retailers will be forced to lobby for an energy labelling scheme, which, in turn, will force manufacturers to introduce more energy-efficient models.

Refrigerators and Freezers

On average, UK domestic refrigeration uses about 1.9GW of delivered electricity. With transmission and distribution losses, the peak demand on UK power stations is probably near 2.5GW. If over the next 15 years we replace our present appliances with the best mass-produced European models, which save about 75%, we could displace about 1.8GW of generating capacity, or nearly 2 nuclear power stations.

The most efficient West German and Danish fridges and freezers are not sold in this country. But we know from their experience that energy-efficiency does not necessarily appear to affect price - it is possible to find similarly priced appliances whose electricity consumption differs 3 fold.

If the whole European Community matched the best available German and Danish technology, we could displace the output of tens of large power stations. Improvement in newer member states is particularly urgent. The growth in electricity demand in Greece and Spain can be attributed substantially to refrigeration equipment. Unfortunately, like the UK, the efficiency of models sold there appears to be among the lowest in the OECD.

The average UK refrigerator uses

CHOOSING AN ENERGY-EFFICIENT FRIDGE OR FRIDGE-FREEZER

THE GREEN CONSUMER GUIDE RECOMMENDED

WORKTOP HEIGHT FRIDGES
(With frozen food compartment)

Brand	Prices as quoted by *John Lewis* May 1988 (£s)	Storage volume of fridge (litres)	Storage volume of freezer (litres)	*Which?* tested (✓✓ = *Which?* recommended) Jan. 1988 issue[1]	Approx quarterly running cost at 5.4p per kWh (*Which?* Jan. 1988)[1]	Quarterly cost per 10 litres storage[2]
Zanussi ZR50/2	124	113	9	✓✓	£4.20	34p
Zanussi ZR54/3	185	123	22	✓✓	£3.90	25p
LARDER FRIDGES *(no freezer or frozen food compartment)*						
Electrolux RF592	165	153		✓✓	£2.40	15p
Zanussi ZR6L	205	161		✓	£3.30	20p
Zanussi ZR56/L	172	158		✓	£3.90	24p
FRIDGE-FREEZERS *(Single temperature control type)*						
Bosch KSV2610	370	189	68	✓✓	£5.70	22p
Bosch KSV4310[3]	540	315	97	✓	£6.40	15p
Electrolux TR915A	255	98	102	✓	£7.10	35p
Electrolux TR925A	255	144	72	✓✓	£6.70	31p
Electrolux TR1125A	not available	195	103	✓✓	£8.00	27p
Zanussi ZS62/26[4]	233	163	61	✓	£7.80	24p
Zanussi ZF65/14	205	174	40	✓	£7.90	37p

1. *Which?* August 1987 issue for fridge-freezer section of this table.
2. This is an average across the whole appliance.
3. Revised model number from Bosch KSV4300.
4. Used to be Zanussi Z918/8R.

290 kWh/yr or 1.9 kWh/litre. The **Green Consumer's Guide** recommends a 'larder' fridge with approximately the same storage capacity as above, which uses 178 kWh/year or 1.2 kWh/litre. Bearing in mind that you shouldn't buy a fridge too big for your needs, John Lewis recently introduced their 'own label' fridge manufactured in Sweden, which is almost twice the size of the above, and uses only 230 kWh/yr or 0.7 kWh/litre. Despite this sign that things may be improving, we have a long way to go to catch up with Denmark's best which uses only 80 kWh/yr or 0.4 kWh/litre.

The average UK fridge/freezer uses about 700 kWh/year or 2.5 kWh/litre. The **Green Consumer's Guide** recommend a model which uses only 422 kWh/year or 1.64 kWh/litre. Mass produced fridge/freezers in Europe and Japan can consume as little as 1.1 kWh/litre.

Washing Machines

Not only do more of us own automatic washing machines and tumble driers than we did 20 years ago, but we also use them more often. So their environmental performance is crucial. Together they account for about 0.5GW of delivered electricity.

In order to get the best use of the energy used by your washing machine, it is obviously better to wait until you have a full load, and to use the programme best suited to the fabrics - people often use too hot a wash when a lower programme would economize on electricity. Many energy-efficient features are available when buying a new machine, but they haven't yet been combined into one appliance.

In general, hot-fill machines are more efficient than cold-fill ones, especially if your domestic hot water supply is heated by gas or solid fuel. Having the option to wash at the temperature the water arrives in the machine at, if this is adequate, can reduce consumption. Cold water washing has become common in Canada, USA and Japan, using detergents which can dissolve fat in cold water, but further work is necessary to make these detergents environmentally acceptable. A spin speed of 3,000 rpm instead of the usual 500-1,000 would be useful for people who need to use a tumble drier.

Low energy washing machines are not expected to cost much more than current models. Because they would use water from the domestic hot water supply, the cost of an electric motor could be used to offset the costs of extra plumbing and a better motor. Using the best available technology annual consumption for a washing machine could be reduced from 400 kWh to 40 kWh.

CHOOSING AN ENERGY- AND WATER-EFFICIENT WASHING MACHINE

(Unless otherwise stated the machines in this chart can run on either hot or cold fill)

FRONT-LOADING MACHINES

Brand	Prices as quoted by John Lewis May 1988 (£s)	Maximum load (kg)	Maximum spin (rpm)	Which? tested (✓✓ = Which? recommended) Jan. 1988 issue	Energy use on HLCC1 programme (cotton, all whites) (kWh)[1]	Energy use on HLCC4 programme (colour-fast synthetics) (kWh)[1]	Cold water use on HLCC1 (litres)[2]	Hot water use on HLCC1 (litres)[3]	Total water use on HLCC1 (litres)[4]
Bendix *Autowasher 800 71668*	265	4.0	800	✓✓	1.6	0.2	67	23	90
Bendix *Autowasher 71968*	325	2.5	550	✓✓	1.5	0.5	64	0	64
Electrolux *WH 1125*	?	4.5	1100	✓✓	1.3	0.8	85	20	105
Hoover *Logic 1300*	354	5.0	1300	✓✓	1.3	0.4	91	19	110
Hotpoint[5] *Electronic 9520*	?	4.1	800	✓✓	1.6	0.5	68	20	88
Candy *Turbomatic 38 WD*	385	4.5	1000	✓✓	1.6	0.6	69	22	91

1. Amount of energy used in one wash. These figures are from unpublished data supplied by the Consumers' Association (April 1988) and are based on their tests.
2. Amount of cold water used in this wash (HLCC1) when tested by the Consumers' Association.
3. Amount of hot water used in this wash (HLCC1) when tested by the Consumers' Association.
4. Total amount of water used in HLCC1 wash.
5. Hotpoint model numbers are due to change but the machines will be the same.

The best mass produced models of tumble driers use 30% less electricity than the average. Just using washing machines with higher spin speeds, to dry clothes to 35% rather than 80% moisture, saves 50-60% of the energy.

Heat pump driers on the Japanese and US markets save 65-87% of normal electricity consumption. By 1991 microwave driers should be on the market.

Dishwashers

The sales of dishwashers have grown rapidly in recent years. They already account for 0.1GW of delivered electricity. The average cold-fill dishwasher uses around 2kWh of electricity for a full load. Current UK stock uses about 500 kWh/year. The better mass produced models which wash dishes at 55°C instead of 70°C use only 240 kWh/year. In future it should be possible to reduce this to 50 kWh/year by using more efficient motors, and using water from the household hot water system.

Colour televisions sold in the 1960s often consumed 3-500W. Many sold now use 150W, yet some Japanese models use only 40W. The extra cost is nil; the electricity saving is purely a result of better electronic circuit design. Televisions, both colour and black and white account for 0.8GW of delivered electricity.

Lighting is not an enormous consumer of electricity in the home (0.92GW). However, using the wrong light bulbs or keeping them on all day will certainly drive up your electricity consumption. Energy consumption can be cut by using new energy-saving compact fluorescent bulbs, instead of ordinary filament light bulbs. Examples of these are Philips SL18, Thorn-EMI 2D and Wotan Dulux EL. These bulbs are more expensive, but because they last much longer than ordinary bulbs and use much less electricity, the initial investment is well worth it, especially if you are using them in places where the light is on for long periods eg a hall or stairway.

