

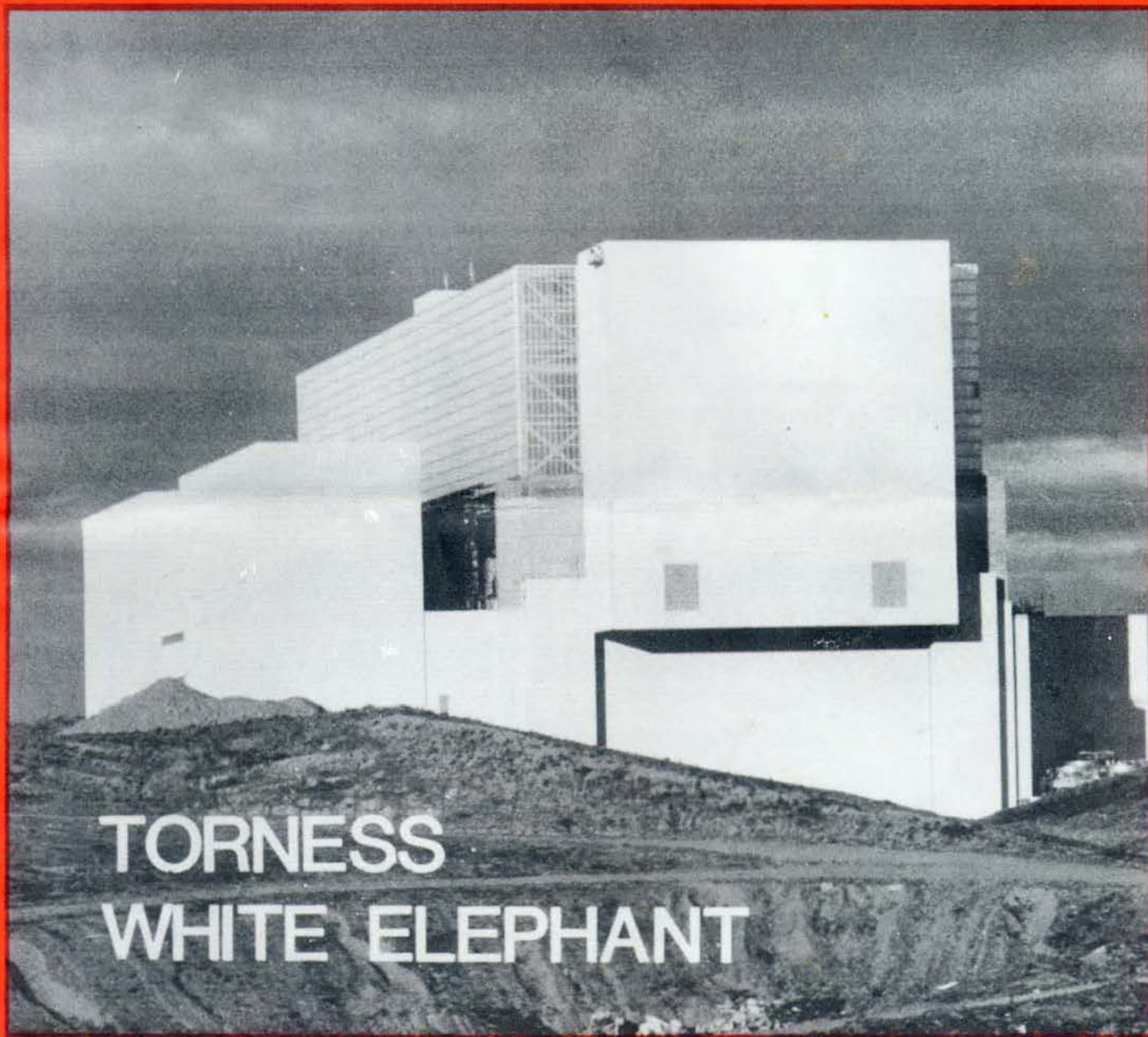
The Anti Nuclear & Safe Energy Journal

# SCRAM



56

50p



**TORNESS  
WHITE ELEPHANT**

photos: John Retiach

p6 Dounreay Rad Health

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

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Tel: 031 557 4283/4.

ISSN 0140 7340 Bi-monthly.

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

Deadline for the next issue:

Articles (800 words/page), 12 December;  
News & graphics, 19 December.

# Comment

Alastair Goodlad, Nuclear Energy Minister, said during a recent visit to Heysham: "I welcome the excellent progress on this important project which is being built to the highest standards:

- the highest standards of safety,
- the highest standards of efficiency,
- the highest standards of reliability."

He spoke too soon; as we go to press we learn that a design fault in the Torness and Heysham 2 Advanced Gas-cooled Reactors will delay their commissioning for several months. The problem is with the control rods which are used to moderate the reaction, and which shut the reactor down in an emergency.

During tests it was discovered that the rods have been damaged due to vibration caused by the flow of the pressurised CO2 coolant. The Central Electricity Generating Board expect it to take "a few months to resolve this particular problem". Tests are to be carried out by the National Nuclear Corporation, who are responsible for the design of the plants, with the possible help of the UKAEA.

This latest setback for the nuclear industry has provoked a great deal of interest. To discover what it will mean for Torness, SCRAM contacted the South of Scotland Electricity Board. We experienced the usual difficulty, akin to extracting blood from a stone; all their spokesman would offer was to read the press notice over the phone, and he refused to comment on it. So much for the "new openness" after Chernobyl!

How much will these faults cost to correct? Who will pay? The special broadsheet included with this issue of SCRAM shows how nuclear power has been an economic disaster. The record of the AGR programme in particular offers little hope that the faults will be corrected quickly.

We've said it before, and we'll say it again:  
Stop it now, before it's too late.

The Scottish Conservation Society led important evidence at the Dounreay inquiry on the medical effects of low level radiation. Such evidence, however, was not cheap.

The SCS have now opened an appeal fund, not only to help cover some of the costs, but also to raise money to take the Scottish Secretary to the Court of Session. This decision was taken for various reasons, but mostly because of undemocratic way in which the inquiry was conducted.

Please send donations to:  
Kathleen Miller, Hon Secretary, SCS,  
The Manse, Dalry, Galloway.



# Magnox Malady

Most of the UK Magnox reactors have already operated beyond their 20 year design life, and their safety reviews have not been made public. This report of an incident at Hunterston A, by THOM DIBDIN, fuels the call for their early closure.

On 8 May, just twelve days after the Chernobyl disaster, a fuel assembly in Hunterston A's number one Magnox reactor became jammed in a fuel channel. Unable to remove the assembly using normal methods, the operators resorted to a more proven technology: they dropped heavy weights onto the fuel.

Hunterston A is unique among Magnox reactors, in that the fuel is loaded from below. So when the attempt to batter the fuel out failed, the operators faced the delicate operation of transferring the fuel across the top of the core to an empty fuel channel. At some point during the exercise, the graphite cladding on one of the ten fuel elements in the assembly broke. It is unclear whether the breakage occurred when the weights were dropped, or when the fuel was being transferred.

The South of Scotland Electricity Board (SSEB) have denied that the graphite sleeve fell off the fuel element; Mr James of their press office told SCRAM that they "were separated in a planned manner". Whether the separation was planned or accidental, the sleeve ended up on the top of reactor core and procedures were implemented "to ensure that any shards of graphite were removed".

The incident occurred during a planned shutdown. There was no release of radioactivity. None of the workers were exposed to excess radiation. There was no emergency. The Nuclear Installations Inspectorate (NII) were informed.

## ALARMING

So why is this incident so alarming?

Firstly; the age of Hunterston. It was commissioned in 1964; the fourth of eleven Magnox stations built by the National Nuclear Corporation (NNC). (The first two were at Berkeley and Bradwell, the third at Latina in Italy). Its design life of 20 years has been long exceeded, yet, according to the NII, the required safety audit will not be completed until the "early part of next year".

The SSEB have examined the economic feasibility of keeping the station open. According to the Monopolies and Mergers Commission report on the SSEB, published in August, Hunterston A could stay open until 1994.

This assumption is based solely on economic grounds, with the SSEB making the least possible modifications to fulfill the statutory safety criteria. Certain of the station's equipment is ageing and requires replacement.

These modifications have to be agreed by the NII. Refurbishment appraisals were carried out in 1981 and 1984, in which the Board considered two options: to continue operation until 1994; or early closure before that date. One reason for considering the second proposal is that future discharge limits could mean an extra £5 million expenditure.

Secondly; the nature of the accident. It occurred during a planned shutdown, so it was relatively easy to rectify. The cause of the jamming was a thermocouple wire. The SSEB have not told SCRAM how it caused the jam, although they did say that the thermocouple is placed inside the magnox cladding. It must therefore be assumed that the wire was outside the assembly to obstruct the fuel channel. If this is so then the danger of a "hot spot" caused by the inability of the coolant gas to circulate properly, and subsequent melting of the uranium fuel could have ensued.

## ALLEGATIONS

Thirdly; the way in which the public were informed of the incident. Although the fuel became stuck in May, at a time when the UK nuclear establishment was attacking the Russians over their lack of openness about the Chernobyl disaster, it did not become public knowledge until 12 September. And even then, only because employees who witnessed the weight dropping exercise were so worried that they informed their local newspaper: the Largs and Millport Weekly News.

Fourthly; the fact that this is not an isolated incident. On 26 June, two employees were in the separation room, where the fuel cartridge is separated from the graphite cladding, when they received doses of radiation in excess of Hunterston's normal dose limits. On 11 August, the number two reactor was shut down because of a problem with an indicator in the fuel



Broken graphite sleeve on top of core.

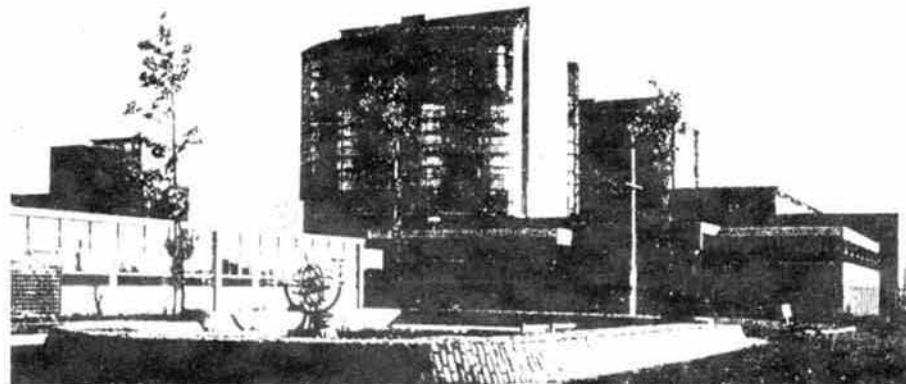
charge machine.

There are even more serious allegations, however. Hugh McMahon, the local MEP told SCRAM that he has received several letters from "concerned workers", alleging that whilst building a wall to screen the stores at Hunterston, one of the workforce left a monitoring badge on the wall. When they picked it up, it had been irradiated.

SCRAM has also received reports that some two years ago, when there was a leak from a pipe carrying liquid waste from the plant, the perimeter fence was moved to enclose the leak so that it did not have to be reported.

## DESIGN

These reasons and the design and equipment problems which are constantly coming to light in other Magnox stations - over half of them have experienced serious incidents in recent years - can only add weight to the argument for closing all the Magnox stations immediately. All but the two most recent stations, at Oldbury and Wylva, have operated beyond their 20 year life, and the full safety reports have not been published. It is interesting to recall that the Italians were considering closing the Latina magnox plant after Chernobyl, partly because it is getting old and partly because, of all their nuclear stations, it is the one which most resembled the Soviet reactor.



China

Despite a one million signature petition from Hong Kong and a highly critical safety report, Beijing has decided to press on with the construction of a new PWR at Daya Bay.

The saga of Daya Bay, about 30 miles from Hong Kong, began in 1978 when the French offered to provide China with four nuclear reactors by 1987. Hong Kong became involved in 1982 when serious financial negotiations began. In 1985, the Guangdong Nuclear Power Joint Venture Corporation was formed, with the Guangdong Investment Corporation taking a three quarter stake, and Hong Kong shouldering the remainder through their Nuclear Investment Company.

In May this year a Letter of Intent was signed between China, Hong Kong, France and the UK. The contract, worth £3.76 billion, was finally signed in September, supported with some £2.3 billion worth of loans to the bank of China. The bulk of the contract has gone to Framatome of France to supply the two PWR reactors with GEC providing the turbines.

Following Chernobyl, 117 community organisations joined together to oppose the project; a petition was initiated which collected over one million signatures - a fifth of the Hong Kong population - by the end of September. The opposition point out that several key questions have yet to be answered:

- The Chinese authorities have not decided where to put the waste;
- In order to keep the costs down, certain parts of the plant will be

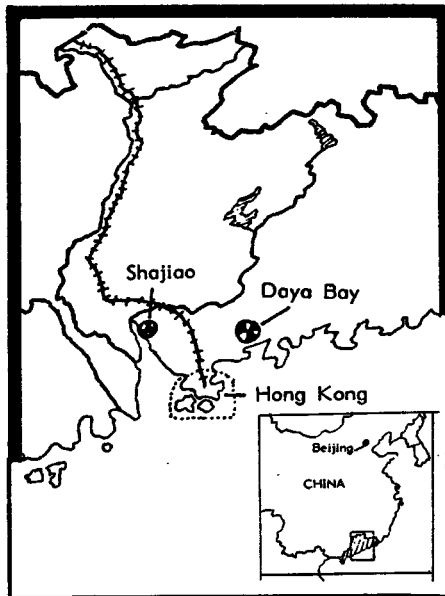
Nuts!

Contaminated rain after the Chernobyl disaster has affected this year's crop of hazelnuts from Turkey. Up to 60% of the crop is said to be above the EEC import limit of 600Bq/kg.

Turkey is the world's main producer of hazelnuts, which would have been in increased demand this year following the failure of the Californian almond crop due to bad frosts. Those most directly affected are likely to be the confectionery and food firms who use hazelnuts in chocolate bars.

Martin Meteyard of the Glasgow Green City wholefoods co-operative told SCRAM that they have notified their suppliers that they will not accept nuts that are above the EEC limit. Green City have just bought a radiation counter and will now publish the becquerel content of all their products.

The Under Secretary of State for Energy, Alaster Goodlad, has recently been on a visit to Turkey to promote the UK's "experience and expertise" in the energy sector. Turkey plans to have three nuclear power stations by the turn of the century.



made in China: Framatome have refused to guarantee the quality of these parts;

- The Chinese and Hong Kong authorities have made no contingency plans for evacuation: the only escape route is by sea, as all the overland routes lead north, towards the plant.

Perhaps more disturbing is a safety report on the plant, written by the UKAEA for the Hong Kong Administration. Although it was supposed to allay fears about the plant's safety, the report (leaked to The Observer) only served to "increase the disquiet of the Hong Kong authorities".

