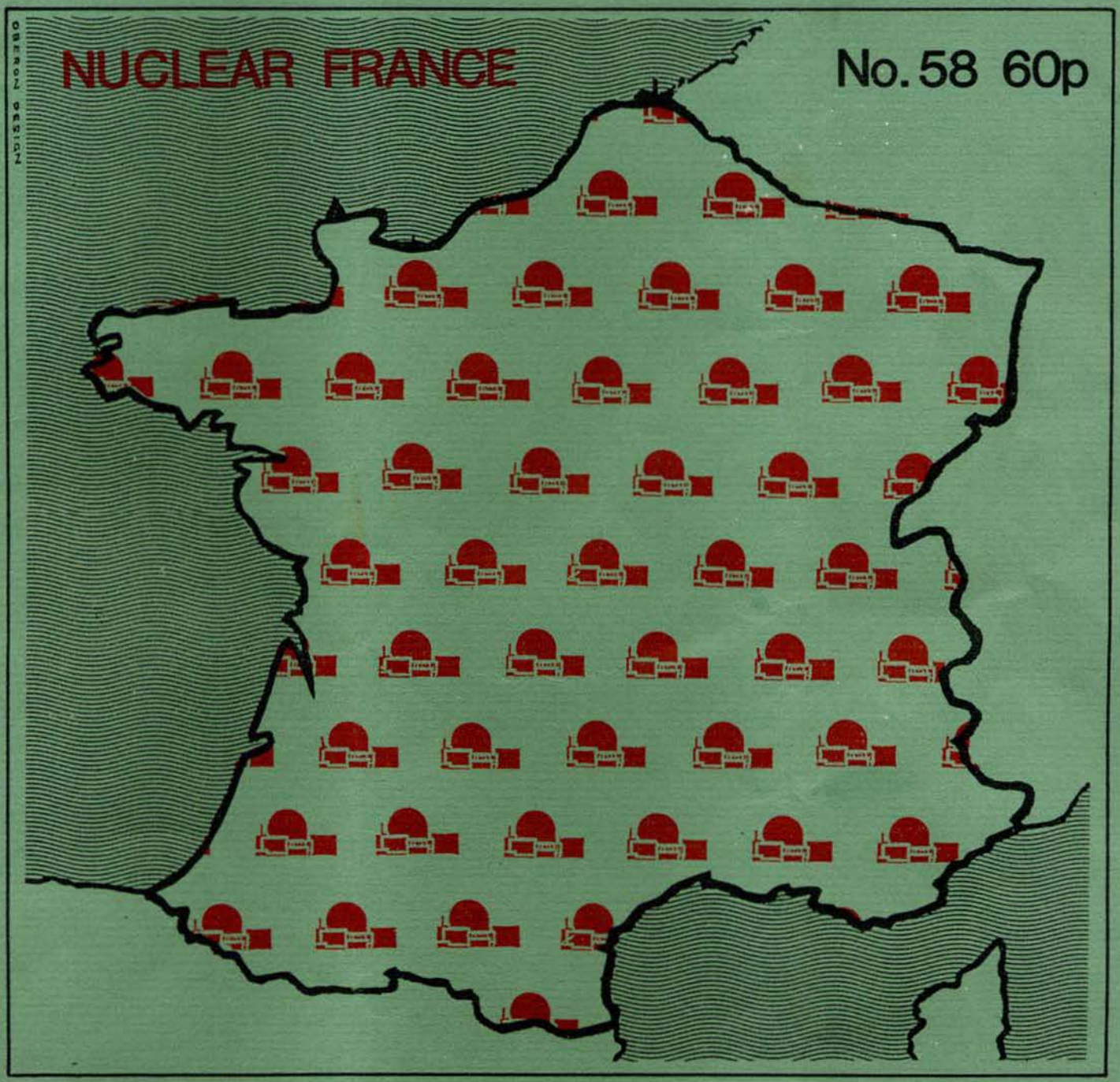
The Anti Nuclear & Safe Energy Journal

SCRAM

NUCLEAR POWER? NO THANKS



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COMMENT

Sir Frank Layfield's report on the Sizewell B public inquiry has eventually been published, four years and 16 million words after it began. And the result is just as we expected. The wisdom of proceeding to the final report stage without taking account of subsequent events has been rightly criticised. But the adjournment debate in the House was supposed to take care of these points; and many speakers, from the opposition parties, stressed the incompleteness of the report in the light of Chernobyl and fossil fuel price changes. The Energy Secretary said almost nothing, because of his "quasi judicial" role in this affair. Let's hope he listened though.