Major savings are also available in commercial lighting, cooling and ventilation, space and water heating, cooking, street lighting, process heating, process refrigeration, motive power, electrolysis and transport.

It is quite clear that there is enormous potential for the efficient use of electricity. As David Olivier pointed out (SCRAM 67) using best available technology would reduce mean UK electricity demand by 70% from 28GW to 8GW. And the potential is growing with the development of new technology. However, realising that potential has been painfully slow in the UK. The global environmental crisis makes it imperative that rapid action is taken to reduce our energy demand and the environmental impact of our energy services. Bringing consumer pressure to bear on appliance manufacturers and retailers is one way this can be done.

Another method of bringing pressure to bear is through our MEP. With European elections on the way now is the time to lobby them. The European Community is in an ideal position to encourage and publicise the best available technologies; by setting standards for member countries which are constantly improving, and by introducing mandatory energy labelling.

When considering the Nuclear Industry from a British perspective, one aspect which is easily overlooked is uranium mining. It is an integral part of Britain's nuclear power programme, and should not be ignored. GRAHAM STEIN outlines one country's uranium industry.

The Yellowcake Road

Australia is the world's sixth largest producer of uranium, and is estimated to have 30% of the West's reserves. Recent relaxation of uranium mining restrictions by the governing Australian Labor Party (ALP) has caused considerable controversy.

Uranium was first discovered in Australia in 1906, at Radium Hill, South Australia, with a second deposit found at Mt. Painter in 1910. The uranium was discovered when both sites where being mined for radium. The uranium for American and British nuclear bomb projects of the late forties to early sixties came from, a reopened, Radium Hill and Rum Jungle, in Northern Territory.

From the late sixties to mid seventies many deposits of uranium were discovered. Finds in Western Australia included large deposits at Yeelirrie. Sites in Northern Territories were concentrated in the Alligator Rivers Region, in what is now Kakadu National Park. They included large deposits at Ranger and small but rich deposits at Nabarlek.

Working mines

Ranger and Nabarlek are two of the three working Australian uranium mines. Ranger was the subject of a Uranium Inquiry which generated considerable political activity because it combined the issues of uranium, a proposed National Park and Aboriginal land. The Ranger mine received the go ahead in 1977, a decision which was followed by permission being given to mine at Nabarlek, in 1978.

One of the world's largest known deposits was discovered at Roxby Downs (Olympic Dam), South Australia, in 1975. It is the final member of Australia's trio of working uranium mines, and has attracted the largest anti-nuclear activity. Two blockades, held in 1983 and 1984, were intended to mobilise public opinion and pressurise the Australian Labor Party into overturning its 1982 "no new mines" policy. That policy included Roxby Downs as one of three mines which the ALP would allow to be developed. The continuing campaign aims to highlight the detrimental effects of the mine on the environment.

A deposit of similar size to Roxby Downs, in the Maureen area of north east Queensland, has not yet been mined as it is uneconomic due to a lack of other suitable mineral deposits.

In all over 50 locations of uranium deposits have been publicly 'gazetted', and many smaller deposits have had proposed mines rejected on environmental grounds.

Environmental and health problems from uranium mining are mainly associated with the tailings (waste material from the mining) and from the acid leach which is used to extract uranium from the rock. There are cancer risks from tailings, dust and from contaminated water.

Aborigines under threat

Aborigines have been considerably affected by mining operations. Their social and cultural independence has been put under great strain. Their food and water supplies have been contaminated: water birds frequent the contaminated storage ponds at Ranger Mine and freshwater mussels from creeks in the vicinity of the mine have been known, since 1972, to contain excessive levels of radium. Scientific research has tended to ignore the different lifestyle of Aborigines when undertaking monitoring studies. Despite the risks, in Northern Territories, where Aborigines have succeeded in getting land rights, they depend upon the mining for economic survival.

Exports of Australian uranium are subject to controls and regulations intended to prevent "non-peaceful" use. These safeguards are now, however, regularly flouted by the nuclear industry's practice of reflagging - uranium owners swap the country of origin of their material, in order to get round the varying restrictions from exporting countries and bans on South African uranium. These swaps can involve the supply of different grades and products of uranium.

Bob Hawke's ALP have come in for heavy criticism because of a gradual weakening of their restrictions on uranium mining; a slice by slice cutting away of their original Uranium Policy - the so-called "Salami Effect".

Pacific nuclear tests

As a result of French nuclear tests in the Pacific a ban was put on exports of uranium to France. This was lifted by the Labor Government in August 1986 and on January 6 1988 the Federal Government announced a long term contract for the supply of Australian uranium to France. This contract contravenes ALP policy - France is not a signatory of the Nuclear Non-Proliferation Treaty (NPT).

The French connection together with the government's inability to prevent reflagging has increased concern over where Australian uranium ends up, and the uses to which it is put.

Three mines policy

Another weakening by the Government is over their "three mines policy". Originally the policy stated that they would "prevent the development of any mines other than Nabarlek, Ranger and Roxby Downs". This "no new mines policy" was reinterpreted as a "three mines policy", allowing new mines to open as existing ones close.

In May of this year the ALP began a series of hearings around the country for both ALP members and the public to examine the party's "three mines policy". The Review comes after several years of pressure from the pro-mining lobby, especially from mining companies excluded by the three mines policy. Despite their exclusion, these companies have committed themselves to supply Australian uranium to overseas customers.

Falling demand for uranium and lower prices do not seem to have affected the desire of some people in Australia to open more mines and sell more uranium.

RANGER

Location: Alligator Rivers Region, Northern Territory
Ownership: Energy Resources of Australia Ltd.
Reserves: 140,000 tonnes uranium oxide
Mining: Commenced production in October 1981 producing 3,000 tonnes each year by open cut, acid leach, with saturated tailings.
Contracts: USA, Japan and several European countries including France

The Ranger Uranium Inquiry, while allowing mining, stressed safety, environmental protection and compensation to local Aborigines.

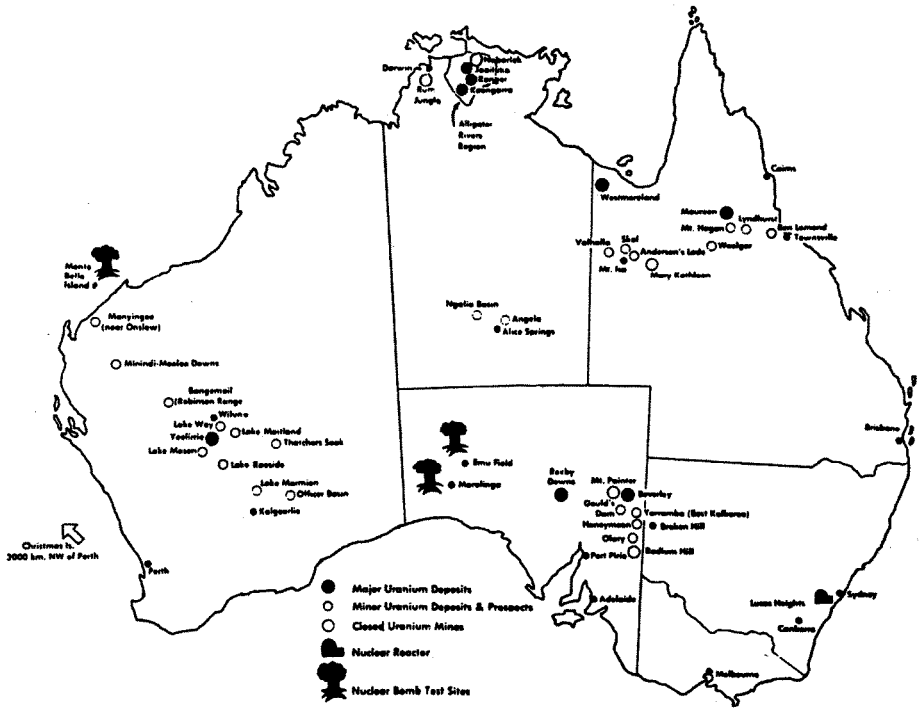
There is often excessive water on the mine site and the company argues for periodic releases of contaminated water into Kakadu National Park.