The UKAEA seem to have been

O-Rings

O-rings, the notorious devices which leaked and destroyed the space shuttle last January, are widely used in the nuclear industry, according to the Union of Concerned Scientists in America.

Although most O-rings used in nuclear plants are designed to seal at temperatures up to 200°C, in some postulated accidents they could be heated to three times that temperature. The O-rings are used throughout nuclear plants, but not apparently in the reactor core.

According to a report in the New Scientist of 25 September, O-rings have caused several nuclear incidents in the passed seven years. The failures have occurred in various parts of the cooling system and the head of the vessel containing the reactor core.

Accidents involving the cooling circuit are potentially the most catastrophic, as a loss of coolant accident could lead to an overheating of the core and a subsequent release of radioactive materials.

*Nuclear Note!*

keener on presentation than hard facts. When Hong Kong asked for assistance in presenting the report, the UKAEA suggested changing the wording to make it more obtuse; or that certain comments that could be "quoted out of context" could be "... deleted entirely without loss of information (which is all in the tables and figures)."

The Observer report (27.7.86) points out that the study:

- is purely theoretical and fails to answer key safety questions;
- puts the risk of a serious accident at 1 in 300;
- misses key environmental factors;
- fails to take into account the lessons of Chernobyl;
- lacks any authentic French design information.

Guangdong province is China's leading export zone, attracting 60% of the nation's foreign investment. Yet the province has a 40% shortfall in electricity. With the overriding need for China to export goods to generate foreign exchange, Beijing hopes that Daya Bay will fill the so called energy gap, and remove the threat of power cuts to the manufacturing industry. Yet 70% of the station's electricity is destined for Hong Kong.

It is difficult to see why China, with it's vast resources of oil and coal, untapped hydro potential and serious foreign currency problems, is building unsafe nuclear plants: the reliance on foreign expertise and cash investment can only serve to exacerbate China's problems and destroy their credibility in the eyes of Hong Kong.

Sellafield

Bubbles that are generated on the bed of the Irish sea are causing airborne contamination of plutonium and other radionuclides, according to a letter to Nature (11.9.86).

In a field survey carried out during 1984 in the vicinity of the end of the Sellafield marine discharge pipeline, it was found that bubbles cause increased actinide levels in the air immediately above the surface. As the bubbles are formed on the sea bed they pick up clay particles contaminated with plutonium, when the bubbles burst, droplets of contaminated water are released into the atmosphere.

The letter concludes that the bubble bursting mechanism increases the airborne level of plutonium by factors of 30-600, with artificially generated bubbles. It also suggests that naturally occurring bubbles are responsible for the trace quantities of Sellafield derived plutonium found up to 60km from the plant.

## Radwaste

A large increase in the amount of low-level waste dumped in Britain could ensue, if an idea being explored by BNFL is found to be feasible. The new deal would involve BNFL returning waste on an "equivalent activity" basis, to countries who use BNFL to reprocess their spent nuclear fuel.

Current contracts outline the return of bituminised, or concrete clad low and medium level waste to the country of origin; This has yet to be carried out. The new deal would mean that the customer countries would receive a smaller quantity of high-level waste, which would probably be stored in the UK for several years before being sent back in one shipment. BNFL denied to SCRAM that the plan will mean increased dumping of foreign wastes in the four proposed dump sites.

## Uranium

American sanctions against South Africa preclude the import of raw uranium, but there are indications that the State Department will reinterpret the law to allow the import of Uranium Hexafluoride (UF<sub>6</sub>).

The Sanctions Bill, as passed by both the Senate and House of Representatives, explicitly bans the import of uranium ore and uranium oxide from S. Africa and Namibia for domestic use. Anti-nuclear and anti-apartheid campaigners are worried that two gaping holes in this legislation will allow continued US involvement in S. African uranium mining.

The first loophole concerns the definition of uranium. It is uncertain whether to view the list of uranium imports included in the bill as exhaustive, or merely a badly drafted generic bar on all uranium imports. If the list is seen as complete, then

uranium will be allowed in that has been converted to UF<sub>6</sub> in other countries, whether in S. Africa, or elsewhere.

The second argument centres around comments allegedly made in Congress, but conveniently omitted from the daily version of the Congressional record. These amount to assurances that the temporary importation of S. African goods will be allowed, if they are not for domestic consumption. Uranium imports allowed through this loophole would be enriched in the US and then re-exported to Japan or Taiwan.

EEC imports of S. African and Namibian uranium are to continue, following the Energy Ministers meeting in September. Just how much S. African uranium is used in the EEC's nuclear plants is unknown, although it is used by most member countries.

## Accidents Will Happen

- The major US plutonium producing facility at Hanford has been closed down indefinitely following a near criticality accident in September. The incident happened at the nuclear complex in Washington on 29 September when rules to stop the formation of a critical mass of fissile material were broken.

Operators at the plant were transferring plutonium bearing liquid from an extraction plant to a storage tank. But a pipe leading to another storage tank which was not criticality safe had not been sealed off. If the second storage tank had been filled with any more plutonium, it could have reached criticality, producing intense radiation and large amounts of heat; an explosion could also have ensued.

Following the incident, the plutonium processing facilities were closed and an investigation into their operating practice started. Hanford is notorious for its routine violations of safety measures and planned releases of radioactive material. It has been estimated that the cost of cleaning up the site will be at least eleven thousand million dollars.

- The Finnish PWR which leaked cooling water (see SCRAM 55) has restarted. The Finnish Centre for Radioactive Protection, stated that a "series of human errors" at the Loviisa plant led to the faulty positioning of a safety valve. This allowed about 17 cubic metres of contaminated water to escape onto the floor of the cooling unit.

The Finns claim that the water was as contaminated as the rain which fell over the country after Chernobyl. The Soviet-built 465 MW PWR is one of two at the Loviisa plant. In a separate incident the other reactor had to be shut down because of a fault in the main feed pump.

- Filters and monitoring equipment at the Muehleberg Boiling Water Reactor in Switzerland failed during September, allowing contaminated material to escape. The emissions were only detected when increased levels of radiation were measured by a Swiss physicist on 11 September. Workers at the plant were not notified until 26 September.

The contamination escaped through tears in aerosol filters and failed to set off alarms designed to detect just such an emission. This latest incident can only help the sponsors of an all party initiative to a public referendum on nuclear power before the end of the year.

- Cracks in the RAPP-1 reactor in the Indian state of Rajasthan were discovered in 1982, it has been closed ever since. Now the Indian authorities say that it will be closed down permanently, as the cracks in the reactor vessel are too expensive to repair.

Technicians, who have been attempting to repair the fault in the end shield of the reactor core with remote controlled welding equipment for the last four years, have now conceded defeat. The shield which has become "embrittled by radiation" according to the chairman of the nuclear power board, is too radioactive to approach, and could only be replaced after a long cooling down period.

The reactor, which is a Canadian built Pressurised Heavy Water Reactor (PHWR), has only been in service for 8 out of its 25 years expected life. The PHWR has been described as one of the world's "safest designs". The cracked reactor's twin, RAPP-2, which was built with only 20% Canadian involvement is unaffected by the fault.

- In a separate incident, the Indians have lost a key plutonium producing facility, following vibration problems in the fuel of the Dhruva reactor in Trombay. Dhruva was expected to produce up to 60 kg of plutonium a year for the Fast Breeder Test Reactor in Madras.

Dhruva went critical in August last year but was shut down last September, when vibrations in the core caused the unique aluminium cladding of the uranium fuel to rupture. The highly radioactive fission products leaked out and contaminated the heavy water coolant circulating through the core.

- More faults at the Cattenom nuclear plant on the Moselle in France, which is due to go on stream this November, are fuelling the growing controversy about the plant.

The latest fault occurred when a short circuit inside the reactor halted the pre-commissioning tests. Local government officials in Luxembourg and West Germany recently failed in court to prevent the first reactor coming on stream, but the EEC Commission will depart from the usual practice and publish the safety report due to the controversy over emissions.

- According to the owners of the Tihange nuclear complex in Belgium, a leak of contaminated water caused the complex to close down in September. The water leaked from the primary cooling system.

- The much delayed Hartlepool AGR leaked non radioactive steam from pipework outside reactor one during September, causing a two week shutdown. Although the station was ordered in 1968 it is still not yet fully commissioned.



# Dounreay, Radiation & Health

The 1970s and 1980s are decades of important reassessment worldwide of what have been "acceptable" doses of radiation to the public. This article, by KATHLEEN MILLER, sums up some of the medical evidence presented to the Dounreay public inquiry.

The Scottish Conservation Society put all of its resources at the inquiry into presenting medical evidence of the highest quality available. Dr. Alice Stewart of Birmingham University, supported by Dr. Shirley Ratcliffe of Edinburgh, expounded the results of a long life of research which, if the Scottish Secretary takes it seriously, must disturb the Scottish Office. It all depends on the Government's understanding of the health risks, particularly to children, which result from any increase in body burden of radionuclides and exposure to radiation, including background.

Dr. Stewart's early work, supported by powerful studies in Japan, showed that the risks of low doses of radiation which had been calculated from studies of Bomb survivors, seriously underestimated the true dangers for many people, especially the unborn, the young, the old and groups particularly sensitive for various reasons.

another study before announcing his opinion on the cluster. Dr. Heasman was not recalled to the stand to answer these attacks.

With Dr. Stewart's contribution the



Dr. Alice Stewart

background radiation is a very important cause of childhood cancers, possibly the only cause, led her to testify that nuclear installations are bound to increase the incidence, and also to cause increased genetic damage.

Questioned by the Medical Assessor, Dr. Stewart answered that the evidence now seems to show that radiation caused all childhood cancers initiated in utero; those initiated after birth are adult cancers. The NRPB map added weight to the conclusion because geographical frequency can be correlated.

Compared with this evidence, which is supported by massive data, Dr. Wilkie's fog of statistics and innuendos of bias against Dr. Heasman became a side issue, a clutching at statistical straws.

The Applicants' QC asked if her evidence was designed in part to question their approach, which accords with Government policy and standards. Dr. Stewart agreed that her evidence did put these in question.

The political question therefore remains; the inquiry cannot examine Government policy so the remit is a stranglehold on the witness. But, if Government policy on "safe doses" is out of date, and about to be proved

## Scottish Conservation Society

Before Dr. Stewart took the stand, the questions before the Reporter turned on the interpretation of statistical evidence from Dr. Michael Heasman, until September the Director of the Information Services Division of the Common Services Agency which provides statistical information to the Scottish Office. Following his report in the Lancet, which indicated that there was a high incidence of leukaemia in young persons near Dounreay, the Reporter asked him to give evidence at the inquiry, "from a neutral standpoint."

The Applicants put up Dr. David Wilkie who specialises in developing statistical methodology, but has no experience of epidemiological studies.

Dr. Wilkie tried to show that the leukaemia cluster was not significant and could have occurred by chance. At one point the QC examining him had to warn him, "be very careful", after he claimed that Dr. Heasman's methods were devalued because he "had some knowledge of part of the data that went into his study." Dr. Wilkie often found it difficult to give short, unbiased answers!

Dr. Heasman found it extremely unlikely that the cluster had arisen by chance and recommended case-control studies, which could take up to ten years to complete. Dr. Wilkie produced statistics to show that chance could explain the cluster and said Dr. Heasman should have done



inquiry took a quantum leap. The Applicants seized on her recent paper, delivered in Pisa this September, which described how background radiation can affect childhood cancer. The paper is a pre-publication draft and will be updated; she is seeking EEC support for her studies.

Her previous studies had data from 22,000 children; place of birth and death, whether x-rayed, mother's age, and more. This, the "Oxford Survey", was just in the position to measure the effects of background radiation if that was known. Then the National Radiological Protection Board (NRPB) produced a "radiation map" she could use, and the work of correlating it with the Oxford Survey data goes on. Dr Stewart's finding, that

so, the examination of it must be conducted in public, in Parliament. Will the Reporter recognise this in his Report? Are MPs equipped to assess the arguments?

Whether the Scottish Secretary will take the Party Line that there is no evidence of damage to the public from nuclear power, or whether he will take on board that recent studies are about to cause a massive shift in public and official perceptions, will be a testing measure of his sincerity as a man concerned with the true needs and commonweal of the Scottish people.

## RADIATION & SCOTTISH HEALTH

Public Meeting organised by the Scottish Conservation Society

9 December, 7.00pm

Queens Hall  
South Clerk Street  
Edinburgh

Main speaker:  
Dr. Alice Stewart

# Waste Watchers

Almost three years to the day of their original announcement that Elstow and Billingham were to be prospective nuclear waste dump sites, NIREX (the Nuclear Industry Radioactive Waste Executive) have now gained access to the four new sites that they have short-listed for low level radioactive waste disposal: Bradwell-on-Sea in Essex, Elstow in Bedfordshire, Fulbeck in Lincolnshire, and South Killingholme on Humberside. JERRY FITCH reports.

Contractors working for NIREX had tried to get on to each of the four sites from early August; only to be turned away repeatedly by local opposition groups. Blockades varied in size, from over a thousand that were mustered one day at Bradwell, to the handful that Elstow came to rely upon. But the result was the same.

NIREX were successfully prevented from carrying out their investigations for over two months, and eventually had to take out court injunctions to enable their contractors to get drilling equipment onto the sites. This speaks for itself: NIREX had to seek the protection of the courts in order to impose upon the four communities something that those communities clearly did not want.

The opposition groups always realised that NIREX would eventually get on site, by fair means or foul; but the success of the blockades was more than anyone could have imagined. The four campaigns have received messages of support from all over the country, and even from abroad. They have gained national sympathy and national credibility; and have certainly brought the country's attention to the issue of waste dumping as a national problem.

NIREX frequently make great claim that they believe they are working in the national interest. Campaigners reply that they are too, and that no community anywhere should have to face the option of shallow land burial.

## POLICE OVERKILL

For NIREX and the Department of the Environment (DoE), the blockades were disastrous. Not only did they lose out on the propaganda front, but the way in which they went about breaking the blockades won them few friends. At Fulbeck several hundred Ministry of Defence police prevented the protestors from getting near the site; at Bradwell a dawn raid by the police kept villagers in their homes whilst equipment was taken on site.

This kind of police overkill could not have worked at Elstow, where much smaller numbers have been involved. NIREX tried the more "subtle" approach of trying to discredit the blockaders. After Tom MacInerney, the NIREX managing director, had visited the blockade, they claimed that outsiders were brought in who had nothing to do with

the "official opposition". Protestors took a dim view of being dubbed an "official opposition" but were able to turn the tables on NIREX by vouching that everyone on the blockade, bar two, was from Bedfordshire.

The final, self-inflicted, item of ridicule came when NIREX had to specify names on the court injunction. People were included who had never been near the sites, and at Elstow they even named the wrong local vicar! One would have thought that after three years they would have learned their lesson and made sure that they got things right first time.