The Sizewell B PWR is not only opposed by anti-nuclear types; the Scottish electricity boards and other wings of the nuclear industry are also against it. In fact, apart from the teams of Lord Marshall and Mrs. Thatcher, almost everyone seems to be against it. But, it is the difference of opinion between Lord Marshall and Donald Miller at the SSEB which is the most interesting. As you will see from the stories on pages 3 and 5 there is a nuclear feud raging which has no parallel in the partisan world of nuclear power: the CEGB seems determined to undermine the SSEB's AGR stations, both the one under construction at Torness, and the one operating at Hunterston. They don't seem to mind that they have two almost identical stations and that the row is making them look like spoilt children: the PWR is all.

The great example of PWR technology which the CEGB and the Government consistently point to is France. The story in the centre pages, based on the excellent report by Friends of the Earth, shows that France is suffering as a result of their expanding nuclear programme, both in terms of international debt and safety. This is not an example we wish to follow.

With the publication of the CHP feasibility study from Leicester (see page 16), and the similar reports from Belfast and Edinburgh which are expected soon, Britain is getting closer to following a much better example in energy policy: Denmark and Sweden have been using this technology for decades, and no-one can accuse them of being backward countries. This is the route we should be taking, a route to better standards of living for our people and lower fuel costs for industry. We can't have both a massive nuclear programme and a national energy efficiency drive: we have to decide which to choose.

ANNOUNCEMENT
SCRAM AGM to be held on TUESDAY 21 APRIL
Please write to us for the agenda and venue.

Sizewell "Dirty Tricks"

The pro-PWR faction is using scare tactics to influence the debate over future power station policy. But the feud between the English and Scottish electricity boards, over reactor choice is a red herring: we don't need, or want either type. Instead, STEVE MARTIN argues for a series of new coal-fired power stations and a major energy conservation programme.

In the run-up to the publication of Sir Frank Layfield's Report on Sizewell B the pro-nuclear lobby began a campaign of "dirty tricks" to persuade the country that we need more nuclear power, and that the Pressurised Water Reactor (PWR) is the right choice.

The opening shot was the *Guardian's* "exclusive" front page lead (5.12.86) which revealed that the Electricity Council (the body responsible for the industry in England and Wales) had reassessed future electricity demand since the Sizewell Inquiry closed, and a "crash programme" of perhaps 4PWRs, and 5 coal-fired stations, would be needed by the end of 1993. (A story tucked away on the inside pages of the *Financial Times* the same day claimed that growing demand forecasts are exaggerated.) The following day John Hooper, the author of the piece, appeared to apologise and accept the figures "came at a suspiciously useful moment for the (nuclear) industry."

BLACKOUT THREAT

Having failed to convince with that ploy, the Central Electricity Generating Board (CEGB) used the severe cold spell in January to justify expansion. They only met the demand by using emergency load management arrangements.

The CEGB claimed that the only way to avoid blackouts during a future cold spell was to order new power stations, preferably nuclear, as soon as possible. However, they failed to stress that, during the cold week, Dungeness B and Hinkley Point B were not generating due to "operating problems" and Bradwell, Trawsfynydd and Heysham all had one reactor off. Moreover, nuclear stations supply "base load" power and, as such, are inappropriate to provide the "peak" electricity only required for winter conditions.

HEYSHAM "LEAK"

The final move was another "exclusive" page 1 story, this time in the *Observer* (1.2.87). Internal reports "leaked" to the paper described a "major design fault" in the control rods of the Torness and Heysham AGR stations. The fault could delay the plants' fuelling by 6 months to a year. The two stations were supposed to be generating electricity early this year.

Regular *SCRAM* readers will be surprised by this sudden media interest in the control rod problem: the story was covered in both of the previous issues, and received an airing in the Scottish press in November. Why was the information leaked just a week after the Layfield report, and who leaked it?

NUCLEAR FEUD

The answer could be linked to the feud between the CEGB and the South of Scotland Electricity Board (SSEB) over reactor choice. Alf Young reported in the *Glasgow Herald* (26.1.87) that Lord Marshall, the CEGB Chairman, is refusing to buy electricity from Scotland because of the latter's position at the Sizewell Inquiry: the SSEB's Chairman, Donald Miller, gave evidence favouring the British-designed Advanced Gas-cooled Reactor (AGR) against the PWR.

Assuming the public, and politicians, were taken in by the first two gambits - demand is increasing, and we need more nuclear power stations to meet it - the logical next step is to discredit the AGR as an option.