The Ranger Inquiry recommended that tailings be covered by two metres of water to reduce the release of radioactive radon and to prevent dry season winds from carrying radioactive dust particles over the region. These regulations were changed after an embarrassing incident when the mine was opened in 1981 - it was found that they could not maintain adequate water cover. The authorities bent the rules and allowed the mine to proceed as long as the tailings were kept damp.

The authorities ignored claims that the tailings dam base was not built on bedrock and that faulty concrete was employed in construction. And they turned a blind eye in August 1988 when, following an abnormally low rainfall wet season, more than a third of the tailings in the dam were exposed.

On 4 March 1986 the sulphuric acid plant was started up at a faster than usual rate. This led to an increased emission of sulphur dioxide, in excess of 10 parts per million (ppm). The actual level is not known because Ranger's monitoring equipment had been out of order since November 1985. The Federated Miscellaneous Workers' Union made a detailed media release claiming that the exposure was 'well in excess of 150 ppm' and that 'the priority accorded by the Ranger Uranium Co. to matters of health and safety at the mine site was markedly insufficient'.

On 2 February 1988 between 20 and 100 cubic metres of treatment water in the Ranger mill, contaminated with uranium and calcium carbonates, overflowed into the restricted release zone of the mine - designed to prevent contaminated water from entering the National Park - again calling into question the operating methods at the mine.



NABARLEK

Location: Alligator Rivers Region, Northern Territory
Ownership: Queensland Mines Ltd
Reserves: 13,000 tonnes uranium oxide
Mining: Commenced production in April 1980, producing 1,500 tonnes each year by open cut (mined entirely and stockpiled in 1979), acid leach with saturated tailings
Contracts: Japan, Finland and France

In March 1981 contaminated water escaped from a plant run-off pond and entered the creek system. Soil studies six months later indicated elevated levels of contaminants (Cu, U, Mn, Pb, Zn) at the monitoring sites downstream of the pond. Further research was regarded as necessary by the authorities but no public reports have appeared.

The tailings are neutralised with lime and disposed of in the open cut. Originally the tailings had been maintained in a wet state but since June 1985 semi-dry techniques have been employed.

Authorities believe that improved conditions for rehabilitation are resulting, although the company still has to remove the sub-aqueous excess water which was originally deposited with early tailings.

The Northern Territory Government has lobbied Queensland mines to continue exploration on Aboriginal land so that the A$60 million plant at Nabarlek can be utilised. Since 1981 the mine has kept a very low profile but has sought to influence the Aboriginal community to permit further mining exploration.

ROXBY DOWNS

Location: Olympic Dam, South Australia
Ownership: Western Mining Corporation Ltd (WMC) 51%; BP Australia Ltd 49% (RTZ may buy this stake, but WMC have pre-emptive rights)
Reserves: 1.3 million tonnes uranium oxide, 32m tonnes copper, 1,200 tonnes gold
Mining: Commenced production in August 1988, by underground mining and dry tailings, 1,900 tonnes uranium each year
Contracts: Britain, Sweden, South Korea and Japan (but 50% of output projected remains unsold)

Nearby springs from the Great Artesian Basin played a pivotal role in the white settlement of the region and are also fundamental to the lifestyle and spiritual beliefs of the Aboriginal tribes. At least two of the springs have dried up since Roxby's water extraction programme began; this requires investigation. There is no environmental surveillance programme comparable with that at Kakadu.

Initial job forecasts, in 1979, were for 5,000 jobs, this reduced to 2,430 by 1982 and 380 by 1988.

The decline in the world market for nuclear reactors, due to spiralling costs and unresolved safety problems, means that future markets for Roxby uranium are highly uncertain. Roxby wants to sign more contracts with Japan, a move which will place downward pressure on world uranium prices.

In 1988 a contract was secured with South Korea, despite them not being signatories of the NPT.

Insulation projects fight back

1.8 million low-income households have no, or only low, levels of loft insulation. 6.2 million lack adequate draught-proofing, yet the Government's decision to replace the Community Programme with the Employment Training scheme has drastically reduced the ability of energy projects to reach those who desperately need their help.

Neighbourhood Energy Action, which co-ordinates a network of 330 local energy projects, is concerned that the introduction of Employment Training has led to a dramatic decline in the workforce which has so far helped over 600,000 households to "beat the winter cold."

This winter the number of homes draughtproofed has fallen by 150,000.

JENNY SAUNDERS highlights the problems faced by energy projects and outlines recent events in the campaign to preserve the national network.

Bill Sheldrick's comprehensive article on the community energy project network (SCRAM 69) provided a realistic summary of past achievements and outlined the implications of recent changes in the financial programmes supporting energy projects.

Neighbourhood Energy Action (NEA) and Energy Action Scotland (EAS) are taking action on behalf of the project network, to overcome current problems and to promote a more comprehensive energy efficiency service to people on low incomes.

There are three areas of concern -

- the future of the Energy Grant which meets 90% of the cost of draughtproofing materials for people receiving income support, housing benefit or family credit.
- the effect of the Local Government and Housing Bill on the Homes Insulation Scheme which currently provides grants to meet 90% of the cost of loft insulation (materials and labour), up to £144, for people receiving income support, housing benefit or family credit.
- the impact of Employment Training (ET) on the services offered by energy projects.

This third point has the most immediate and dramatic effect on energy efficiency measures for the poor. Many projects have closed, and most of those which remain are finding it difficult to recruit trainees. NEA and EAS have been deeply involved in trying to persuade the relevant Government Departments to assist in overcoming the problems presented by ET.

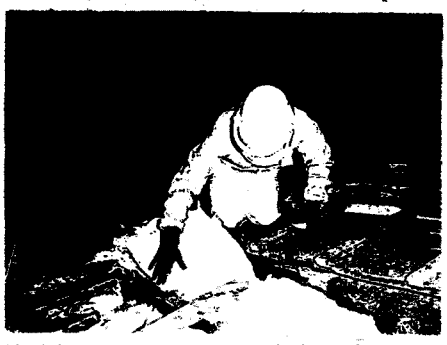
In September 1988 the Community Programme, and other temporary employment and training schemes, were replaced by ET. The new scheme moved away from the concept of community benefit and emphasised the training needs of the long-term unemployed, people whom ET is designed to help.

Although the change in emphasis was recognised, NEA did not initially view the aims and objectives of quality of training and service to the community as being entirely incompatible. The ability of energy projects to meet training demands was well documented, and a wide range of certified training opportunities, including the City and Guilds in Draughtproofing Installation Skills, was already in place.

NEA and EAS have attempted to ensure that energy projects successfully make the transition to ET. But, although certain concessions have been won from the Government, to improve the scheme, it is unlikely that they will be sufficiently extensive to provide a secure future for energy projects.

Recruitment difficulties

There is an inherent difficulty with regard to the recruitment of trainees on to energy projects or, more specifically, to the concept of



linking the needs of low-income households to the demand by trainees to train in the skills which projects provide.

Even if the short-term problems of the lack of places on community insulation projects and the lack of trainees could be overcome, there are features of ET which makes it inappropriate as a means of providing an insulation and draughtproofing service for the elderly and other low income households.

There are indications that, even if the numbers of trainees were adequate, there would be problems in maintaining adequate levels of productivity under ET. The financial arrangements under ET allow only for supervisory ratios which are inappropriate for projects which involve working in the homes of the most vulnerable members of society.

Alternative funding

An alternative method of funding the projects is required. One which takes fully into consideration the requirements of providing such serv-

ice to low income households. A total of £50 million per annum is spent on the Community Insulation Programme, the majority of which is paid via the Department of Employment Training Agency. This funding would be sufficient to provide a comprehensive and co-ordinated national network of community insulation projects if it was paid directly, rather than through temporary employment and training programmes. Projects could still provide valuable places within ET either through subcontracting to Training Managers or through employer placements.