In case they missed anybody out, the injunctions were worded so as to include all people that were "affiliated to" or "associated with" the protest groups. Humberside and Lincolnshire took their injunctions back to the High Court and eventually got thirty of the original names removed.

## FAR-RANGING INQUIRY?

Yet, in spite of the mileage that local groups have achieved from all this, the fact remains that NIREX are now carrying out site investigations. They tell us that if, during the course of their drilling and exploration, a site proves unsuitable (on what criteria?), then it will be immediately dropped from the investigation (and

another unfortunate community will be added to the list?). Eventually, one site will be preferred and will be the subject of what the DoE calls a "major public inquiry". This contradicts a statement from NIREX that they hope the inquiry will be a limited one. After Dounreay, no-one is assuming for one moment that an inquiry would necessarily be far-ranging.

At Bradwell and at Elstow the sudden and sporadic blockading of equipment still takes place, causing even greater consternation to the contractors, who don't know what to expect next.

At Elstow, the protestors are keeping a daily watch on all the companies that are seen to be working for the contractors in any way. The North Bedfordshire Borough Council has asked for lists of local firms that have been involved, with a view to making sure that no more council contracts will go their way.

## CONSOLIDATED FORCE

At the national level, Britain Opposed to Nuclear Dumping (BOND), the federation of anti-dumping groups, grows stronger, having had its national launch and press conference in October. This national network is an important step forward. It avoids the NIMBY (Not In My Back Yard) syndrome, and, in addition to what local groups can achieve, the network can bring pressure to bear at a national level.

By coming together as a united and consolidated force, the groups and their supporters aim to show the Government that shallow land burial is totally unacceptable, anywhere. Wastes should continue to be stored at their points of origin until such time as a demonstrably safe and publicly acceptable option is found. Until then, the blockades and the protest will continue.



photo: Jerry Fitch

# Radhealth in India

In SCRAM 55 we carried a short news story about a study by a "People's Science" group in India on the incidence of cancer and heart disease at the thorium plant in Kerala State. This article, by R L KUMAR, gives more detail of the study, and the nuclear power programme in India.

Radical politics in India has recently seen the emergence of a new issue: nuclear energy. The Indian nuclear programme has come a long way in the 40 years since it was conceived by Dr Homi Bhabha. By the end of the century 22,000 crores of rupees will have been invested to produce an installed capacity of 10,000MW, 10% of total expected supply. However, the programme has failed, despite heroic public relations efforts to the contrary by the Department of Atomic Energy (DAE).

The Indian nuclear scene is not very different from that of the rest of the world; it is proving expensive and dangerous. The more expensive a technology the more complex; the more complex the more dangerous; the more dangerous the more secretive. Nuclear technology is no exception; it is bound to weaken the plural foundations of a democratic polity, creating the structures for a "police state", the only way such a dangerous technology can survive.

## "UNPATRIOTIC"

None of the problems associated with nuclear energy - cost, waste, radiation, safety - were fully anticipated when it was pushed so aggressively in the 1950s. What is most alarming is the deceit and manipulation which characterises the pro-nuclear arguments, and their glib philosophies of "acceptable risks" and "as low as reasonably achievable" levels of radiation. Worse is the Third World governments' nuclear buying spree as though it was going out of fashion.

In India the DAE can get away with ludicrous palliatives to anxious questions because the marginalised peasant knows nothing of nuclear power: opponents are dubbed "unpatriotic"; radiation is found in cosmic rays, milk etc; nuclear safety

is compared with road accidents. The DAE must take the common man for a jerk!

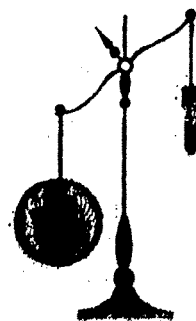
As there is no independent body to regulate the nuclear power establishment, there seems no limit to their arrogance and power. Even if there were an outside body capable of assessing the programme, the DAE has been reluctant (to put it mildly) to publish any relevant information. The annual average radiation exposure for workers at the Tarapur nuclear plant were released in 1983 only after a detailed report on the same by Praful Bidwai had appeared in the Times of India.

## INDEPENDENT STUDY

An independent case study into occupational radiation exposure, entitled "The Number Game", was published in October 1985 by Kerala Shastra Sahitya Parishat. The study looked at the workers of the Indian Rare Earth Ltd (IRE) thorium plant at Udyogamandal, Alwaye, Kerala.

The importance of this study is twofold. Firstly the IRE plant is the only one handling radioactive material which has operated for more than 25 years (it was acquired by the DAE in 1956 to extract the abundant thorium hydroxide deposits from the monazite sands of Kerala for stockpiling for future use as a nuclear fuel). As cancer has a minimum latency period of 6-10 years, this period of exposure enables the study and determination of any link between the handling of radioactive materials and cancer.

The other important aspect is that this is the first study of its kind carried out by an independent team. The author of the report points out how difficult it was to collect the relevant data and the inadequacy of the available data. No substantial denial or critique of the study has come from the DAE since it was



## PEOPLE FOR PEACE

published.

### AIM OF THE STUDY

The study attempts to show an epidemiological link between the processing of thorium and cancer, sterility and some genetic disorders. Three areas of evidence are usually required for such a study:

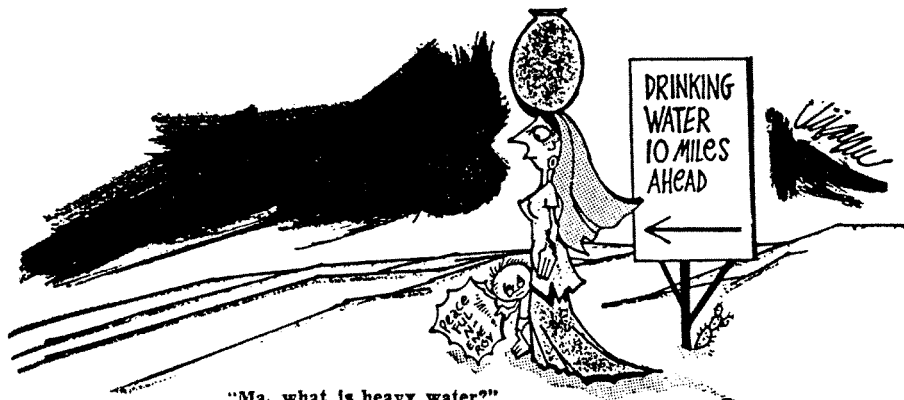
- the production process, its safety apparatus and health monitoring by which one can establish possible radiation exposure;
- an epidemiological study of the exposed population compared to a control population; and
- dosimetry readings of the exposed population, radiation levels in the plant and background radiation levels.

The first two requirements were met but the third could not be, because the relevant data weren't made available by the Health Physics Department; even the plant's General Manager doesn't have access to such data.

The study doesn't claim to detail the initiating factors of carcinogenesis, but points out the high levels of morbidity and mortality rates due to cancer. If the radiation levels actually measured are as low as is claimed by the IRE management (500mrem/year) then the study's importance is enhanced; it suggests that the safety of low level radiation is a myth. Epidemiological studies are the only way to determine the relationship between cancer and its initiating factors.

### 5 TIMES HIGHER RATE

As the first cancer patient was diagnosed in 1970, and the cancer latency period is 6-30 years the study concentrated on workers who joined IRE in or before 1964 and continued to work there up to 1984; cancer cases occur between 1970 and 1984. The control population was the workforce of Travancore Cochin Chemicals (TCC) which was chosen because it is exposed to the same pollution load outside the factory and the pay structures, sex and age ratio and social background are similar.



"Ma, what is heavy water?"



Also, there is no known carcinogen involved in the production process at TCC.

It is important to note that about half of the 1964 IRE workforce left the plant by 1984, and its current health status is not known; the IRE statistics could be a gross understatement.

The table shows that the cancer incidence at IRE is nearly five times as high as the control population at TCC (4.2% compared with 0.91%). The State average (ESIC) is 0.62%, but this figure is not reliable because it is based on projections of Bombay estimates.

Of the 11 cancer deaths at IRE 6 were due to abdominal cancer. The report argues that the chief hazard at IRE is from internal radiation when thorium or its daughter products are inhaled or ingested and, referring to earlier studies on thorium and its effects on the body, it suggests that "workers in plants refining thorium have shown chronic deposition of the metal in lungs, liver, kidneys, spleen and bones."

The report's suggestion that agents in the working environment could be the cause of heart disease is controversial; although the comparative analysis seems to back this up, other experts don't believe there is sufficient medical or diagnostic

INCIDENCE OF CANCER & HEART DISEASE					
Unit	Population	Cancer		Heart Disease	
		no.	rate	no.	rate
IRE	262	11	4.2%	8	3.05%
TCC	440	4	0.91%	6	1.36%
ESIC	7 million		0.62%		1.12%

IRE - Indian Rare Earth  
TCC - Travancore Cochin Chemicals  
ESIC - Employees State Insurance Census

grounds to establish the association. However, it is well accepted that thorium tends to concentrate in the gonads and, as such, this suggests a strong association between the work environment and sterility and genetic disorders: 10 cases of sterility and 12 cases of genetic disorder have been discovered through trade union sources.

### DAE AUTHORITARIAN

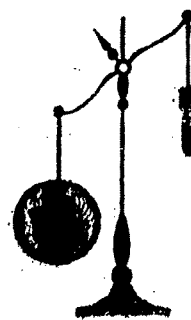
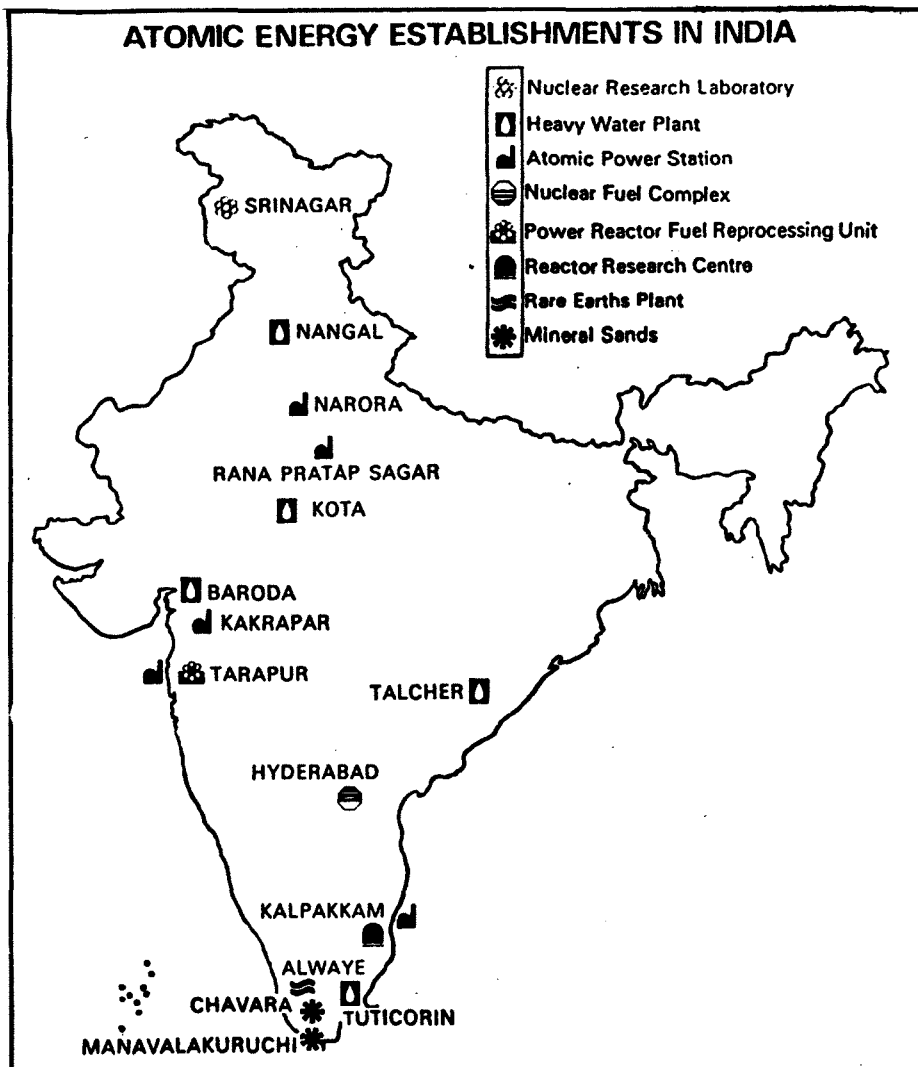
Whilst a study of this sort cannot conclusively prove a cause and effect, neither can the atomic energy establishment conclusively prove the contrary. Radiation exposure evidence

is based on "maximum permissible limits" which are in turn based on statistical studies of Bomb survivors. The 5rem/year limit for workers used by the Indian Atomic Energy Commission has been severely criticised by anti nuclear groups. (The present limit in this country is 1rem, or 10mSv, a year.)

Until now, those affected at IRE have not been recognised as radiation victims. The Indian DAE has got away with this stance because it is secretive, authoritarian and grossly inefficient. When the workers complained about radiation hazards the IRE management offered them 40 rupees a month "risk allowance". They also claim that the probable cause of the diseases is the workers' poor and unhealthy eating habits, unhygienic living conditions and alcohol consumption.

A Bangalore-based media group, currently making a documentary on IRE were not allowed to film inside the plant, and a questionnaire submitted in advance to the management was not completed. One member of the group was arrested and taken to IRE for questioning!

A number of groups have prepared an exhibition on IRE and it is being taken round Kerala State, and groups in other parts of India are planning a national network and hope to take IRE to court. Two MPs raised the issue in Parliament and the Government assured them that "it would look into it."



### PEOPLE FOR PEACE

\* a crore is 10 million rupees, and at present there is 18.35 rupees to the pound sterling.

# The Real Cost of Torness

As the date for commissioning of the South of Scotland Electricity Board's (SSEB) Torness Advanced Gas-cooled Reactor (AGR) nuclear power station approaches KERR MacGREGOR examines the options which are still open and their associated costs.

The SSEB have recently gained much publicity by threatening that if Torness is not run, electricity bills could go up by 30%. Clearly their tactics are similar to those employed when they were criticised by the 1981 Energy Select Committee which commented: "There is undoubtedly a case for not ordering Torness." By that time, however, the Board had rushed into placing contracts with penalty clauses and claimed that electricity prices would rise if these were invoked by cancellation. The same "no retreat" attitude prevails today.

By any reckoning Torness is not needed to provide additional generating capacity in Scotland. Even without it the installed capacity is about twice the maximum demand on the system while, on average, only about one quarter of the generating plant is actually utilised. There is clear evidence that the (Labour) government of the day decided that in order to prop up the ailing nuclear industry two AGR stations should be ordered ahead of need: one for the Central Electricity Generating Board (CEGB) and one for the SSEB. As the previous chairman of the SSEB, Roy Berridge, has said: "it is worth emphasising that Torness is not solely an SSEB initiative; it is an integral part of the UK nuclear power strategy."