US NUCLEAR DOLDRUMS

In his report, Sir Frank judged that an AGR for Sizewell B has a 20% chance of being more economic than a PWR. The CEGB's aim is to prove that an AGR is even less economic than that. It is not a difficult task: Sir Arthur Hawkins, the then CEGB Chairman, told the Science and Technology Select Committee in 1973 that the AGR was "a catastrophe we must not repeat." Dungeness B, the first AGR ordered in 1965, was 15 years late and the AGR programme to date has cost more than five times the original estimate.

However, no new PWR has been ordered in the US, the home of the design, since 1978. The reason for this reluctance was the escalating costs necessary to fulfill new safety criteria. Some US utilities are now giving interest-free loans to customers to install wood-burning stoves and super-insulation rather than building further generating capacity.

The debate about reactor types for the next generation of power stations in this country is a waste of time and money and, after Chernobyl, frankly spurious. Opinion polls continue to show that the majority of people want no more nuclear stations, and a sizable minority would like to see existing plants closed down.

COAL & CONSERVATION

The bleak plight of the power engineering industry because of a lack of orders should be a lesson to us all. This will be compounded if a decision is taken to order a series of PWRs, with much of the work going to overseas companies. What the industry needs is a long term serial ordering policy for new, clean coal-fired plant, to replace the stations which will have to be taken out of service by the end of the century; and this includes the Magnox and AGR stations.

This strategy should be coupled with a nationwide energy conservation programme. This doesn't just mean draughtproofing and insulating lofts, it should also include building (and converting) combined heat and power schemes, and replacing inefficient electrical machinery in the domestic, commercial and industrial sectors.

Such a policy would not only help to alleviate misery and ill health caused by dampness, and avoid death from hypothermia for our old folk; it will create badly-needed employment, and revitalise British manufacturing industry. And, in the long term, it will help our competitiveness in world markets.

We don't want to get involved in the "my reactor's better than your's" argument : both, and all, reactors are bad. They have only two uses: to produce materials for nuclear weapons; and profits for the multinational companies.

Food Irradiation

BOMBS NOT BREAD!

Plutonium production from reprocessing civil nuclear fuel is to be reintroduced in the USA, on the back of a $10 million Department of Environment food irradiation demonstration project.

The closure of the 'N' reactor at the Hanford nuclear complex in Washington State (*SCRAM 57*), leaves America with no military plutonium production plant. All the plutonium available in existing military waste is likely to be reprocessed within five years. The Military will then have to look for another source of plutonium.

Although plutonium is present in civil nuclear waste, President Carter stopped civil nuclear reprocessing, as part of his non-proliferation package.

The six proposed demonstration plants will not use X-rays as the radiation source, which most experts agree are the cheapest and most efficient method. Instead they will use the gamma emitter: Caesium 137, for which reprocessing of civil nuclear waste will be necessary. The Caesium will be subsidised, so that it is one tenth the cost of cobalt 40, an alternative gamma source which would not involve reprocessing of waste. Despite the subsidy, the use of Ceasium as the irradiating source will be fifty times the cost of X-rays.

If the demonstration irradiation project is a success, then reprocessing of civilian fuel will have to start in five years time. While the prime purpose will be to extract Caesium, it is farcical to assume that any plutonium produced as a "by-product" will be thrown away.

Tony Webb, author of "Food Irradiation-the facts" told *SCRAM* that irradiation of food "has yet to be demonstrated as safe, wholesome, controllable and needed. It appears that the pressure for it to continue comes not from the food industry, but the nuclear industry."

The Freeze

During the severe cold weather in early January, the CEGB recorded their highest ever maximum system demand - 48,300 MW.

Only 7730 MW of this demand was supplied by nuclear plant. Of the Board's 24 nuclear reactors, 5 were "shut down for statutory overhaul," and several other reactors were down because of "operating problems."

Despite the great demand on the system, the Board did not bring any of their mothballed plant into operation. They told *SCRAM* that only one conventional plant was out of use: Fiddlers Ferry, which had a steam leak.

Icing and freezing pipes caused more problems, including a radioactive leak at Hinkley Point.

Snow caused the worst problem during the week-long freeze, when all access to Bradwell was blocked for 36 hours. Despite this, the one magnox not on statutary outage, continued to operate, when the emergency services could not have got through in the case of an accident.

In France the situation was much worse. Seven nuclear stations shut down when a sudden drop in voltage occurred, instead of reverting to their own auxiliary power systems.

On 12 January, four generators, responsible for supplying power to the gas circulators at the St. Laurent magnox reactor, failed when ice blocked the entrance filter. Supply was switched to the grid. However, several hours later, the grid also failed, due to the cold, as did the other reactor at the site. If the two events had occurred concurrently, then there could have been a melt down.