Northern Ireland

A possible model is provided by the situation in Northern Ireland where projects are funded under the Action for Community Employment Scheme (ACE) run by the Department of Economic Development. People on this scheme are employed for a period of 52 weeks and receive a wage which currently averages £88 per week.

In addition, the projects receive an overheads grant for each post filled. This scheme also allows for payment of a core worker grant, to cover the cost of key posts such as managers and senior supervisors. Such core workers are employed for the lifetime of the project. The Department also pays a training grant to meet the full costs of approved training.

Early Day Motion

MPs were made aware of the impact of the ET, at a lobby meeting at Westminster, organised by NEA, on the 21st of March. They were also urged to sign Early Day Motion 496, which calls for Government action to ensure that NEA is able to

rebuild a national Community Insulation network. Speakers at the meeting included representatives of major national charities concerned with the welfare of the elderly and others on low incomes. Representatives from insulation and draughtproofing manufacturers were also present to support NEA. Manufacturers are obviously concerned about future sales of materials: the Energy Grant budget of £14.5 million for 1988/89 will be underspent by over half due to the impact of ET.

Other concerns

The other two major areas of concern - the future of the Energy Grant to pay for draughtproofing materials and the changes to the Home Insulation Scheme proposed in the Local Government and Housing Bill are also currently being addressed by NEA and EAS.

The main goal is to ensure that adequate grants are available to the largest possible number of people on low incomes to pay for comprehensive energy efficiency measures and that the grants are administered in a straightforward, fair and simple fashion.

NEIGHBOURHOOD ENERGY ACTION

The current situation means that the Energy Grant may only be administered through Training Managers running energy projects which are registered with NEA, and may only be claimed if the work is carried out by an energy project.

Of course, when there was a truly national network of energy projects this system seemed both sensible and practical. It was, however, always intended to be an interim measure. The intention was to transfer the grant to the Department of Environment after April 1990 to become, along with the loft insulation grant, part of a comprehensive home improvement grant.

Energy efficiency

The recently published Local Government and Housing Bill does not, however, offer an adequate solution. The proposed legislation does not allow all grant aid for energy efficiency to be incorporated in the new home improvement grant because:

- grants will be discretionary rather than mandatory
- grants will not be available to local authority tenants
- there will be limited opportunities to ensure that fitness standards and the definition of "adequate provision for heating" are truly meaningful.

A more cumbersome administrative system is envisaged which would also lead to a very limited number of low income households having easy access to energy efficiency grants. The current inadequacies and anomalies must be avoided in any new system and NEA, as part of the Association of Metropolitan Authorities working group on the Bill, is pushing for amendments. A national conference, "Losing Power, Losing Heat", was organised by NEA to address the impact of the Bill on low income consumers.

Unanimous support

NEA continues through lobbying and negotiation with the Department of Energy to try to salvage the situation. To date 133 MPs have indicated their support via the Early Day Motion and the parliamentary meeting resulted in unanimous expressions of support for the work of energy projects on social, economic and environmental grounds from organisations as diverse as Age Concern, Child Poverty Action Group, Friends of the Earth and the Association for the Conservation of Energy.

Latest figures suggest that, in terms of numbers of projects, there has been some recovery, there are currently some 330 operating projects but the paucity of trainees and low productivity levels contradict this apparent improvement.

The mild winter has brought a collective forgetfulness of the misery and hardship endured by the poor in a more typical winter. When the next bitter winter comes and brings outraged headlines in the national press about the suffering of the old and poor it must be hoped that there will exist a national network of community energy projects able to offer loft insulation, draughtproofing and energy advice services to their clients and that an adequate system of grants will exist to finance these measures.

Jenny Saunders is the Press Officer for Neighbourhood Energy Action.

Torness was officially opened on Saturday 13 May, by the Prime Minister herself. PETE ROCHE examines Britain's newest nuclear nightmare.

Opening day blues

Lorry loads of blue carpet tiles and a sea of blue draping were imported to transform the SSEB's £1 million celebration into the final, blue stained, V-sign to all those local people who have opposed the station for the last decade and a half.

Local MP, John Home Robertson (Lab), denounced the opening as "pseudo-royal...an absurd demonstration of the SSEB's sycophancy."

The public have always been against the construction of a nuclear power station at Torness point:

- A System Three Poll published in November '78 showed a majority of the people living in Lothian Region opposed to Torness.
- In May 1979 10,000 people demonstrated at the site.
- Again in 1979 a poll conducted of its readers by the East Lothian Courier showed 90% opposition to the station.
- In 1987 a System Three Poll concluded "The majority of respondents (53%) believed that Torness should not start operation, 32% wanted it dismantled and 21% mothballed."

Torness unnecessary

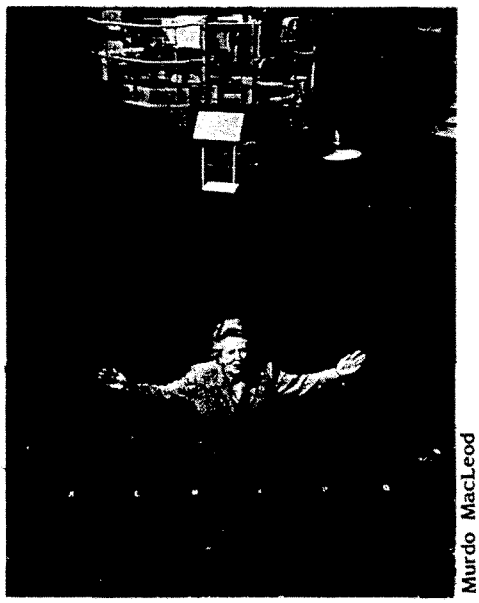
At the Torness public inquiry, which lasted just 9 days in the summer of '74, the SSEB based their case on their estimate that electricity demand would grow by 6% every year until the end of the century. The demand in 1987/88 was 21,123 million units compared with 19,220 million units in 1973/74 - a total increase of only 9.9% over 14 years. Adding insult to injury Scotland's second newest power station the 2000MW, Inverkip, oil fired station "was placed on a care and maintenance regime from April 1987."

What will happen to Scotland's, now, ludicrous overcapacity? Donald Miller, SSEB chair, says "We had always anticipated when we built Torness - and I remember going through this with the government at the time - that we would be allowed to export power." He is hoping to double Scotland's export capacity to 1,600MW. The £70 million required for new transmission lines may be postponed because of uncertainty over the Government's non-fossil statutory obligation in England and Wales.

The SSEB claimed that the new power station would "provide job opportunities both during and after construction and give a continuing boost to the economy of the area." Granted, at the height of construction it employed about 6,000 people. Most of whom where brought into the area and have since moved on. These jobs were temporary.

Jobs fraud

The employment effect of nuclear generation is two-fold: it is a highly capital intensive industry clearly shown by the 9.5% decrease in the number of SSEB employees over the last ten years (from 13,632 in 1978 to 12,339 in 1987) compared with a 320% increase in fixed assets per employee (from £49,039 to £207,744); the knock-on effect of opening Torness posses an immediate threat to the jobs of people working at Cockenzie power station and the Monktonhall and Bilston Glen pits. The two mines employed 4,000 miners in 1982, by the time British Coal formally announced their closure this figure had been reduced to 700. Miners at Bilston Glen have already accepted the closure, for fear of losing redundancy money, but miners at Monktonhall are hoping to appeal.



Murdo MacLeod

Prime Minister Thatcher opens Torness

Emergency plan

Three Mile Island and Chernobyl have shown that the threat posed by nuclear power stations is global. Yet the Government refuse to extend the evacuation zone, in case of a major accident at Torness, from 3km to 10km, as requested by Lothian Regional Council. At the time of Chernobyl the 30,000 inhabitants of Gomel, 125km from the station, had to be evacuated. Dunbar is outside the evacuation zone. Can the citizens of Dunbar really be expected to stay put when villagers from Innerwick are evacuated to Dunbar? Miller believes "Nuclear power is the safest source of any kind of energy, bar none."