## HIGHER BILLS

However Torness is now nearly built and the SSEB have had to borrow almost £2000 million to build it. Whether it runs, or not the repayment of the loans and interest charges will have to be met. I estimate that this will cost about £300m a year over the next decade. If Torness operates and displaces coal fired plant the operating saving to the Board is unlikely to be more than £100m a year. For the average domestic consumer this means that building Torness will push up the annual electricity bill by almost £100 (35%) while if it runs the penalty will be reduced by about £30 (12%).

On the other side of the question, what are the costs involved in running Torness? Most obviously it will have a devastating effect on the Scottish mining industry. The SSEB recently signed an agreement to buy some 3.5m tonnes of coal a year. If Torness is operated to plan it will displace 3-4m tonnes of coal a year from the power station market. Thus it could virtually wipe out the remains of the Scottish deep mining industry.

Job losses are unlikely to be less than 4000. In addition to the unquantifiable damage to community life and personal dignity there will also be the economic cost of maintaining such a large body of potentially productive manpower in unemployment. In energy terms, hundreds of millions of tonnes of coal reserves will be irretrievably lost if these mines are closed and allowed to collapse or flood.

There are many other costs and commitments associated with running Torness. Decommissioning a large highly radioactive nuclear power station has never yet been done but it is certain to be an expensive and tricky business specially since the basic structure will have to be maintained and guarded for about 100 years before it can be fully dismantled. The nuclear wastes associated with operation, decommissioning and fuel processing will have to be disposed of by a yet undisclosed method in a yet undisclosed location so that they are completely isolated for many centuries. Torness may or may not be safer than Chernobyl, but the possibility, no matter how small, of a major operational accident must cast a shadow over much of Scotland.

There is also the distinct possibility that the shelved proposal to build a massive and expensive pumped storage scheme on Loch Lomond (Craigroyston) will be dusted off and declared essential. Nuclear power stations are inflexible in operation and the addition of Torness to an already large nuclear generating base in Scotland means that some of the nuclear plant would be forced to operate intermittently which is not desirable in terms of plant life or safety. Craigroyston, which will only be needed if Torness operates, could

cost another £1000m.

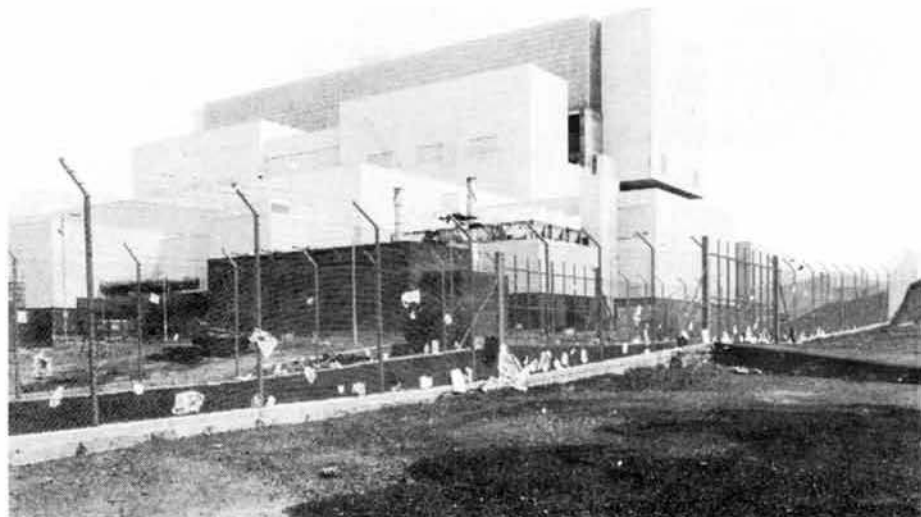
In addition operation of Torness could mean a loss of valuable energy opportunities for Scotland. For example, the prospect of expanding our hydro capacity, which at present provides by far the cheapest electricity, would become even more remote: the government recently turned down an economically viable hydro proposal by the Hydro Board on the grounds of existing overcapacity. Development of the other clean and renewable energy sources - wind, wave and tidal power - would take an even lower priority. The exciting potential for building district heating schemes to distribute presently wasted heat from coal fired power stations would come to nothing if these stations, such as Cockenzie, are closed because of Torness.

## OPTIONS

It is clear that the best option would have been not to have built Torness at all, but we have to face the fact that Torness exists and we will have to pay dearly for it whether it runs or not. The only option now is whether to run it or not.

If it runs, our coal industry and communities will be devastated, and valuable coal resources written off for ever; we and our descendants will be irrevocably committed to dealing with even more nuclear waste; we may be saddled with the expense and environmental damage of having to build a large pumped storage scheme in one of the loveliest parts of Scotland; we will have to accept yet more excuses for not developing the vast resources of renewable energy while the possibility, however remote, of something going horribly wrong at Torness will hang over all of us.

On the other hand if Torness is mothballed (perhaps it could be opened to tourists as a "nuclear folly") then our electricity bills could go up by about 60p a week. I believe that this is a price worth paying.





# THE COSTS OF NUCLEAR POWER

The nuclear power programme was begun in 1955, the year that the UK Atomic Energy Authority was created as an independent statutory body, reporting directly to government and with the responsibility for the overall development of nuclear power and the fuel cycle of the nuclear weapons programme. The Central Electricity Generating Board (CEGB) was established in its present form in 1957 and, unlike the UKAEA, was required to function as a commercial body. However, from the beginning the economic aspects of the nuclear power programme were subordinated to the political objectives. Hence the cost issues were fated to be treated in a cosmetic manner so long as the UKAEA held its political position within the machinery of government.

## Magnox Programme

The first of the six electricity generating Magnox stations put power into the grid in 1962. It was ten years before the last station of this series, Wylfa, on Anglesey, was commissioned. From the beginning these stations were only made to appear cost effective by a combination of hidden subsidies and increasing massaging of the figures.

None of the Magnox stations has run at its design capacity. They have been derated by an average of 23%. Only by counting the cost in 1962-65 money values ("Historic Cost Accounting", which greatly understated their capital cost compared with coal-fired stations) was the CEGB able to present them as economic. Finally, after some ten years of pressure and criticism, the CEGB came

clean at the Sizewell Inquiry and admitted that the Magnox stations are more costly to run than coal fired stations.

From the Table it can be seen that both Magnox and AGR reactors are nearly 10% more expensive to operate than coal fired stations. Although this understates the true size of the difference, it was significant that when the CEGB for the first time carried out a cost analysis that could be accepted as consistent with the rules normally required in the Public Sector (in particular the use of "Current Cost Accounting" which allows for inflation), it revealed that the claims, that nuclear stations had been economically justified were hollow.

Generating costs (p/kWh) (March 1984 money value)

	Major stations commissioned between 1965 and 1977		Most recently commissioned stations	
	Magnox	Coal-fired	Hinkley Point B	Drax(first half)
Capital charges (incl. decommissioning provision)	1.37	0.46	1.37	0.47
Inclusive fuel costs	0.89	1.71	0.93	1.81
Other costs (incl. research & training)	0.34	0.21	0.34	0.18
Total	2.60	2.38	2.64	

Source: 1985 Analysis of Generating Costs (Table 3),





## AGR Programme

By 1964, the chairman of the CEBG was aware of the dubious nuclear power economics, and expressed his doubts about going on with the programme, but the UKAEA and the government ran roughshod over such considerations and insisted that a second and larger programme be embarked upon - the AGR (Advanced Gas-cooled Reactor).

This was projected as part of an even larger programme to begin in the early seventies, which if successful would have meant that by the mid-eighties, the UK would have had a preponderance of nuclear power stations. The AGR programme, however, far from being a success, turned out to be a disaster.

The AGR programme began in 1966, and was scheduled to be completed by 1975. None of the original four stations was finished by that date. The only one that was built anywhere near to time and cost was Hinkley Point B. It was October 1978 before the second unit was commissioned. The target programme was four years four months, and the actual period to final commissioning was 10 years and 10 months. The station has had two significant accidents in the first ten operating years.

The other three stations had time overruns of between 11 and 15 years. The first to be commenced, Dungeness B (1966) was still not finally commissioned in June 1986. None of

the three is able to operate at more than 75-80% of their design capacity. The AGR programme (in England and Wales) has so far cost the CEBG at least five times the estimated cost and the costs continue to mount. For example, as a result of not operating Dungeness B, the loss in terms of the extra coal the Board has to buy is £15 million per year.

In current values, the cost of the AGR programme has been astronomical - not less than £10 billion (ie. four times the projected cost of the Channel Tunnel). The Board admits that "the operating savings likely to be made by these stations over their lifetimes are not anticipated to be sufficient to meet the overall costs of building and operating them". It is very clear that the programme should never have been started. The leap from the small prototype station (30MW) to the very large stations of the AGR programme (1300MW) was technically a leap in the dark.

The rest of the massive cost escalation can be put down to mismanagement on a massive scale. It should have been clear by 1975 that the programme was a disaster. Indeed, the Chairman of the CEBG, Sir Arthur Hawkins, said as much before a Parliamentary Committee. What conclusions did the government draw? In 1978 it approved the building of two more AGRs, plus an option to build PWRs.

## Scottish Experience

Recently, the South of Scotland Electricity Board (SSEB) has tried to argue that the AGRs now being built, which have not (yet) experienced the delays and cost overruns of the early AGRs, will be more cost-effective than the proposed PWR for Sizewell.

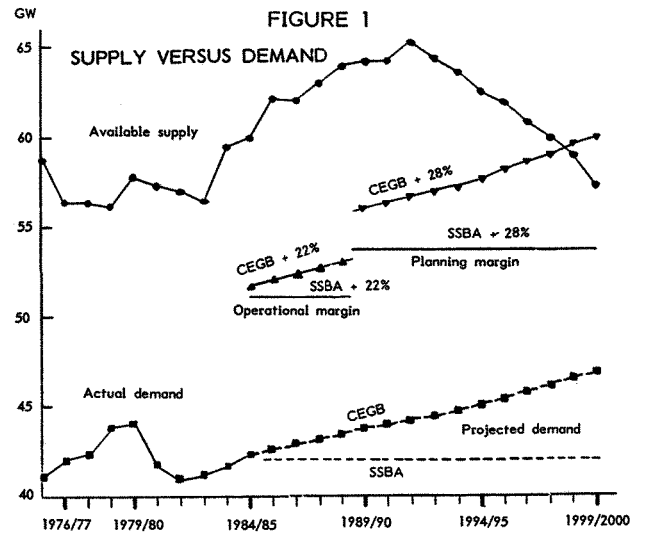
Not only does the SSEB pay less for its coal than the CEBG, it also based its case for building the Torness AGRs on a 37% implicit rise in real coal prices between 1980 and 1986. In reality, the real price of coal supplied to the SSEB had fallen by 11% between 1980 and 1984/5, and is unlikely to show any increase at all on 1980 levels by 1986/7. Any justification for building Torness on economic grounds in a situation of massive overcapacity of conventional plant therefore disappears.

The issue of future coal costs is totally ignored in a recent document published by the SSEB: "Nuclear Power - Consolidation or Change" which summarises their evidence to the Sizewell Inquiry and other factors in favour of the AGR as opposed to the PWR. Their figures show large cost savings arising from a programme of AGRs or PWRs (more than £6,000 million for a 7GW programme built by

the end of the century). Various factors affecting their assumptions are discussed, but they make little difference to the conclusions. The crucial question of assumptions concerning future coal prices is not mentioned.

It is evident that the PWR programme would almost certainly be another monumental disaster. After the AGR, could the nuclear industry and the CEBG survive such an experience? The cost of the original programme of ten stations would not be less than £20 billion in 1983 money terms and could be more. More over, there is no need for such a programme. The Board's agreement with the NCB to keep the price of coal constant in real terms if the CEBG takes 75 million tonnes per year has worked well and there is no evident reason why it could not continue to provide the basis for stable and relatively low cost power.

Certainly, the conclusion must be that if coal remains plentiful so that the real cost only increases slowly, if at all, then a new central station of any kind will raise the price of electricity high above that which older stations could achieve.

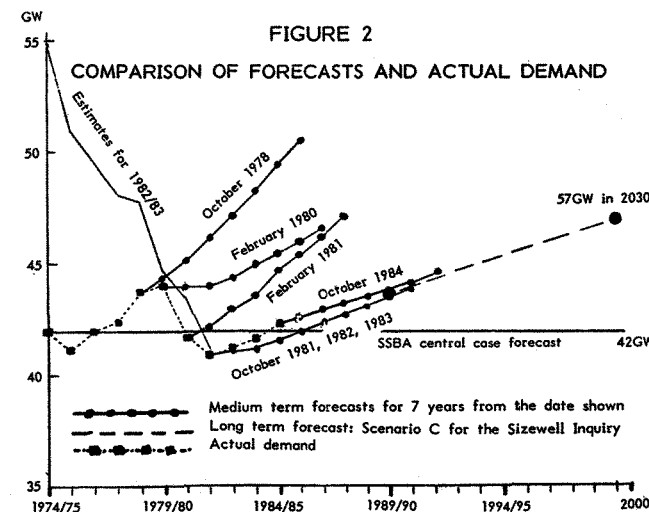


## Do we need any more?

A real question is whether we need any more generating capacity at all. In 1984/5, the maximum demand for electricity from CEBG stations was 42GW (42 thousand megawatts). The available supply was nearer 60GW increasing to more than 63GW in 1986/7. Even allowing for the CEBG's operational margin of 22% (which is used in periods of surplus supply to decide which stations can be prematurely retired), or their planning margin of 28% (to allow for unexpected increases in demand), the supply is excessive and will not in fact fall to the 28% level until near the end of the century (see Figure 1).

The overcapacity in Scotland is even more serious. At the same time, the CEBG is proposing to import substantial quantities of electricity from France.

The main reason for the overcapacity in both the SSEB and CEBG contexts is a continuous over estimation of future demand. In the 1960s, the CEBG predicted a demand in the early '80s of 110GW, when the actual figure turned out to be only 42GW. Each time the CEBG has reassessed the future demand for electricity, it has been similarly over optimistic. In its evidence to the Sizewell Inquiry, the Stop Sizewell B Association (SSBA) suggested instead that an assumption of a constant level of demand between now and the end of the century was more realistic. The effects of these assumptions are shown in Figure 2.



## PWR & Sizewell B

The nuclear industry has been trying since 1972 to bring the PWR design into the UK. It was only in 1979, however, when Mrs Thatcher came to power, that approval was given to a 15,000MW programme of 10 stations of a modified Westinghouse design. Sir Walter (now Lord) Marshall was moved from the UKAEA to take direct control of the CEBG to put this grand design into effect.

Marshall had been dismissed as Chief Scientific Adviser to the Department of Energy by Tony Benn three years earlier, principally because he had been pushing the PWR, not so much in the UK, but with the then Shah of Iran and other Middle Eastern potentates.