Waste

The Navy has had an increasing amount of intermediate level waste from it's nuclear submarines, since the ban on sea dumping in 1983.

To cope with the waste, the Navy is planning to open an interim storage facility at the MoD complex at Gillingham. Appart from a low level waste disposal site, the complex is closed. Reactors from decommissioned submarines, which were originally intended for sea disposal, will now be held at Gillingham until new stores are built at the soon to be privatised Devonport and Rosyth dockyards.

New Nukes

Poland seems intent on pressing ahead with the nuclear station at Zarnoweic, despite faults in the foundations.

Zarnowiec, Poland's first nuclear station, is already way behind schedule because of insufficient building materials of a high enough standard. A recent report states that the foundations are not strong enough to hold the station's weight.

- Egypt is extending the time for bids for the nuclear station planned at El Dabaa on the Mediterranian coast.

The French Government has already withdrawn financial backing for a French/Italian bid because of Egypt's large debt to France. This leaves two contenders: Westinghouse and the German company Kraftwerk Union. The latest delay, probably a result of Egypt's mounting overseas debt, means that the station is unlikely to be finished before the end of the century.

Italy

NUCLEAR REFERENDUM

The Italians are likely vote in a referendum on nuclear power on 14 June.

Three referenda were declared constitutionally admissible in early January by the Constitutional Court, who said the poll had to be taken before 15 June.

The referenda can only be avoided if an election is called before 14 June, or Parliament passes legislation which, in the eyes of the Court, satisfies the referenda's intentions. The turbulent nature of Italian politics means that only the first possibility is likely.

The Italian Constitution dictates that referenda can only make laws in a negative way: by changing or abolishing existing law. The Italians will vote on three issues:

- to abolish financial incentives given to local authorities where nuclear stations are sited;
- to revoke the power of the Interministerial Committee for Economic Planning (CIPE) to impose power stations on unwilling local authorities;
- to repeal the law allowing the state electricity authority to participate in international nuclear ventures.

The results of the referenda will be legally binding.

If the referenda are succesful,the growth of Italian nuclear power will be severely restricted. The country already has three reactors, with two more due to come on line in the 90's. Nuclear power is already under siege, with local opposition to siting of new stations bringing it to a virtual standstill. Recent opinion polls have given over 70% against nuclear power.

The third reform will complement a recently passed law stipulating that the Italian nuclear agency, ENEA, can not put any new funds into fast reactor research. This will mean that Italy will have to withdraw from European fast reactor collaboration.

BNFL

600 jobs are to be lost at BNFL's Springfield fuel fabrication plant over the next three years.

According to the February issue of BNFL News, the reduction in the workforce is due to "a further change in the production of AGR fuel" and "increasing international competition for many of the site's products."

A further 120 jobs will also be lost when fast reactor fuel fabrication is moved from B277 at Sellafield to France because of rationalisation as part of the European collaboration.

The nuclear industry has constantly stated that large numbers of jobs will be lost if a nuclear phase out policy is instigated. The latest job cuts make these threats sound all the more hollow.

Torness

CONTROL RODS PROMPT NUCLEAR SPLIT

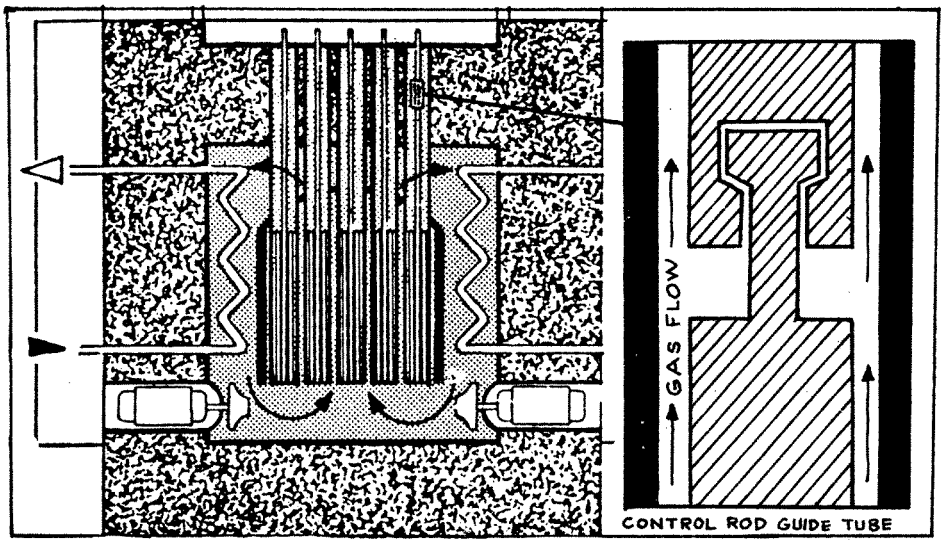
The extent of the control rod problems at Heysham and Torness has caused a major split between the SSEB and the CEGB.