Nuclear Waste

There is massive public opposition to the Government's plans to dump radioactive waste, in a hole in the ground. Whenever prospective sites have been named in the past public opinion has forced the Government to drop their plans. Yet still they continue to produce it, with no adequate method of disposal, even for low and intermediate waste.

Torness is planned to have a thirty year operating life, during which time it will generate electricity by 'burning' uranium. Spent fuel rods will be removed from the reactor and flasks, each containing 20 spent fuel elements, will be sent to Sellafield by rail - "roughly one flask every ten days". The route is from Torness via Edinburgh-Carstairs-Carlisle to Sellafield. There is great concern among local authorities and the public about transport of spent fuel through their communities.

At the time of the 'Skateraw' public inquiry into the SSEB's application to build a nuclear flask railhead at Torness, it was estimated that 975 long-term cancer deaths would result from a 10% release of radioactivity, caused by a terrorist attack on a flask in the Niddrie area of Edinburgh. With flask movements due to begin towards the end of this year, communities along the rail route are starting to worry.

Miller is deluding himself if he believes, "There is no significant opposition to this station anywhere in this area." It is a project that has been forced through, against the wishes of local people by heavy handed tactics. From the very beginning of construction, Tuesday 14 November 1978, when Half Moon Cottage was bulldozed into the sea, to the official openning, when Pamela Banks was fined £100 for throwing herself in front of the Prime Minister's motorcade, this has been a depressing story of bureaucratic intransigence.

Donations to help pay Pamela's fine should be sent to Faslane Peace Camp, Shandon, nr Helensburgh, Dunbartonshire.

Environment pledge

Power Gen, National Power and the National Grid Company have issued a joint pledge on protecting the environment.

At the request of the Department of Energy, who want the industry's image cleaned-up, in the run up to privatisation, the three successor companies to the CEGB, have published a "joint statement of environmental policy." It says there will be no lessening of their environmental obligations.

Each company commits itself to take environmental care as a "guiding principle" to cover all operations, planning and construction programmes. To ensure that this principle is applied, "the companies will follow an 18-point policy", including:

- "encouraging greater efficiency in end-use of electricity by consumers directly supplied by the generating companies;
- "using wastes and by-products in a creative and beneficial way and, where this is impractical, ensuring proper disposal and monitoring;
- "minimising environmental disturbance in all its activities and;
- "minimising environmental disturbance, especially to National Parks and other designated areas and honouring the CEGB's declaration of commitment to the National Parks."

It states, "Each generating company will have good reasons to maintain high standards of environmental care. In the competition for new capacity, there will be strong commercial incentives for each new project to be planned to high standards of environmental performance so as to secure ready planning consent."

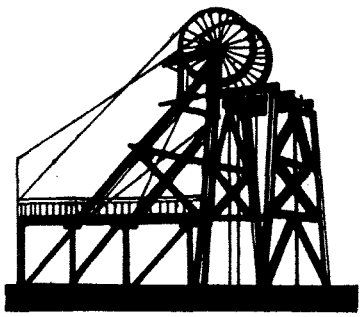
All new fossil fired power stations will be designed to meet the "strict emission limits of the EEC Directive." It adds, all existing, major, coal-fired stations will be fitted with special burners to reduce nitrogen oxide emissions - which along with sulphur dioxide is the main acid rain gas - and "many will be fitted with sulphur removal plants".

Acid test

The non-nulcear successor to the CEGB, Power Gen, are joining British Coal's fluidised bed combustion research project, at Grimthorpe (SCRAM 70).

Although they will contribute only £1 million, it marks a change in attitude of the generating companies towards the system.

Two years ago the CEGB withdrew funding from the project, claiming it was not an economic investment for them, they did, however, concede it was economic for small coal-fired power stations. They failed to anticipate the rejection of their "big is beautiful" philosophy brought about by privatisation: all three of their



proposed super stations - involving 900MW turbine generators - have been shelved: Fawley in Hampshire; Kingsnorth in Kent and; West Burton in Nottinghamshire.

British Coal, who are putting in £7 million, still need to find £9 million to complete the research programme, which they have asked the Government to provide. A Finnish company, A Ahlstram will provide £5 million.

In the short term gas-fired power stations are expected to be built - they are more efficient and therefore considered environment friendly. However, when gas supplies begin to diminish over the next 30 years we will need the new breed of efficient coal stations.

Flue gas desulphurisation

Continuing with the new green consciousness, Power Gen have announced their intention to fit desulphurisation equipment to 2 large coal-fired power stations.

Ratcliffe-on-Soar, Nottinghamshire, which burns high sulphur coal from the Midlands, is expected to be their first choice because it would maximise the effectiveness of the large investment required. The other is likely to be chosen from Fiddlers Ferry in Merseyside, previously earmarked for desuplphurisation by the CEGB, Cottam in Nottinghamshire and Ferrybridge in North Yorkshire.

According to the company's version of the 'polluter pays' principle the £800 million costs of the clean-up will be passed on to the consumer.

It is not yet known which type of desulphurisation they will choose. National Power the other decay product of the CEGB who will inherit the 4,000MW Drax station also inherit the Board's commitment to fit the Limestone/Gypsum flue gas desulphurisation system to it. That process consumes large quantities of limestone in order to fix the sulphur from the flue gasses and generates even larger amounts of waste, including gypsum and a toxic sludge both of which will have to be dumped.

Environmentalists favour the Wellman Lord process which requires much less limestone because the limestone is recycled. It also produces fewer by-products for dumping, sulphuric acid, which we currently import from Europe, can be made by processing some of its waste.

Ministry *for* the Environment

A new "green" government ministry will be given control of energy efficiency later this year according to a leading member of the influential, Tory, Bow Group, Tony Paterson.

The Group, obviously concerned by the strength of feeling on environmental issues, are setting up a special committee to concentrate upon green issues.

Such a ministry, it is thought, would also take on responsibility for environmental protection and town planning from the Department of Environment, and countryside protection from the Ministry of Agriculture.

It should be backed up by an environmental unit in the Treasury and other ministries, co-ordinated by a top civil servant at number 10 Downing Street, "under Mrs Thatcher's caring supervision," says Paterson. He believes, such a move would be "a symbolic act which will win a lot of votes, particularly among young people."

It has long been thought that the Environment Ministry is too cumbersome, "It is impossible for the Secretary of State, able though he is, to cover green issues properly," adds Paterson.

The concept of a new ministry in light of the likely closure of the Department of Energy, post privatisation, and subsequent loss of a cabinet position, carries considerable weight.

If it is to promote energy efficiency, it would highlight the special need in view of pressing environmental concerns, like the greenhouse effect, for interference in the market, and lend weight to the argument for building the principle of 'least cost planning' (see p8-9) into the privatised regime.

New wave

Baroness Hooper, the Under Secretary of State with special responsibility for renewable energy has asked that "a study of wave energy, including offshore technologies should be made at an early stage."

The review is being billed as an update of the Department of Energy's (DoEn) 1896 "appraisal of research, development and demonstration". This means that all other renewables will be included, it is, however, significant that offshore wave has been singled out. Many see it as a victory for those who have campaigned to have the British wave power programme restarted, since it was closed down in 1982.

The circumstances of the 1982 decision have attracted considerable criticism. Professor Stephen Salter, designer of the eponymous 'Duck' wave power device has campaigned relentlessly on behalf of wave power.

The likely cause of the DoEn's change of heart is the embarrassment being caused by allegations made by Salter and Gordon Senior. They complained that a key report in the department's appraisal of wave power was altered. Senior, an independent consultant and appointed assessor of the 'Duck', the author of that report said, "most of the text was as I had drafted, but the key conclusions had indeed been changed and even reversed."

Over the past year or so the allegation has received considerable attention: many articles in the press; it played a central role in an examination of renewable energy technologies in the House of Lords, whose final report endorsed the call for an independent inquiry; Salter himself appeared at the Hinkley Inquiry and gave a very interesting proof of evidence, at the request of David Ross; and perhaps the final blow was an Early Day Motion, written by SCRAM and sponsored by Frank Cook MP (Lab), the co-vice chair of the all-party Parliamentary Alternative Energy Group, which reiterated the call for an independent review.