It was intended that the first PWR would have been operating at Sizewell on the Suffolk coast by 1991 and that nine others would have been built by the end of the century. However, no approval has yet been given for Sizewell B, and none may be given. It is clear that the plan has run into political heavy water. Not only did the CEBG have a difficult time at the 340 day Public Inquiry at Sizewell, but (notwithstanding Mrs Thatcher's enthusiasm) the unpopularity of building American reactors in the UK has caused a considerable cooling off in Whitehall, and possibly within the Government as well.

The main economic case in favour of building a PWR at Sizewell at a time when the CEBG has a massive surplus of generating capacity, is that the new station will cost less to run than the existing, older stations. This cost advantage is described by the CEBG as the Net Effective Cost (NEC).

The CEBG showed a substantial negative NEC at the Inquiry: the PWR would be worth building. But, the counter evidence on behalf of the SSBA showed the CEBG's case to be dependent on assumptions which have turned out to be wrong. Different assumptions, with calculations agreed by the CEBG, show a different picture.

All benefits (coal or oil saved over the lifetime of the station) and costs over the period during which they occur are combined to produce a single figure at the date of commissioning.

Construction costs and interest during construction are totalled to give capital cost. For any future year, the Present Value of the running costs is calculated as the sum which, at 5% interest a year from the commissioning date, would equal the future cost, which is said to be "discounted".

The effect of discounting is that future costs, which may be very large, such as waste management and decommissioning, can appear negligible. These costs occur for a long time after the power station has closed - this does not arise with coal-fired stations.

The SSBA assumptions lead to a greater positive NEC for a new PWR than for a new coal station: we would be better off not building any new power stations but continuing to use the ones we already have.

Firstly, the CEBG assumed that the real price of coal would increase rapidly, but at the same time as they were doing the planning, they reached an understanding with the NCB to keep the real cost of coal constant. In 1979, the case for the PWR was made on the basis of a 36% increase in the real price of coal between 1980/81 and 1986/7. In fact there has been a small decrease.

The rapid fall in oil prices in early 1986 means that coal prices may well fall further: in May 1986 the CEBG and NCB struck a further deal that some coal would be supplied at an even lower cost to take account of the competitive position of imported coal and oil.

Secondly the CEBG assumed that the cost of coal supplied to a new power station would be higher than the cost of coal supplied to existing stations, because of the increase in demand for coal. The cost of this additional coal, the "marginal cost", was not only assumed to be higher, but was also assumed to rise at a faster rate. Virtually all the NCB estimates presented at the Inquiry were lower than the CEBG's lowest estimate, and the NCB admitted that usual market conditions did not apply in the current economic circumstances. It seems very unlikely that marginal cost will exceed the cost of coal supplied to existing stations. Ironically, the CEBG's "understanding" with the NCB currently enables it to buy additional coal at a lower price than its main supply!

The third assumption which the SSBA questioned was that of a saving on oil-burning. The SSBA assumed that by 1990, or when Sizewell B was commissioned, there would no longer be any oil-burning taking place and therefore no saving to be made. Even without this, the recent oil price fall may even mean that oil-burning represents a net benefit, rather than a cost.

Finally, the CEBG assumed that the PWR would be built on time and that there would be no capital cost overruns - an assumption completely at variance with experience of other reactors in Britain and with PWRs in the United States. The CEBG also assumed that the PWR would run at full load for the whole of its projected life.

These two assumptions were seriously questioned by WANA's evidence, drawing on the record of Westinghouse in constructing PWRs around the world. The Westinghouse experience can only lead one to the conclusion that the CEBG's assumptions are totally unrealistic.

# French Programme

In other countries, nuclear power has not proved to be an economic blessing either. In the United States, where market forces have, ironically, a greater effect on nuclear decision making, a combination of high interest rates, cost overruns and the aftermath of Three Mile Island has resulted in no new plants being ordered since 1978 and several under construction being mothballed. In Europe, many countries are less than lukewarm about the development of a nuclear industry.

There is one prominent exception, or so the nuclear industry will argue, to this "pessimistic" situation: France. France, we are told, has invested heavily in nuclear power and can now export electricity to Britain at 25% less than it would cost the CEBG to generate it: a serious commitment to nuclear power should herald a new era of cheap electricity!

But the French situation does not stand up to examination. Electricite de France (EdF) (equivalent to the CEBG) has massively expanded nuclear power, based on the PWR, which now accounts for 65% of electricity production, and more than 25% of total energy consumption. Planned stations will increase the nuclear electricity proportion to 75%.

However, because of a massive overcapacity, the new stations are not needed. And, EdF has accumulated a debt of more than £20 billion, mainly in dollars (a quarter of France's

foreign debt) in the process. The total debt fell in 1985 for the first time in the EdF's history, largely as a result of the fall in the value of the dollar.

There are two principal reasons why EdF is able to sell "cheap" electricity to Britain. Firstly, EdF receives a hidden subsidy in the form of the loans it receives - borrowed capital does not have to be repaid, only interest on the capital. Similar conditions here would allow the cost of nuclear electricity to be about 15% less. Further hidden subsidies arise from massive military funding of nuclear research and development.

Secondly, any extra electricity which EdF can sell will help to offset losses, the capital costs having been incurred already. In 1984, exports of electricity reached 23TWh (23 thousand million units), nearly 10% of home consumption. In the ten years to 1984, EdF made a loss every year: it wasn't even able to meet the interest payments.

In 1985, EdF made a profit of FF900 million (£84m), largely because 22TWh more nuclear electricity was sold than was forecast. All other costs, labour and financial, will have been paid for in the charges for the forecast demand. By making deals for exports at prices below the marginal cost in other countries EdF can make a handsome profit (10c/kWh in 1985), and may even begin to pay off some of its debts.

# Fast Reactor

In 1955 when the nuclear power programme began, work started on an experimental fast reactor at Dounreay in the north of Scotland. It was sited there because it was recognised that there were safety risks attached to fast reactors greater than those associated with ordinary reactors. But the fast reactor was central to nuclear strategy, and was intended to be in commercial operation in the early seventies. That has not happened, and no commercial plant will be built in this country this century, if at all.

The reasons for building it were:

- it is fuelled with plutonium derived from the spent fuel of thermal reactors; and
- whereas thermal reactors can use less than one percent of the original uranium, a fast reactor can, in the optimum circumstances, allow the use of just over 1% (by 2020), and 2% (by 2040). In theory, by 2200, it might get up to 40%. This hypothetical maximum (60 times the amount used by thermal reactors), by converting uranium 238 to plutonium 239, has been a major propaganda point for the industry.

In practice fast reactors are:

- difficult to operate in anything like the manner necessary to "breed" plutonium. The prototype reactor at Dounreay for example has almost the worst operating record of any nuclear reactor in the world. Its output is about 10% of its design capacity; and
- prohibitively expensive to build. Only France has built a commercial FBR and it has cost 2.5 times the amount of an equivalent sized PWR.

# Energy Politics

Nuclear power has failed, largely by its own efforts. After 30 years it accounts for 16% of electricity, and about 3% of total energy supplied in the UK. The billions of pounds that it has absorbed could have been spent on improving efficiency, and in developing alternative sources, saving between 10% and 20% of the cost of electricity to the user.

Nuclear power soaks up very large research budgets: £260 million a year goes to nuclear research, compared with only £11 million to renewables.

We don't need any more power

stations; the breathing space we now have should be used to develop energy efficient systems and cleaner technologies.

We continue with nuclear power, ultimately, for political reasons. Many industrial states moved from nuclear weapons to nuclear power; there never has been any real distinction between them. Also there is a powerful web of interests who have invested heavily in nuclear power; it is multi-billion pound issue. In the face of this the public interest counts for less than it ought to, whilst the consumer is ignored.

# Contacts

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FoE (Friends of the Earth),  
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Centre for Energy Studies, Southbank  
Polytechnic, Borough Road, London  
SE1. (Director, Colin Sweet)

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# Blanket of Secrecy

The European Demonstration Reprocessing Plant (EDRP) public inquiry will finish in mid November. Several organisations, including SCRAM, chose not to take part because of certain restrictions. The issue of plutonium proliferation was but one such restriction. The following article is a shortened version of the Precognition on this issue by JOHN ABERDEIN for the Labour Party's Scottish Council. This evidence was ruled out by the Reporter at the Inquiry.

The Labour Party's case on plutonium proliferation risks of EDRP is based on the Party's commitment to remove all nuclear weapons from Britain. The Party recognises that EDRP proposes to isolate and separate plutonium from spent fuel. This plutonium may well be primarily designated as future fast reactor fuel, but there is nothing, whether in technological terms, or in terms of commitments by French spokesmen, or in terms of binding safeguards, or in terms of previous British reprocessing practices, or in terms of the planned nuclear warhead requirements of the present Conservative Government, which can give absolute confidence that plutonium from EDRP would not find its way into nuclear weapons.

Dounreay has at least two military connections which rarely, if ever, appear in the establishment's publicity material. These are the transfer of materials to Harwell for defence work, and the connection with the Vulcan Naval Reactor Testing Establishment, adjacent to Dounreay.

## MILITARY POTENTIAL

Historically it is instructive to note that 33 years ago, in documents since declassified, Mr R E Francis of the Atomic Energy Division acknowledged the military potential of Dounreay:

"The fuel used in the breeder could in an emergency be removed and used for the manufacture of weapons and it might be necessary to do this."

Professor Joseph Rotblat has pointed out that fast reactors are relevant to the production of weapons-grade plutonium:

"Moreover, the plutonium in the blanket would contain over 95% Pu-139, making high quality weapon-grade material."

The "blanket" is the nuclear material which surrounds the fast reactor core and is made up of "depleted" uranium which is capable of absorbing neutrons given off from the nuclear reaction in the core; plutonium-239 is thereby "bred" in the blanket. There are two types of breeder, the axial breeder material (above and below the core material in the fuel pin) and the radial breeder material in assemblies surrounding the core.

On Day 9 of the EDRP Inquiry Owen Pugh, Assistant Director of Fuels at Dounreay, in answer to the

question whether any radial breeder blanket had been reprocessed in the present PFR reprocessing plant, replied:

"Radial breeder sub-assemblies, no. The only breeder to have been reprocessed was that of the lower integral axial breeder ..."

He went on to say:

"... you will see that there is a very small amount of what we call top integral axial breeder at the very top of the pin, that is also processed with the core fuel there ... so that it is all processed at the same time, no separation whatsoever."

These answers confirm that there is indeed a separation, because there is the additional breeder material above the fuel pins, described on p.4 of Dounreay's own "The Prototype Fast Reactor" brochure. Another Dounreay brochure, "PFR Fuel Reprocessing", indicates on p.7 that this material goes to "separate stores". Why? Is it because it has a lower admixture of plutonium-240 (an unstable isotope) and is therefore to be kept isotopically pure and clear of a reprocessing batch of reactor-grade plutonium?

The same question can be asked of the decision not to reprocess any radial blanket material yet. Over 7 tonnes of mixed oxide fuel have been reprocessed during 6 operating "campaigns". In all that time one would have thought a significant number of radial breeder assemblies would have accumulated; the number is nowhere quantified, although the number of fuel sub-assemblies reprocessed is given in the annual Health & Safety Reports.

## PLUTONIUM SHORTFALL

According to Walt Patterson, because the two dedicated plutonium production plants at Caderhall and Chapelcross are nearing the end of their functional lives, and no replacement facilities have been mentioned,

"... the blanket plutonium from the (PFR) reactor may be being stockpiled ... (to) be used for weapons if the need arose."

Duncan Campbell, using secret official documents, wrote in the New Statesman (29.11.85):

"... the present British stockpile is insufficient to fill even one Trident D5 submarine's complement of 224 warheads."



Dounreay's pretentious symbol, the motto means: "From Caithness to the World"

As this contention has not been officially contested, it is legitimate to question whether the Government will be happy to continue with the bluff of Trident, or whether there will be increased pressure on nuclear power stations and reprocessing plants in Britain to make up the shortfall.

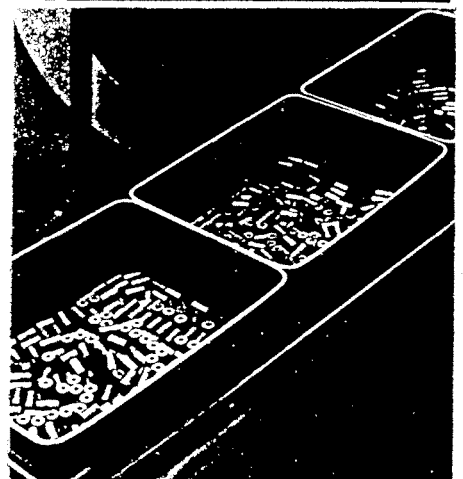
If the Government may be now, or in the near future, seeking additional stocks of weapons-grade plutonium then it is obvious that the fast breeder could make a contribution to stocks by:

increasing the number of radial blanket assemblies, or employing short-burn tactics for fuel assemblies.

Both of these would radically increase the available quantities of Pu-239 from PFR operations.

As mentioned above, there has been a lack of clarity, at times amounting to evasion, about the quantity of irradiated radial blanket assemblies stockpiled at Dounreay. It is the tendency to evasion which gives rise to the suspicion that the quantity is regarded as a matter of national security, in other words a military secret.

These stocks have not been reprocessed or recycled as fuel, and there seem to be no plans to do so. This gives rise to reasonable doubt as to whether they have any role to play in the "collaboration ... directed to the peaceful development of nuclear energy" of which EDRP is supposed to be part. By their very nature, rich in Pu-239, they remain ideally suited to another kind of development altogether.



Plutonium/uranium pellets from PFR reprocessing operation



# Power Politics

Nuclear power was a major focus of attention at this year's Party conferences. With the exception of the Conservatives, where real debate is unheard of, the issue was explored and debated with passion, a far greater depth of understanding and knowledge than ever before, and with significant results for the anti-nuclear movement. STEWART BOYLE attended the conferences, and here he describes the debates, the resulting policies and the priorities which need to be addressed in the run-up to the General Election.

## SDP

The SDP Conference at Harrogate debated a Green Paper entitled "Safe and Efficient Energy", the output of a special working party chaired by Sir Leslie Murphy (ex managing director of NEI) and including Tom Burke (Green Alliance), Glyn England (ex CEGB chair), Bob MacLennan MP (the SDP's answer to Jack Cunningham) and Polly Toynbee (of the Guardian).

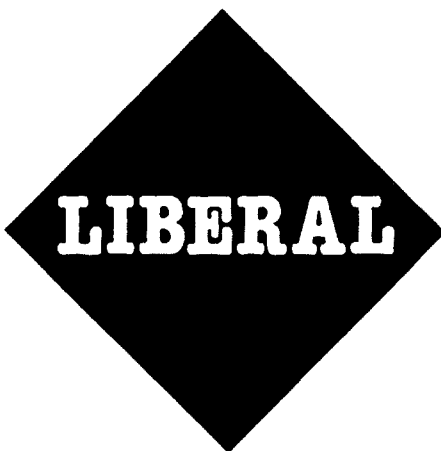
The document called for a moratorium on nuclear power, "a pause for thought and reflection", whilst clearly stating that the Party did "not wish to abandon nuclear power totally." It fully supported Fast Breeder (FBR) research, cautiously opposed the Pressurised Water Reactor (PWR), and called for a reassessment of reprocessing.

Much was left open for interpretation: "nor do we believe that we can reject the potential of nuclear power." Sir Leslie clearly hoisted his Advanced Gas-cooled Reactor (AGR) flag during a fringe meeting organised by the Nuclear Electricity Information Group (NEIG), stating that the "SDP is not an anti-nuclear party", a strategy for appearing cautious whilst public concern is high, but cranking up the nuclear industry when the Chernobyl factor is less prominent.

The debate revealed a strong level of grass roots opposition to nuclear power (twice as many speakers as those in favour), but it was disorganised and lacking in political strategy; and the voting went against them. Amendments calling for a referendum on the phasing out of nuclear power, and the early closure of Magnox stations were heavily defeated as the 250 members of the Council for Social Democracy voted narrowly for a Wantage Area Party (includes Harwell) amendment calling for consideration of additional nuclear stations once safety reviews had taken place.

The SDP are committed to major initiatives on energy efficiency, Combined Heat & Power (CHP), and

spending more on renewables; but they clearly remain attached to the AGR, the FBR and fusion.



The Liberals nuclear power debate at Eastbourne followed the passionate defence debate which narrowly committed them to a non-nuclear strategy. Inevitably this overshadowed nuclear power, but nonetheless the Assembly overwhelmingly reaffirmed their long-term opposition to nuclear power.

It was clear from statements by Malcolm Bruce MP, Liberal energy spokesperson, that Magnox will be phased out within five years; but AGRs would be allowed to continue to the end of their operating lives; FBR research would also continue (on the basis that FBRs could be used to consume plutonium and other wastes and make them more manageable!) as would fusion research.

Speakers opposing the Party's anti-nuclear line used the familiar arguments: nuclear power is cheap, the developing world needs it and coal is a dirty and dangerous fuel. Intellectually they were well rebutted by speakers supporting the motion; a sign of good organisation and briefings laid on for the main speakers.

The Liberal Party will attempt to overrule the SDP fudge with their own clearer statement. The key document to watch for is the joint SDP/Liberal Alliance "Partnership for Progress", currently in its consultative stage.



Blackpool was a sharp contrast to the

gentle air and hospitality of Harrogate and Eastbourne; brash, gaudy, filled with week-end trippers who seemed totally unaware that the Labour Party were about to commit themselves to a non-nuclear energy future: a bit like the real world I suppose.

This year's Conference had been a key focus for anti-nuclear activists who had worked hard to co-ordinate trade union and constituency party opposition to nuclear power. This led to an unprecedented 197 motions, a higher number than on any previous issue in Labour Party history. The composite motion which was finally presented to Conference was comprehensive, detailed and skillfully argued, covering issues such as jobs in the nuclear industry; a key factor with a number of trade unions.

The anti-nuclear activists flexed their muscles at the Sunday evening fringe event co-sponsored by many interested groups; over 800 people heard speeches and entertainment by Red Wedge and Ben Elton. Spirits were extremely high as those attending realised that this was to be their year. The presence of BNFL workers demonstrating outside the Winter Gardens somehow lacked impact in the face of the strength of feeling of Party activists. For once they were on the inside and the nuclear industry were kept outside, behind crash barriers - a complete reversal of previous years.

Anxious to avoid any suggestion of a split in the Party (as had been witnessed in the Alliance), the National Executive Committee (NEC) hinted that they might agree to support the more radical composite motion, with several reservations. These were spelled out in a short written statement: a phase-out could not be achieved by "the next Labour Government", hence the timescale would be longer; THORP would be completed but it would not be "commissioned for the purposes of reprocessing"; Torness and Heysham 2 would only be operated if they were already commissioned; and the total opposition to waste dumping was not felt to be detailed enough policy on nuclear waste management.

The debate clearly revealed how far Labour's energy policy has moved in the past six months. Nuclear power was condemned by Eddie Haigh on behalf of the NEC as "dangerous, expensive and unnecessary", and was described as "a fuel of the past." Speakers attempting to raise Arthur Scargill as the eternal bogeyman ("El Supremo" according to a Copeland delegate) were greeted with derision by delegates, whilst pro-nuclear unions were identified as looking after their members' interests, yet failing to be convincing on the simple arguments over nuclear power safety, the weapons links and nuclear waste.

The NEC statement was carried by a near 70% of the vote, whilst the composite failed by a mere 42,000 votes to achieve the two-thirds majority required to make it manifesto policy.



The Green Party has been totally opposed to nuclear power for so long there was little left to discuss about it at their Newcastle Conference.

Their General Election strategy agreed prioritised the Party's limited financial resources into "nuclear" seats, including those like Orkney which are affected by nuclear developments. A motion was discussed, but not voted on, which criticised the Party Council for not responding quickly enough to Chernobyl.

Energy-related motions passed concentrated on acid rain. One called for existing coal-fired power stations to be "retro-fitted" with equipment to reduce the effects of acid rain, and for new stations to include clean burning technology such as fluidised bed combustion systems.

The second motion urged the UK to join the "30% Club", the member states of which are committed to reducing sulphur emissions by 30% by 1993. Another motion was passed which called for no food irradiation facilities to be built in the UK.

The Greens continue to pressurise the other parties to tackle environmental issues.



## Plaid Cymru

The Party conference bandwagon ground to a halt with the Plaid Cymru Conference at the end of October. They debated only one motion on nuclear power, but it covered ten pages.

The motion included a hotly debated section on decommissioning of existing plants, which resulted in a narrow victory for those calling for a gradual phase out of plants, i.e. only to decommission them at the end of their planned life.

Unfortunately, they also stated their support for the phase out to start as soon as "the station cannot produce electricity under current safety standards"; this does seem to be a slight contradiction.

They also called for the 20 year safety reviews to be published by the CEBG, which primarily affects Trawsfynda.

They retained their opposition to the dependence on nuclear electricity and opposed the building of any more reactors on Welsh soil. Sellafield was a high profile part of the motion, with a call for the immediate end to reprocessing, the cancellation of THORP and an immediate end to all radioactive discharges into the Irish Sea.



## The Scottish National Party

The 1986 Scottish National Party Conference at Dunoon brought no change to the Party's long-standing anti-nuclear policy. Two resolutions were tabled on nuclear power in Scotland. The first empowered any future SNP Government to halt the European Demonstration Reprocessing

Plant (EDRP) at Dounreay, to stop reprocessing foreign nuclear materials, and to diversify research at Dounreay towards alternative energy systems. Amendments by the Thurso & District branch (which contains Dounreay), calling for a continuation of the EDRP project, were heavily defeated: they each achieved 5 votes!

The second resolution called on the Party's National Executive to lead a campaign to end plans for EDRP, to mothball Torness; to decommission all Scottish nuclear plants, and to call a referendum of the Scottish people on these issues.

Add to these resolutions the strongly anti-nuclear speeches by Winnie Ewing MEP and Donald Stewart MP, the Party President, and the SNP came out well in the Party political anti-nuclear stakes.

Now the dust has settled a much clearer picture emerges. The voter can choose Labour or Liberal: both have clear anti-nuclear policies, but with anomalies in each. Of the two, the Labour Party has a clearer position on FBRs (abandon them), whilst they fudge awfully on THORP (if THORP is built it will operate as a reprocessing plant, make no mistake). The Liberals are clearer on getting rid of Magnox, whilst remaining open-ended on the phase-out of AGRs.

If the Liberals can override the latent pro-nuclear ambitions of the SDP, then there appears likely to be a close convergence between the policies of the Alliance and Labour. The Conservatives are thus the only clear supporters of the PWR and nuclear power in general. In the words of one observer: "If the Tories get in at the next Election, then you'd better learn to love radiation."

A number of priorities have also emerged although many details of the policies are still missing. Changes in the structure of the energy industries, particularly the Electricity Boards, are vital, but these still remain to be worked out. Changes in legislation, the statutory duty of the energy industries, rating structures, building regulations; all these have yet to be decided. Without such changes, anti-nuclear policies will remain unfulfilled as BNFL, the CEBG and the UKAEA will continue to dominate research budget allocations, and the advice given to Energy Ministers.

A clear message from the success at this year's Conferences is that co-operation between environmentalists, trade unionists, politicians and party activists really works; it is not essential to have an "Anti-Nuclear Campaign" to achieve success. Organisations playing to their strengths and influencing their own constituencies, whilst liaising informally with other groups, can

achieve real breakthroughs. This process must continue to be influenced. Government policy is to be influenced.

This level of co-operation is to be crucial in selling non-nuclear policies to the electorate - the task before us now. We have to give the public hope that energy efficiency, CHP and renewables can provide a safe and secure energy policy.

A sense of realism must pervade our thinking and action up to the next Election; the nuclear industry will be fighting back - witness the near doubling of public relations expenditure by BNFL, the CEBG and the NEIG. Current and future Ministers will come under a lot of pressure to water down radical policies; we need to follow and criticise their speeches and statements.

We need to provide honest answers to issues such as the CO2 problem, the developing world argument, and radon gas in energy efficient homes. We need to realise in Jack Cunningham and Bob MacLennan we have two politicians who put constituency interests above Party policy, and who will fight to retain the nuclear power option. Cunningham has promised BNFL workers in his constituency that he will protect all of their jobs; many MPs from coal mining or ship building constituencies would like to make similar promises. If he remains as a filter or a block to achieving difficult political changes, Labour's new energy policy will lack real credibility. His talents, as the Guardian has put it, "lie elsewhere".

In the final analysis we have seen shifts in the position of at least six trade unions, the TUC itself and the Labour Party, all within the last year; the SDP continue to fudge merrily away, whilst the Liberals have reaffirmed their long-standing position. Not bad - but the fight to come will be much harder.

# Energy World

For a month this year, from 23 August to 21 September, the Milton Keynes Development Corporation hosted an exhibition of 50 energy-efficient homes - Energy World. The exhibition was sponsored by the Anglia Building Society and recognised by the Department of Energy as "a central part of their promotion of Energy Efficiency Year." MARTIN FODOR visited the site and here describes some of the exhibits.

The machinery for generating hype and razzamatazz has been well oiled recently, as the Milton Keynes Development Corporation (MKDC) launched their "Energy World" show village into the media spotlight. Success for the Corporation is vital, since commercial viability now has to sustain each New Town project.

The number of paying visitors and VIPs attracted, plus sales of show homes, will probably affect future investment in a wider "Energy Park" development. The success of the energy-efficient housing and employment project over the next 7 years will shape the future Milton Keynes economy too, and help sustain the growth record of the city.

## ENERGY WORLD

The exhibition village of around 50 low-energy houses is the result of a challenge to the housebuilding industry to develop houses costing at least one third less to run than standard new houses.

Each house had its design tested against a computer model, the Milton Keynes Energy Cost Index (ECI). This establishes the energy consumption per square metre (for both construction and domestic appliances) and the target figure is less than 120 (about half way between normal UK practice and Scandinavian standards).

In fact some developers bettered these levels: including all-round insulation, integral conservatory sunspaces, heat reclamation, solar panels, and even wind and solar power generation in one scheme. The houses will subsequently be monitored to assess their performance.

As is usual in Milton Keynes, the purpose of the event was mixed: to involve more housebuilders and developers in the city (like the earlier

"Homeworld '81" innovative houses exhibition); to increase house sales and executive housing choice; to promote the good image of Milton Keynes; to improve house design in the locality (perhaps); and to innovate - ultimately helping to improve UK building regulations for energy efficiency.

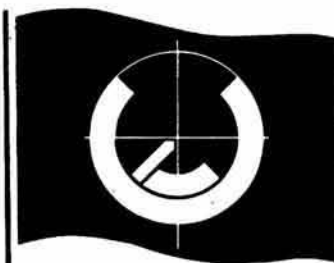
## THE SHOW

Tens of thousands of visitors came to Energy World; it was like an Ideal Homes Exhibition in reality. Each house was filled with products and brochures; the latest ovens and hi-fis; co-ordinated furnishings and bathroom tiles. Presumably the event broke even over the month, although the £3 adult (£5 during a "Business Week") and £1 child admission fees did put some people off, despite a £7 family ticket. It also attracted the Prime Minister and her Energy Secretary, eager to support the biggest event of Money Year.

## THE HOUSES

It is impossible to appraise all the houses in one visit, or indeed in one article, but the more interesting deserve mention.

Undoubtedly the most notable house was a private development by the architect Keith Horn: the Round House is a conical, earth-sheltered, two storey house with a south-facing conservatory and adjacent pool. Unfortunately it wasn't finished in time for the exhibition and the copper roof appeared in stages over the weeks. As with other exhibition houses the hurried construction may lead to subsequent expense for the purchaser. Being a difficult, experimental house it may be a great financial risk for Keith Horn. The ECI is 84.5, well



MILTON KEYNES

# ENERGY WORLD

within the target maximum. Cost? Maybe £180,000.

The Midlands developer Persimmon Houses teamed up with Solapak, a major solar power company, plus other bodies including the EEC to bring a prominent co-generation project to the site: a sixty foot wind generator and a solar cell array which will store power for nine houses, only one of which was on show.

There was also an attractive scheme by Haslam Homes, "Solaire Court", near their show house: passive solar bungalows, each with a private courtyard, state-of-the-art argon filled triple glazing with a fourth, low emissivity, pane and automatic shutters. Price - about £90,000.

An upgraded Super Homes timber/brick house, built by Laing, had the highest efficiency, an ECI of only 41.9, less than half an ordinary Scandinavian score, and perhaps £80 annual fuel bills. This was aided by low energy lighting and appliances, but these could be replaced or misused by future residents. It was also noted for the audio-visual "concept" exhibition of videos, sculpture and darkened windows supposed to emphasise energy saving features.

## SHARED OWNERSHIP

In contrast most other houses are fairly conventional, merely using some extra insulation techniques, integral sunspaces or conservatories, or smaller extra-glazed windows.

For the poorer Thatcherite house buyer there were buy-in-easy-stages MKDC "shared ownership" homes, worth from about £30,000 but available for partial rent while bought in shares. (A broad-shouldered person must walk sideways up the stairs in the cramped apartment.)

As a day out, my favourite features were various sundials and Peter Logan's wind-powered sculptures - eerie giant pencils, nails and crayons which pivot and rotate around unexpected axes in the breeze. Ironically, a lack of wind on the day Mrs Thatcher visited led - according to reliable sources - to the use of electricity to turn the wind generator to order for the TV cameras!

AN EXCITING DAY OUT FOR ALL THE FAMILY!