The Energy Technology Support Unit, the body responsible for renewable energy in the UK, who are at the centre of the scandal, have replied to the allegations and complaints that they are unduly influenced by the United Kingdom Atomic Energy Authority part of whose premises they sub-let. Their reply came in the form of a 4 page article, "The role of the Energy Technology Support Unit." It was published in ATOM, the journal of the UKAEA.

"It is clear from articles in the press that the modus operandi of ETSU is not always fully understood" it argues. "The allegations made in the press explains why an early day motion...calling for an inquiry into the way the DoEn wound down wave research in 1982-3," it contends. "The very possibility that such an inquiry might be held indicates how little the constraints under which ETSU operate are known and appreciated.

"The information provided by ETSU must not only be dispassionate but must be seen to be such." Whilst denying the allegations of Salter, no mention of Gordon Senior is made.

The article also considers the 12 month contract that ETSU operates on, to the DoEn, "the department's thinking behind this is understandable: it provides a powerful incentive for ensuring that staff concentrate on satisfying its requirements. One thinks of Johnston's comment on the mental state of a man about to be hanged." Surely a man waiting to be hanged, regardless of integrity, will do almost anything to postpone his death.

SCRAM are not arguing that all the staff of ETSU are corrupt, it need not be them all. And, the evidence from Senior underlines the concern that has been held for many years, that ETSU links with the UKAEA can be nothing but bad for renewables.

● £87,000 for a detailed survey of the UK potential for Islay Rock Gully System, currently being built by Trevor Whittaker of Queens University, Belfast, was also confirmed by the Under Secretary.

Danube reprieved

The struggle to prevent the building of the Nagymaros Dam, in Hungary (SCRAM 70) is coming to an end: the Government have announced a 2 month halt in construction pending a review of the scheme.

It is widely believed that this is the final curtain on a campaign which has been played out over the last 12 years.

On 30 May, the Hungarian Government will table a resolution in Parliament to cancel its obligation to proceed with the project. If Parliament rejects the resolution it will then be faced with the problem of whether or not to hold a national referendum on the project.

The main opposition group, Duna Koer - Danube Circle - Hungary's first independent environmental group, who have a petition of over 150,000 names, welcome the decision. Janos Vargha, co-founder of the group, warned "It is too early to feel triumphant."

Following a meeting between Hungary's Prime Minister, Miklos Nemeth, a prime mover in the decision to stop work, and Ladislav Adamec his Czech opposite, on 24 May, it looks increasingly like the work has stopped for good.

The two sides have agreed to appoint a team of experts to "carry out an in-depth analyses of the problems within a period of 2 months". To the surprise of many observers, Ladislav commented, "If new circumstances appear which could seriously damage the environment of Hungary or ours, we have agreed that we together are going to judge things and heed the conclusions."

Fears over the amount of money that the Hungarians owe to Austria, who have given loans worth £369 million to help Czechoslovakia with their end of the project, were previously considered a major stumbling block to their withdrawal. However Czechoslovakia can take heart in the Austrian Chancellor's statement that, "naturally we respect this Hungarian decision and will not seek to use the occasion to do anything that goes against the spirit of good neighbourliness between Austria and Hungary."

Their loan was riddled with conditions: in return for the money a considerable amount of the construction work was to go to Austrian companies, and the repayments on the loan were to be in the form of electricity generated by the scheme over 20 years. The spotlight of international press attention it would seem has tempered the Austrian stance - they were prohibited from building their own potentially ecologically disastrous hydro scheme on the Danube by environmentalists in 1985.

Wave cylinder

Swedish engineers have produced a new wave energy device, called a Chalmers converter, which has been tested and approved by their National Energy Research Commission.

The device consists of two aluminium counter-rotating wave rotors, which are positioned to face incoming waves. The rotor, which floats on the sea's surface, is long and cylindrical, and has a number of curved horizontal vanes separated in transverse compartments.

Initially the system will be used to supply electricity for water pumps and desalinisation units, in the long term it is hoped to link several of the devices to produce electricity for the national grid.

Test have shown the device to be suitable for shallow waters, proximity to the shore keeps costs down because it limits the amount of expensive submerged power cable needed to bring the power to land.

Not Fair Isle

Fair Isle's Electricity Council have narrowly escaped an £11,300 rates bill for their 55kW aerogenerator.

After 6 years of successful operation, the island's population of 26 were shocked to hear of the impending rates bill. Such a bill had it been served would have trebled the cost of electricity from the turbine, to about 12p/kWh.

However, after a brief wrangle it was established that the turbine is owned by a charity, the National Trust for Scotland (NTS), who own the island, and are entitled to a 50% reduction in rates. The remaining 50% has been waived at the discretion Shetland Islands Council.

The case highlights the inequalities that exist between privately owned generating equipment and that of the generating Boards. The Boards have negotiated a special rating formula with the government which means they would pay one tenth of the rates for a similar aerogenerator.

Although all is now clear for Fair Isle, other small scale private energy projects still face the bias of rates. The NTS plan to contest the valuation, "on a point of principle" says Alexander Bennett, the island's Factor.

Of particular concern to the Shetland Island Council (SIC) is the new power scheme in Foula, at the heart of which lies a wind turbine: "No doubt this will also receive a high rateable valuation which could threaten the viability of this small but vital power scheme."

The head of the SIC's development committee, Magnus Flaws, is worried about future development of private turbines on the islands. He has written to Ian Lang, Minister of State at the Scottish Office expressing his concern, "As the Government is anxious to develop renewable energy resources such as aerogenerators the council would ask you to reconsider amending the rating laws to provide an incentive for the development of wind power conversion systems." He continues, "aerogenerators could be exempt from valuation."

Last year the Government promised that the rating system would be reformed, however, it will not be done until 1990. They plan to phase in equality, says Robert Armour, Treasurer of the Association of Independent Electricity Producers, "at a rate of 15% a year.

Which means if there is a 100% divergence it would take 7 years."

The reformation is being specifically targeted at private power plant connected to the national grid, neither Fair Isle or Foula have that luxury, indeed this is why they have the wind turbines.

It has been suggested that the Faula community should establish a charity to which they could give their turbine.

Willow power

Excess UK farmland could be used to grow willow trees to produce 10% of the nation's electricity demand, according to researchers from the National Engineering Laboratories (NEL), in East Kilbride.

The trees can be grown in three years and converted to energy simply and cheaply, says Doug Jackson of NEL. He believes with 2.5m acres to be taken out of food production in the UK, because of European surpluses, bio-fuel farming offers an attractive alternative.

The market for electricity is huge compared with that of cereals or other food crops. Farmers who currently receive a set aside grant from the government for not growing crops could invest that money in planting trees. Such an investment would be returned in just 3 years say NEL.

By placing the generating plant in the centre of a large growing area and harvesting on a rotation basis the fuel farms would be able to produce a steady stream of base load power. The drying unit for the trees uses the waste heat from the generating plant, and is therefore very efficient.

Producing electricity this way would not contribute to the greenhouse effect. CO_2 released when burning the trees would only be in effect return to the atmosphere what they had taken whilst growing.

Wind blues

One of the world's largest wind turbine manufactures, James Howden of Glasgow have decided to pull out of the wind industry.

The Company are pulling out because of the unfavourable political climate in this country for wind power: "It is not economic in the short to medium term to continue in the sale of wind turbine generators."

"It [the Government] said it before, and it said it again recently in privatisation, that wind was a favoured source. However nowhere is anything progressing particularly fast," said Howden Group Secretary, Alan MacLachlan. Adding, "privatisation has retarded the development of wind power."

Losses incurred during their excursion into the great Californian 'windrush' have also soured the company to wind power. They lost £13.2 million, mainly due to problems with sub-contracted blades, which had to be replaced, at one wind farm in Altamont Pass, California.