# Coal Cavity Concern

British Coal is planning to extract coal from a new opencast development in the Strathclyde Region of Scotland, near the village of Coalburn in Clydesdale District. A Coalburn Action Group was formed by local residents in February. Here STEVE MARTIN outlines the proposal, describes the methods used by the Action Group, questions the need for the development and suggests that it may be a "Trojan horse" for the Scottish coal industry.

Over a number of years the Coal Board has carried out test boring in the Douglas Valley of Lanarkshire, initially for deep mining and drift mining. Latterly their attention has turned to opencast development. In December last year the local paper "Lanark Gazette" printed an article which outlined the plans to develop the large coal reserves in the area and revealed that the plan had been submitted to Clydesdale District Council.

This was the first indication that the residents of Coalburn had that their village could be affected by a new mining development. They were not, however, unduly alarmed because the area in question was two to three miles from the village, and there are many unemployed miners living in the area.

The plans for the project went on show in the middle of January and many villagers visited the exhibition and several objections were lodged, mainly because the village appeared to be surrounded by the development. A public meeting was held in February, but many of the questions put to the Coal Board officials and councillors present remained unanswered. The Coalburn Action Group was set up at another meeting the following week.

The remit of the Action Group is defined as "endeavouring to obtain the best possible conditions for the residents of Coalburn if planning permission is granted"; they were not specifically opposed to the plans. They circulated a questionnaire to every house in the village (the results are shown in the table) which included a list of conditions the Action Group hoped to achieve.

The results of the poll were sent to the District Council, and the Action Group committee have since met with councillors and officials, the Coal Board, and local politicians. They have also sought legal and technical advice.

## THE PROPOSAL

The Coal Board's proposal is to extract between 500,000 and 600,000 tonnes of coal a year for 20 years; a further 3 years would be required to restore the site. The reserves are estimated at 10 million tonnes of bituminous coal, suitable, according to the Coal Board, for power station and industrial use.

The proposed area is 2462 acres

and is predominately used as rough grazing for sheep and cattle. The main part of the site is currently unallocated in the statutory Development Plan, although some is zoned for agriculture and some for colliery land. The land would be returned to agricultural use under the management of the Department of Agriculture and Fisheries for Scotland for up to 5 years, on behalf of the Coal Board.

Question	Yes	No
Are you in favour of an opencast development at Coalburn?	66.2%	32.4%
Are you in favour of an opencast development at Coalburn along the lines proposed by the NCB?	11.3%	86.1%
Are you in favour of an opencast development at Coalburn with the following conditions?	77.2%	21.3%

There are four public pedestrian rights-of-way and two public roads which cross the site; the Coal Board will apply to the Scottish Secretary for the necessary Orders to close them during the period of operation. However, the Countryside Commission for Scotland has suggested that the rights-of-way be diverted where appropriate.

## THE CONCERNS

The Action Group's major concerns are of safety and environment. The Coal Board intend to use road transport to get the coal to market, despite their policy of using rail transport "whenever practicable and viable". The original route for the lorries has been amended, presumably because of public pressure, but it still means at least ten 20 tonne capacity lorries every working hour for the next 20 years. The Group want the access roads upgraded and pavements provided to reduce the risk to pedestrians, particularly children.

On the environment, the Action Group have demanded the complete restoration of the land; a reduction in rates and the provision of double glazing to combat noise and dust; that the rights-of-way and the environment be protected; that working hours and noise levels be reduced; that the line of excavation be moved further from the houses (it's proposed to be only 65 metres); and that the selling values of the houses be protected. They also want Coalburn residents to be given

priority for employment on the project, with training for unqualified applicants.

## THE POLITICAL DIMENSION

The Action Group are doing a very good job to obtain the best possible conditions for the local people but is the development needed at all?

The Scottish coal field has been decimated over recent years. The workforce has been cut from 24,000 ten years ago to about 6,000 now, and coal production has fallen by a quarter. The South of Scotland Electricity Board (SSEB), the largest consumer of coal, has cut its purchase from 7.8 million tonnes to 3.6 million tonnes over the same period.

The Coal Board claims that there is a market for the coal from this new development; they have secured

a contract to supply coal for power stations and industry in Northern Ireland. However, large reserves of lignite have recently been discovered in Northern Ireland and it is likely that this supply will be used in the Belfast Kilroot power station which is currently being converted from oil to oil and coal burning. Indications are that the lignite has a lower sulphur content, a major contributor to acid rain, than is usual.

A major advantage of the opencast coal, according to the Coal Board, is that it will be much cheaper to extract than deep mined coal. Because of the uniquely Scottish system of the opencast and deep mined coal industries coming under the direct control of the Scottish Area Director, it has been suggested that a profitable opencast industry will be able to subsidise the deep mines (last year the opencast profit was £56m whereas the pits lost £46m). That may be the desire of the new Scottish Board, but the conduct of the National Board during and after the Strike doesn't tally with that view.

Without an expanding coal fired power station programme (and a phasing out of nuclear power in Scotland) the future of Scottish coal mining, and Scottish industry looks anything but rosy. This is a question for government. No matter how much subsidy the opencast operation can give to the deep mined industry the fact remains that there is much more coal being produced in Scotland than there is currently a market for.

## ■ Appropriate Technology

### ■ Wind

Indications that wind generated electricity is gaining international credibility follow a US survey on costs and reliability and an EEC conference in Rome.

The American survey, from the Electric Power Research Institute, shows that the capital costs of wind generators are falling, while power ratings are rising without sacrificing design simplicity. The main problem is still long-term deterioration of turbine components. The EPRI survey shows that for smaller turbines, with a rating below 1MW, reliability and performance are improving whilst running costs are falling. For multi-megawatt machines, however, the initial problems, largely due to complexity and size, remain unresolved.



In Rome, a thousand delegates attended EWEC '86; the European Wind Energy Association Conference, in October. It was claimed at the conference that the European market is now potentially bigger than that in the US, where 13,000 turbines have already been installed. European expenditure on R&D looks set to climb over the £70m mark for 1986. A significant proportion of this money is for multi-megawatt turbines, although the Danish market leaders are concentrating on smaller scale projects.

The UK Department of Energy is promoting its commitment to wind as "the most promising renewable energy source" by starting what it describes as the world's first large scale vertical axis wind turbine at Camarthan Bay - just four years behind schedule. The "Arrow head" turbine is seen as a major step forward in the development of large machines. Because the blades rotate in a horizontal plane, they are equally sensitive to winds from any direction, less subject to complex gravitational stresses and allow the generator and gearing mechanism to be placed at ground level.

In Norway, the potential for small scale wind generators, with diesel back-up is being explored. The Norwegians' first wind turbine came on line in early October, on Froeya Island near Trondheim. Soer Troen, who installed the machine, believe that the combination of wind and diesel should be economic for isolated communities, where power line costs are high.

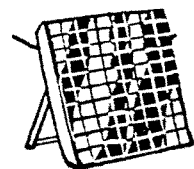
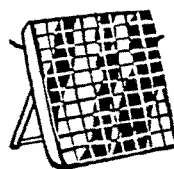
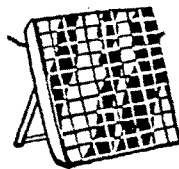
### ■ Geothermal

The City of Southampton is to use hot water from the Hampshire Basin, below southern England, for a district heating scheme. The announcement comes after the Basin has been rejected twice as a source of hot water.

The City Council are developing the scheme with the French company Utilicom, which has already carried out a similar project in the Paris Basin. The Council are providing a pumping site for extracting the water at a peppercorn rent, and have obtained an EEC grant for the project. Water at a temperature of 74°C will be used to heat shops and council offices. Utilicom hope to extract the water at a rate of 10 litres a second for the next fifteen years from the aquifer, which is a mile below the surface.

Proposals to exploit the Hampshire Basin aquifer, were first mooted in 1981 by the CEGB. £2m of the Dept of Energy's renewables research budget was spent on drilling a bore hole in the grounds of Marchwood power station, with the aim of providing hot feed water for the boilers. Unfortunately, Marchwood was closed down and the well abandoned. The project was then taken up by Southampton, who won financial commitment from the Government to drill a second well underneath the city centre. But when the Government pulled out, the City were left to find funding from the private sector.

### ■ Solar



● Solar generated electricity is to power milking machines for 100 cows in an experimental project, funded by the EEC, in Co. Cork, Eire. The 50kW photovoltaic project, in a remote rural location, is unusual in that the bank of solar cells is incorporated in the roof of a calving shed. Usually, the cells are placed on the ground, in arrays about a metre square.

The dairy industry is seen as ideal for the use of photovoltaics, as summer production of milk is as high as sixteen times production during the winter. Incorporated with the cells is a bank of batteries, which will be able to store a week's electricity requirement during the winter and enough for two days during the summer.

● Southern California is to use the sun for more than bleaching Beach Boys' hair, following the signing of a contract worth some £685 million with an Israeli firm. The American wing of the US-Israeli firm Luz International, is to supply twelve,

The Mersey Barrage received a boost last month, when the Government and the Mersey Barrage Company dedicated £400,000 each to a feasibility study. One of the surprise contributors is the CEGB, who although once sceptical about the scheme, are now dedicating £100,000 for research.

The Study will examine the environmental impact of the barrage and its effect on the region's industry. Other lines of enquiry will include the use of off-peak electricity to pump extra water into the barrage when the tide is low.

The use of "pumped storage" in tidal schemes has already been proven in the La Rance barrage, in France. It is not known whether the study will also be examining the use of Diaphragm walling as outlined in SCRAM 55.

A final decision is expected in 1987 for the £500 million project. If the barrage does go ahead, it is envisaged that the Mersey will be providing half a percent of England and Wales electricity by the mid 1990's.

The Severn barrage is still generating controversy, especially from environmentalists. They are worried about the effect on the Somerset Levels, recently declared one of six environmentally sensitive areas, where farmers are paid to maintain traditional methods of farming. Also threatened is Bridgewater Bay, which the UK is under international obligation to keep as an area of maritime conservation.

30Mw solar power stations, bringing to 19 the number of solar "fields" providing power to the the Los Angeles utility, Southern California Edison. Luz is also investigating the feasibility of a 30Mw solar plant in the Indian state of Punjab.

● As well as examining the use of solar electricity, the Indian Government is also proposing the use of passive solar technology in remote villages.

In a new move, the Government of the northern state of Ladakh, which is 3000 metres above sea level and receives only 10 cm of rain a year, will provide a 75% grant for solar walls and greenhouses. The unsophisticated nature of the solar technology seems particularly appropriate to isolated communities. South facing house walls will be painted black and double glazed. Air trapped in the 8cm between the wall and the glass will heat up and enter the house through vents in the top of the wall.

## Biomass

Two new projects to utilise gas produced in rubbish tips for electricity generation, are being started up in the UK. As the waste in landfill sites ferments, it produces methane and carbon dioxide. There are estimated to be some 670 dumps in Britain, capable of producing useful amounts of gas for generation purposes.

One of the problems with using old landfill sites for horticultural purposes, is that the methane continues to migrate through the topsoil and inhibit plant growth. This problem has led the users of the Transworld Festival garden site in Liverpool to install gas extraction facilities at the site.

Although the rate of extraction needed to oxygenate the soil is high, making the methane content correspondingly low, the gas is still viable for the production of electricity, providing that the generating sets are suitably modified. The site is already generating about 1MW of electricity.

In Birmingham, Packington Estate Enterprises are spending £1.5 million on developing gas extraction and generating facilities at the Meriden tip. The Dept of Energy are providing an extra £500,000. Packington hope that the site will be delivering about 3.5MW to the grid by the end of next year. Before the gas can be used, corrosive gasses and dirt are cleaned out. It is then mixed with air and compressed before being burnt in gas generators.

## Heat pumps

Although the technology of the heat pump has existed for as long as the fridge, little use has been made of it in this country. This may change, however, if a plan being proposed by the London Docklands Development Corporation (LDDC) comes to fruition.

The proposal is to use the massive body of water in the docks as a heat reservoir for a simultaneous heating and cooling unit. The LDDC have already installed a prototype water-to-water unit in their Royal Docks office.

The London Electricity Board's Docklands manager claims the £50,000 installation should be 40% cheaper to run than a conventional system, and the heat capacity of the dock water is sufficient to cope with a scheme 50 times larger than the 1.2 million square metre development currently planned. A district heating system based on the heat pump idea could possibly be built.

"Waste" of a completely different kind is at the centre of a major bio-fuels initiative within the EEC. The European grain mountain could be used to produce significant quantities of ethanol. A major article in the New Scientist (9.10.86) claims that western Europe could save some 89 million tonnes of oil a year by utilising the 10 million hectares of surplus agricultural land for fuel growing purposes.

In Sweden, a small fuel alcohol plant has been producing about 20,000 litres of alcohol a day since 1983. The plant also produces animal feed, carbon dioxide and bran as by-products.

The EEC has already committed over £162 million to a major pilot scheme in the Abruzzo region of Italy, which will use over 400,000 tonnes of biomass a year to fuel a 27MW power station. The project is being supervised by DGXII, the EEC's directorate for energy research and development.

Organic wastes and fuel crops will be converted into gas, charcoal and bio-oil in 40 units spread around the Abruzzo region. The bio-fuels will then be used in a CHP station which uses waste heat in a greenhouse complex. DGXII believe

that there are potentially 100 biomass schemes that could be developed in the EEC, based on the experience gained from the Abruzzo scheme, which is due to come on line in 1990.

## Insulation

Scottish Neighbourhood Energy Action (SNEA) are "absolutely delighted" with a £33,000 grant from the Scottish Office. Tony Nec of SNEA told SCRAM that they will now be "able to appoint a new training officer whose role will be to introduce courses for project staff".

SNEA currently employ about 1000 people in insulation projects throughout Scotland, most of whom come straight off the dole with no qualifications. Mr. Nec said that a City & Guilds draughtproofing course and an Open University course for energy advisors, will be started when the money comes through next year.

The announcement of the grant came when Michael Ancram MP opened the SNEA's fiftieth neighbourhood project in Stirling. Mr. Nec hopes that "energy projects continue to develop and provide an efficient and effective service to the poorer members of our society".

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**Power Tomorrow - Sizewell B: the Central Electricity Generating Board's case by Geoffrey Greenhalgh; Kogan Page. 229pp, £6.95.**

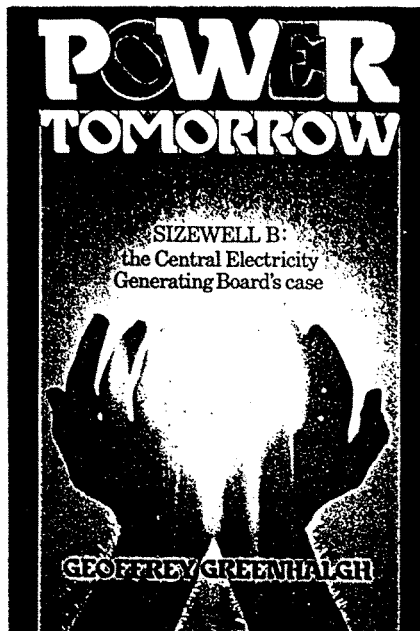
The sub-title - the CEGB's case - is honest and prominent on the cover; and at the end of the Contents is a "note by compiler" which states that "this book is a summary and re-presentation of the CEGB's submissions to the Sizewell B inquiry." However, because Mr Greenhalgh is the compiler, the CEGB is free to adopt or deny the book as expediency dictates; the they can only gain from the book, they cannot lose.