Last year Howden won contracts worth £850,000 from the EC for the installation of "a cost reduced 750kW wind turbine with variable speed generation for wind farm application in Scotland" and for a 330kW wind/diesel system, with flywheel storage and load control, on Rathan Island, Northern Ireland. They are discussing the possibility of continuing in these projects on a consultancy basis only. For such a deal to be struck another UK manufacturer would have to be found; the Wind Energy Group would be the obvious choice.

Existing deals will be honoured, including the construction and monitoring of a 1MW machine at Richborough in Kent for the CEGB, say Howden. However, it has not yet been decided if they will continue their involvement in plans to place a 750kW turbine 3 miles off the coast near Wells-next-the-Sea, in Norfolk.

The other major project left hanging in the balance is plans for the first Scottish wind farm. Howden were members of Scottish Windpark Developments which was brought together by the Scottish Development Agency and included the National Engineering Laboratories (NEL). Feasibility studies began last year into the possibility of siting a wind farm on Eaglesham, just outside Glasgow. NEL's continued involvement in wind power is also uncertain, as the Government are trying to privatise them.

The park was originally billed as a "shop window" for Scottish wind power. Sadly, behind the window, the shop may now be left entirely bereft of stock.

An American dream

Despite a 90% cut in funding, during the Reagan administration, renewable energies now account for 10% of US domestic energy use.

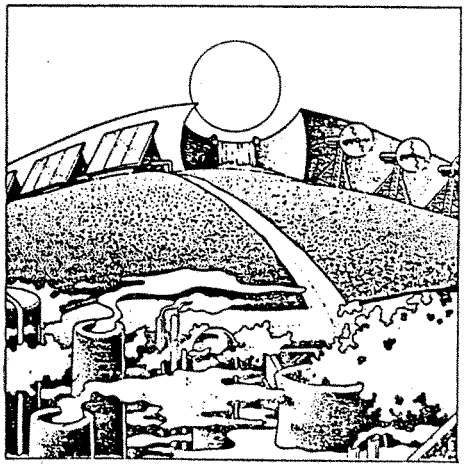
The last 8 years have seen the US budget for renewable energies research and development cut from almost $1 billion (1981) to less than $116 million (1989). Yet funding for nuclear fusion and fission in 1989 exceeds $700 million.

In a report produced by Public Citizen - Power Surge (*) - it is estimated, "using government" figures, that renewables will be providing a minimum of 20% of domestic energy supply, whilst nuclear will stagnate at its present level of less than 7%.

They argue that energy efficiency and renewable energy resources can "meet the challenge" created by conventional energy strategies - without forcing a drop in living standards. The report examines the current status of renewable energies in the US and their potential and projected growth over the next 10 to 20 years. It concludes with an investigation of the public policies that will be required for "renewables to achieve their full potential, allowing them to contribute significantly to the abatement of energy-related dangers, most notably global warming."

Whilst the costs for nuclear power are charging up the costs for renewables have decreased by as much as 75% - "the costs of power from photovoltaic cells has fallen from $1.50/kWh in 1980 to about 35 cents today. That figure is expected to decline to between 6 and 18 cents by 2000". Today electricity generated from renewables including, biomass, solar thermal systems, wind turbines, photovoltaics, passive solar design are economic, with many more set to join them.

"This potential can be realised only with a substantial increase in



the Department of Energy budget for research and development of renewable technologies, restoring that budget to at least 1985 levels of $263 million," says the report.

Public Citizen's overall "finding is that "renewable energy industries have survived President Reagan's dismantling of government support for renewables, and may even meet President Carter's call for a 20% solar society by the year 2000."

Copies of "Power Surge" are available from: The Critical Mass Energy Project, 215 Pennsylvania Ave, S.E. Washington D.C. 20003.

Hot rocks

An £8.15 million feasibility study into developing a commercial geothermal power station is being conducted at the Camborne School of Mines in Cornwall.

The project is being backed by the CEGB, the Department of Energy, the South Western Electricity Board, RTZ Consultants and Kenting's Drilling Services Ltd. They hope to establish a commercial station drawing power from a depth 6km.

Work on geothermal power at Camborne began in 1977 and has so far cost over £30 million.

The current phase of work, which started at the beginning of May, will establish a commercial design and whether or not it offers economic viability. It will be a hot dry rock system, which involves drilling two bore holes and creating a network of fractures in the hot rocks through which water is forced. It then returns to the surface as heated water or steam and is passed through a heat exchanger, which will be used to generate electricity or heat for a district heating system - perhaps both.

According to the Michael Spicer, Under Secretary of State for Energy, the Camborne reservoir has a "potential resource of between 750 and 3,000TWh - enough to maintain the electricity supplies for the South West into the foreseeable future, if it can be fully exploited."

The Rosemanowes area of Cornwall where the mines are situated has a granite geology, which offers a higher than average heat flow for igneous rock because of its natural radioactivity. The natural decay of uranium, thorium and potassium which are found in granite more than doubles the heat flow.

Other regions offering similar geological conditions, suitable for hot dry rock exploitation, are in the Lake district, Weardale in north east England and the eastern highlands of Scotland.

Rubbish power

Domestic refuse from 3 London boroughs could provide economic heat and power, according to a £500,000 study conducted last year.

The South East Combined Heat and Power Consortium, involving the CEGB; the London Electricity Board; the Boroughs of Greenwich, Lewisham and Southwark - whose waste will fuel the station - and; several private companies, hope to begin construction in the spring of next year and to commission the plant in 1992.

Rated at 33MW electricity and 75MW heat the station will consume 400,000 tonnes of refuse a year. Incineration will reduce the weight of the rubbish by 70% and its volume by 90%.

The electricity will be sold to the private distribution company covering the area after privatisation and the heat will be sold to the Borough of Lewisham and piped to 6 council housing estates.

Advanced scrubbing equipment will be fitted to the plant to remove dangerous toxic metals, sulphur dioxide and other acids from the flue gasses.

Chairman of the Consortium's Technical Committee, Bob Wheatly said that the Kent landfill sites, where the rubbish currently goes, will be full in the next few years. When the cost of vermin control and flaring of landfill gasses are addded the cost of incineration is only slightly higher than landfill. However, once the revenues from the power station are taken into consideration the economics look good. The operators of the plant will be paid to burn the refuse.

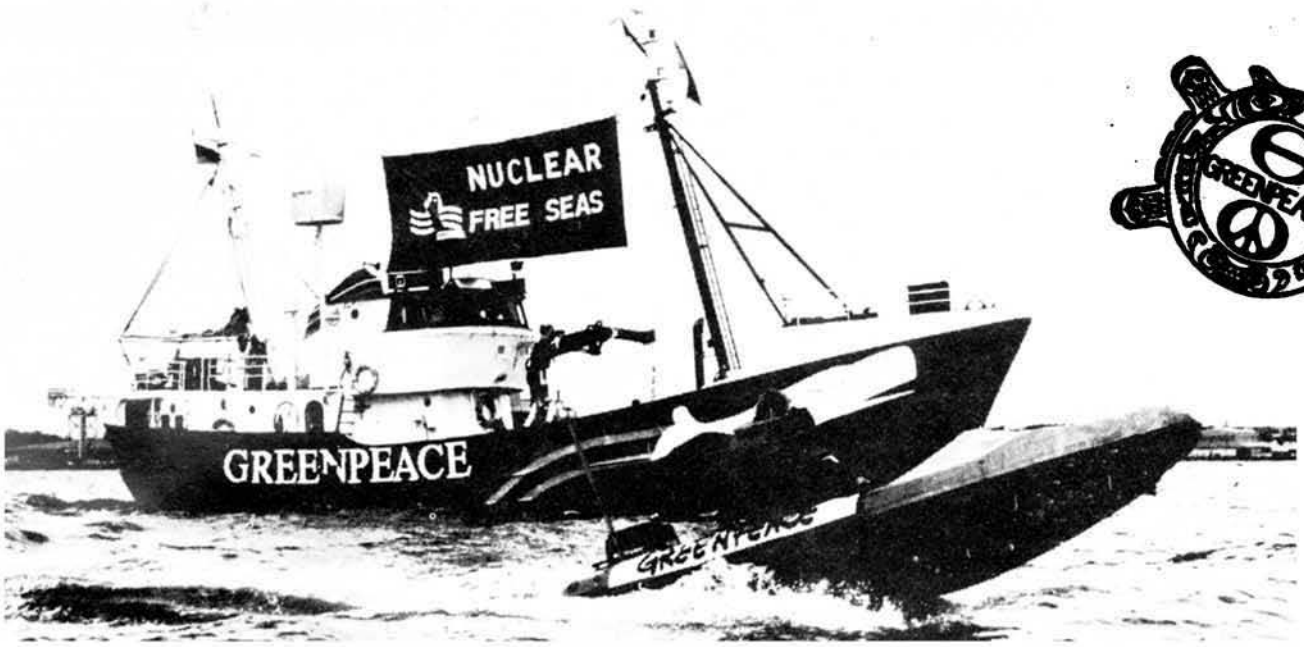
Britain is very short of landfill sites and many existing sites are nearly full. If the London scheme proves successful it may well be the 'shape of things to come.'

Renewable 'Ring Fence'

Renewable energies are to be given a token 600MW 'ring fence' within the Non Fossil Fuel protection zone in the privatisation legislation.

Energy Secretary, Cecil Parkinson, announced that a tranche of up to 600MW will be reserved for renewables, as a late response to fears that the Non Fossil Fuelled section would benefit only the nuclear industry. It is understood that the renewable 'ring fence' applies only to England and Wales, but is not yet known whether a similar compromise will apply to Scotland.

Unlike the grand statements made by their counterparts south of the border, the prospective private Scottish companies have been silent on anything other than how successful the nuclear programme is.



The Greenpeace Story by Michael Brown and John May. Dorling Kindersley; 160pp, £7.95, 1989.

Most people nowadays must have heard of Greenpeace, and many readers of SCRAM magazine must, like me, be supporters. That's about as far as my own involvement goes, apart from general interest in mailings and newspaper stories. Until I read this book, I thought I knew quite a lot about their activities.

In roughly chronological order this book records Greenpeace campaigns from 1970 to 1989, including a host of photographs and other images. It makes a remarkably enlightening story.

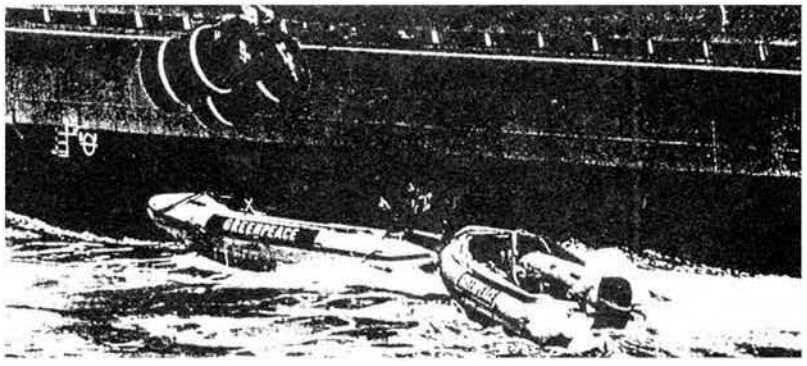
Simply, hearing of campaigns over the years did not give me the overview that I have gained from this book. The full story of Greenpeace collected together in one book is very impressive. The gradual increase in size of the organisation is well described, and if the political problems that this caused in the early years are played down, and the victories emphasised, the end result is a very good read. The courage and determination of the Greenpeace activists should encourage us all.

The main text is a history of Greenpeace, and greater detail of particular campaigns, dramatic incidents and highlights are provided in separate text boxes. This type of layout is attractive to look at and works well in this case. My own favourite aspect of this book is the photographs and other illustrations which are mostly in black and white, though many are in colour. Drawn together like this they form a powerful gallery of dramatic images from all over the world. Horrific pictures of the slaughter of dolphins (before and after the killing) and of a mushroom cloud over Moruroa particularly made an impression on me, though there are lots of dramatic shots of Greenpeace actions and some nice wildlife pictures.

All Greenpeace vessels are shown and the sinking by the French spys of the Rainbow Warrior is covered in detail.

'The Greenpeace story' is a fundraiser and has the look and feel of a coffee table book. I hope that it does well as both.

TIM PUNTIS



Accident - A Day's News by Christa Wolf. Virago; 114pp, £5.99, 1989.

April 1986, the nuclear accident at Chernobyl has recently taken place. An East German writer somehow manages to get through a not so normal day; waiting to hear news of her brother who is undergoing brain surgery. She occupies herself trying to go through her daily routine whilst contemplating on men of science who "would rather 'free' the atom than themselves."

Christa Wolf's poetic narrative and descriptions are at times copious, and at others abundant in literary references. However, it is almost always justified, as the language effectively emphasizes the sinister threat hidden in "this immaculate blue sky, this incarnation of purity." Worth a read!

HELEN LECKIE

LITTLE BLACK RABBIT

Little Black Rabbit's councillor friends from Ayrshire were visiting Sellafield recently. One of their guides explained how dangerous the chemical industry can be. It seemed so unfair to him that whilst Sellafield was suffering from a barrage of press criticism, an accident at a chemical plant involving nitric acid, caused several casualties. And yet there were no immediate casualties involved at Sellafield.

The councillors then proceeded onto the Magnox reprocessing plant. One of them asked their new guide what the fuel rods were being dissolved in. "Nitric Acid" was the reply. "Gosh isn't that hideously dangerous" replied the councillor "The man over there just said. . ."

O O O O O

Campaigners against plutonium flights from Prestwick Airport to Japan were furious to be told in a letter from BNFL that the final decision on the proposals would not rest with BNFL but would "be the decision of the MP for Ayr, Defence Secretary Mr George Younger." (George Younger can't have been too happy either - his majority is only 182 - and you can already fit Tory MPs in Scotland into 2 taxis.)

The letter, sent to various people in the Prestwick area, was signed by Bob Burton. This is not the first mistake Bob Burton, Public Information Manager at BNFL, has made in connection with plutonium flights. A year ago he sent, a draft copy of the Advisory Committee on Safe Transport of Radioactive Materials (ACTRAM) report on plutonium flights to SCRAM. Burton was forced to ask for it back. SCRAM, of course obliged, but only after sending out dozens of copies.

J.A. Preece, Director of Information Services at BNFL wrote to the Glasgow Herald to admit that Burton's reply was a blunder.

Bob Burton joins William McGlaughlan on LBR's Top Ten List of BNFL employees. McGlaughlan is the 'Transport Director' who managed to prang his car into the back of a councillors car when arriving at Ayr to discuss plutonium flights (SCRAM 68).

O O O O O

John Home Robertson, the East Lothian Labour MP, speaking before the official opening of Torness described Mrs Thatcher as "far more dangerous than any nuclear power station". The occasion was a gala event for many of Scotland's top Tories, including the Scottish Secretary Malcolm Rifkind. There must have been a few people thinking that an accident at Torness on that particular day wouldn't have been all bad news. Torness, described by contractors as "The Ready-Brek Factory," already has some embarrassing graffitti about the poll-tax scrawled inside.

Douglas McRoberts, Head of Information Services at Dounreay has been extolling the virtues of deep disposal for radioactive waste in the 'John O'Groat Journal': The Waste Isolation Pilot Plant (WIPP) in New Mexico is, according to McRoberts, an operation of "satellite technology combined with one of the oldest stable geologies in the world . . . It is dry and has remained stable for over 225 million years." He also says WIPP "is already receiving shipments from nuclear plants in 10 states."

In fact, mounting controversy stopped the US Department of Energy's plans to begin shipping military waste to WIPP in October 1988; opening day was postponed to September 1989. As readers of SCRAM 70 will know, the salt beds were selected because they were supposed to be bone dry - in fact brine has been seeping into the underground chambers. There is also a danger that hydrogen sulphide, a highly corrosive gas, could enter the repository from below.

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