But, there are links between the CEGB and the book: the preface is written by John Baker, a Board member, who writes "the CEGB has commissioned this book"; the CEGB (not Greenhalgh) thanks four bodies for permission to reproduce illustrations. Also, Greenhalgh is described only as "the compiler" and his strong pro-nuclear views are not alluded to, although he has written in Atom and Nuclear Engineering International.

The presentation of the book is very attractive indeed, it is excellent in every respect. It is a delight to flick through and is a model of what, with money, a printer can do. There is much diversity in font size, colour, headings; and the diagrams, charts, graphs, photos and boxes are boldly displayed. However, the substance of the graphics is maximally uninformative, and there are ambiguities; there are no references so it is impossible to identify precise

statistics.

The text is clear and simple, with short, direct sentences uncluttered by qualifications, caveats, doubts or a balance of opposing views. The wording is easy-going, bland and contains the usual "cheap, safe, clean" assurances; everything is for the best in the best of all possible worlds. Whatever aspect is mentioned is dealt with by reassurances; no cloud is



visible in the radiant glow of these reassurances.

The CEGB's Statement of Case was produced in April 1982 and, apart from minor changes, this book freezes the Case at that stage; it is 4½ years

old. There are many omissions, the main one being 90% of the Sizewell Inquiry, ie. the objectors cases and the significance of the objectors' cross examination of the CEGB witnesses (which extracted bucketfuls of evidence which invalidated the case). The book omits and ignores all such evidence, thereby ignoring its impact. Greenhalgh therefore does not enable the reader to distinguish between valid evidence (unchallenged by objectors) and invalid parts. Such a book may not be very useful, vis-a-vis intrinsic merit, but it may still serve for PR image generation.

There is a contrast between the book and the reality at the Inquiry. A blatant example occurs at chapter one, sentence one in which Greenhalgh outlines two main responsibilities of the CEGB under the 1957 Electricity Act; cross examination of Baker (who wrote the preface) extracted the admission that the CEGB did not take into account the factors which Greenhalgh blithely asserts. The false impression is created by half-truth and reassuring impressions, by selectivity and omission. If chapter 1, sentence 1 is so defective, why bother to criticise further?

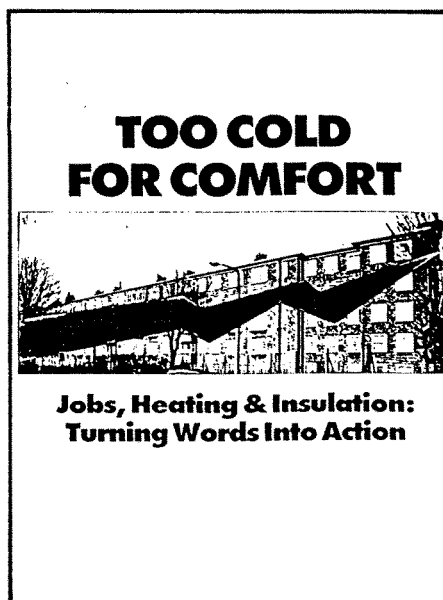
The text's final page (p 205) in the "Prologue" (should be "Epilogue"?) includes a map onto which is fitted a formalised circular ring of 6 PWRs (described as a "small family") which sit at Druridge, Sizewell, Dungeness, Hinkley, Wales and Heysham. How serious is Heysham III as a PWR prospect? See first paragraph, second sentence above: the CEGB can reap the benefits of 1) deniability and 2) softening-up the neighbours.

BR.

**Too Cold for Comfort - Jobs, Heating and Insulation: Turning Words into Action by Simon Hodgkinson; Charter for Energy Efficiency. 24pp, £5.**

Like the "Charter's" first pamphlet, "Still out in the Cold" (see SCRAM 54), this is just the sort of publication we need more of. Not only is it useful for the anti-nuclear activist who needs to catch up on the debate about alternatives, but it would also be very useful to MPs and councillors with limited time to read around the issue.

The pamphlet argues for a major investment programme in energy efficiency and support for CHP and district heating. By drawing on various reports, such as the Association for the Conservation of Energy's "Jobs & Energy Conservation" and Orchard Partners' study of the CHP potential in London, Hodgkinson maps out a programme for energy efficiency, and is able to put figures to the amount



of energy saved and the number of jobs created. His programme would

generate 50,000 jobs in the economy with an annual saving to the Exchequer of around £225 million a year.

The report looks at the way current thinking is going in the conservation movement, on the institutional changes which will be necessary if energy efficiency and CHP are to get the support they deserve.

A new national energy efficiency drive is urgent on all policy counts - employment, social, economic and environmental. No political party seeking office can afford to ignore this. The report is not a blueprint, but it does outline an agenda. We should be planning now to make sure that we are going to achieve our goals early in the life of a new government.

My only quarrel with the Charter is the high price of their reports: I might just have a temporary lapse of memory about copyright laws next time I'm near a photocopier, for the good of the cause!

Buy a "copy" of this report soon and start planning locally for warm homes and jobs now.

PETE ROCHE.

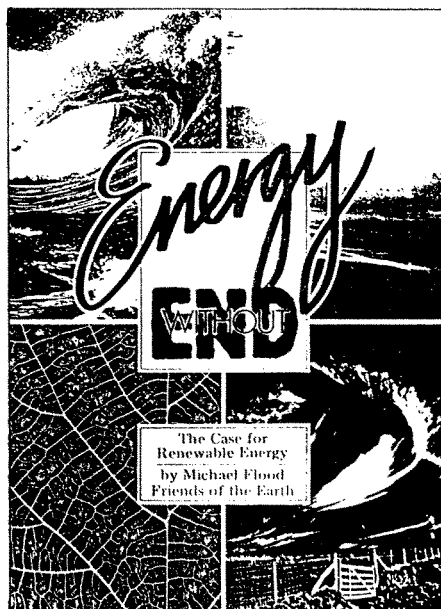
**Energy Without End: The Case for Renewable Energy by Michael Flood; Friends of the Earth. 50pp, £2.50.**

Michael Flood outlines an energy efficient future for the UK where the dependence on capital intensive primary energy sources will decrease at annual rate of 1% over the next 35 years. The basic philosophy of the book can be summed up in three points:

- \* the introduction of an energy efficient society;
- \* clean up fossil fuel combustion and the implementation of CHP/DH;
- \* intensive re-investment in R&D of the renewables.

The emphasis lies in the renewables which are in abundance in the UK, from the windy north to the sunny south; we have enough "natural" resources to last as long as the sun shines.

The book is very readable, and well laid out, but scattered. The subtle use of pictures adds to the ease and flow of reading; as does the use of boxes



to highlight points of interest and figures. The graphics could have a better colour definition (three shades of pink is a bit much!).

The renewables are dealt with in a clear and concise way, with equal

emphasis on the pros & cons. Equal attention is also given over to "conventional" energy sources, fossil and nuclear fuels. The eventual phasing out of nuclear power is dealt with in a box at the bottom of page 17 which also mentions those countries which have decided not to order any more nuclear stations. However it does not examine the enormity of the task which lies ahead with the decommissioning of existing plants.

The book appears to be aimed at younger people with a limited knowledge of energy options, but for battle-hardened campaigners it has little new to offer in the way of technology or argument; but it's a nice book to have on your shelf.

The main criticism from SCRAM's point of view is that, although Flood and ourselves (along with many other environmental groups), have been campaigning for safe, clean energy for years it is a pity that we didn't get into the contacts list on the back of the book.

On the whole, an interesting overview of the renewables with the emphasis on the environmental, as opposed to the energy, aspects.

BRYANT.

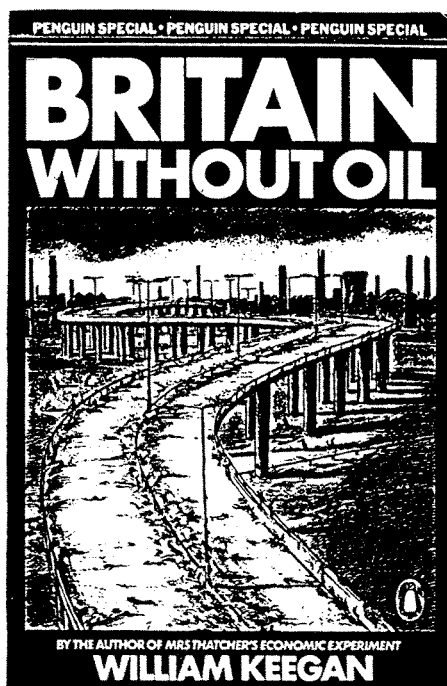
**Britain Without Oil by William Keegan; Penguin. 125pp, £2.95**

I've often advised friends, who throw away the Observer Business News without even reading it, to at least look at William Keegan's column. So I was pleased to see his new book "Britain Without Oil" appear at my local bookshop.

Keegan has a style which, for me, makes economics much easier to understand. Although the book sticks almost rigidly to oil, and its effects on the economy, it is not difficult to see how a massive energy conservation programme would fit into Keegan's plan for Keynesian type reflation. Not only would such a programme help with the problem of our impending balance of payments crisis, when oil begins to run out, but it would also help to get the Country back to work.

In a sense, says Keegan, it was North Sea Oil revenues that made Thatcher's economic experiment possible. The Government was not forced to pay serious attention to what was happening to manufacturing industry, because huge oil surpluses meant that there was no balance of payments problems.

Unfortunately Keegan doesn't offer any solutions other than saying that we need "expansionary policies". But it's not difficult to see that our top priorities should be policies which will help us to avoid imports. One major aim should be to extend the time we have to start importing oil as far into the future as possible. We should also aim to reduce other large imports,



such as timber and paper products. The promotion of paper recycling is in this way analogous to energy conservation.

I thoroughly recommend this book as an aid to understanding economics. But I hope that one Sunday Keegan will explain what he thinks the main expansionary policies should be. After all expansion can mean more nuclear power stations and high rise flats, or it can mean more CHP schemes and well insulated houses.

PETE ROCHE.



**EARTH FIRST!**

Earth First!, the radical environmental journal from the States, has now become available in Britain.

Earth First (EF) is an American based group dedicated to the defence of Wilderness areas. A Scottish EF group is in its formative stage at the moment, and their first aim is to act as an agent for the journal.

The journal is published 8 times a year and costs £1.20 + 22p postage for each issue. To obtain a copy send a cheque or postal order for £1.42 to: G. Collie, PO Box 86, 43 Candlemaker Row, Edinburgh.

Further information on the group can also be obtained from this address.



# Little Black Rabbit

For many years people have believed that the Scottish National Party was a strongly anti-nuclear party. A policy statement delivered to the Dounreay public inquiry has cast doubts on their true commitment; indeed many party members have been surprised to discover that the SNP appears to have a pragmatic line on the issue.

Mr Andrew Currie, a member of the National Executive, explained Party policy at the inquiry on 23 October. He stressed that they have opposed the siting of nuclear weapons on Scottish soil, the disposal of nuclear waste, and the construction of Torness.

However, some of the wording of Mr Currie's statement requires close attention. He began:

"The first thing that we are not saying, of course, is that we are opposed to each and every possible application for nuclear power. That has never been our position as a Party."

This particular point came as a shock to many members of long standing.

Mr Currie continued, elucidating his interpretation of policy:

"We have opposed plans for the disposal of other countries' nuclear waste ... whilst accepting that we had a responsibility to deal with the waste of any nuclear activity in Scotland."

and:

"We have not opposed (properly conducted nuclear research) occurring in Scotland and we can see circumstances in which it might be appropriate to generate power from nuclear sources ..."

The Party have also been "generally supportive of" Dounreay's R&D activities.

So, remember when it comes to your turn to vote: if you don't mind nuclear power stations or nuclear waste covered in tartan, VOTE SNP!

As mentioned above, the SNP gave evidence on their policy at the Dounreay inquiry. Robert MacLennan, the SDP's answer to Jack Cunningham, also gave evidence. He expressed his support for the development but didn't speak much to his Party's policy on nuclear power although he did state that people's fears of nuclear power "has some resemblance to the fear of witchcraft." He was speaking on the last day of the inquiry, which just happened to be Halloween!

You may feel that the inquiry was a useful forum in that the energy policies of the political parties were heard. Well, not true; the Labour Party's policy witness, George Foulkes MP, was not allowed to appear. Mr Foulkes described the inquiry as a "sham and a farce" because the Reporter "suggested that a 600 mile journey for Mr Foulkes to come and explain policy would be fruitless."

Interesting that the two Parties which were allowed to give policy evidence spoke generally in favour of nuclear power in one way or another, and that the Party with, arguably, the most public anti-nuclear policy were not allowed so to do.

It must be said that the Labour Party's evidence was very late in being produced, and the Reporter had warned them of the deadlines. The

delay came apparently from the way in which the evidence was prepared, and because communication between the body preparing the evidence and the Party's office was sometimes not as good as it could have been.



Another snippet from Dounreay. A relation of a Dounreay worker went on holiday to a Communist country and when she returned the said worker was pulled in by the plant's security force. They warned that they knew the woman had been involved with left wing causes, and that the worker better "watch out" in future.

Strange how relations of nuclear workers, who have no knowledge of the industry, are not allowed to go on holiday to Communist countries when Lord Marshall is free to discuss nuclear matters with Soviet nuclear scientists!

A German radical environmental group have pulled the wool over the eyes of the French and German electricity utilities, and have proved that nuclear plants are not as well protected against intrusion as the authorities would have us believe.

Robert Wald wrote asking for support from the German utility for his academic research project, "nuclear power and the personal environment": he wanted to discuss the urgent question of nuclear energy with a group of young and unemployed people.

The utility promised to grant about £600 for the "survey of risks and benefits of this kind of energy." The study was to take the group to various nuclear plants, including Brokdorf in Germany and Cattenom in France.

After a few trips the real identity of the group became known: they climbed cooling towers at Cattenom and displayed banners saying, "Electricity yes - but not this way" and "Non au Nucleaire". The real name of the group was Robin Hood

The French police chased them with a helicopter and threatened to bring in an anti-terrorist unit from Paris. But the bluff had been successful; the group had been allowed to move freely in the plants, they drew plans and took photographs. "We have well documented security fences, entrances and locks," one group member remarked.

Further actions are planned now that the group know the secret routes into the plants. *Black Rabbit Foundation* better protected against intruders than "some kind of chicken coop," claims the group.

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