The two electricity boards, already divided over the future for nuclear power in the UK, have consistently given *SCRAM* different descriptions of the difficulty. As reported in the last two issues of *SCRAM*, the problem is caused by movement of the control rods in the flow of coolant gas around the reactor core.

Both boards admit the problem was discovered during commisioning trials of the two stations last October, when hot CO2 was pumped through the reactors under immense pressure. As the gas passed into the control rod guide channels, eddy currents were set up, causing the rods to move about. This is where the explanations diverge. Athough neither Board will give a date for fuel loading, the SSEB claim that tests to "confirm that the problem has been solved" are underway.

The CEGB say the control rods are "vibrating" in the channels, causing them to wear. Control rods are not solid, but a series of rods, joined together by ball and socket joints. As a CEGB spokeswoman told *SCRAM*: "If you've got vibration, the whole rod is moving. The socket is also moving about and therefore wearing in a similar way to the outside".

The SSEB, say that the rods are "oscillating" because of "rotary flow" of gas in the guide chanels. They refer to the problem as "minor scuffing" on the surface of the rods. An SSEB spokesman told *SCRAM* that he knew of "no damage to the inside of the joint," and that what the CEGB told SCRAM about the problem was "different from what they told me."



Cross-section of AGR, showing "ball and socket" joint in control rod.

The *Observer* claims to have seen documents relating to the damage to the control rods. These are reported to state that several rods which show no sign of external wear, are damaged inside the joints. This is altogether more serious, because there can then be no way of telling if a joint is worn, and therefore likely to break, apart from cutting it open. If this is so, then the allegation that the rods at Hinkley Point and Hunterston are prone to a similar problem under certain conditions is unverifiable - until there is an accident.

The SSEB totally refute the *Observer's* allegations. In a statement issued on 2 February they said:

"The Observer story of 1 February, is entirely unbalanced and bears little relationship with the facts... We do not recognise your description of what happened to the rods... Scuffing was detected on the surface of the rods." Tony Paxton, the SSEB's director of engineering said that the Hunterston rods have been operating for 10 years and "have shown no signs of the Torness problem."

The SSEB are confident that design modifications carried out during the first week of February will cure the oscilation.

Mr John Large, an independent nuclear consultant who is experienced in the problem of "aerodynamic excitation", is not so optimistic. He told *SCRAM* that the control rods are inherently unstable, "if you're on a stable regime then you're very lucky."

The position of the rods is dependent on several factors, including the reactor power, the coolant flow,

The position of the rods is dependent on several factors, including the reactor power, the coolant flow, the reactor charge condition and the amount of xenon in the circuit. Any one of these parameters can affect the stability of the rods, so even if the problem is sorted out, then when the reactor is loaded with fuel, the vibration could reoccur. As Mr Large points out, this would mean redesigning the control rods, "which could take several years."

NADE

NORWAY AGAINST DOUNREAY EXPANSION

The proposed EDRP at Dounreay has prompted Norway's largest ever popular campaign on an international issue.

To draw the British Government's attention the Norwegian's concern, representatives of NADE (Norway against Dounreay Expansion) recently went to London to present a petition to Downing St. and lobby MPs from both sides of the House.

The reason for Norwegians fear of Dounreay, was made clear by Jan Kloustad at a press conference at the House. "The current and the wind are both pointing at us. We will be the first recievers if something happens." Putting on a Sou'wester, he said that Norwegians may be very frightened of the South West wind, which blows directly from Dounreay to Oslo, but if an accident happened, "not even a Sou'wester will help us."

Norway, which has no nuclear plants, was particularly affected by Chernobyl. £20 million worth of compensation was handed out by the Government in 1986 alone. Sheep, milk and cheese had to be destroyed. Pasture is still contaminated and will not be suitable for grazing this year. In the North, the Laps have had their culture ruined because the reindeer are so contaminated.

Chernobyl is not the only factor that has increased the Norwegians fear of Dounreay. The strength of opposition to the plant prompted the British Embassy to bring the UKAEA's information officer: Mr McRoberts, to Oslo for a press conference. Once he had made the UKAEA's postion clear, the number of people signing the NADE petition increased rapidly.

220,000 people (over 5% of the population) have signed the petition, which is supported by 17 of the 19 regional authorities. Both the current and the previous governments have made official protests to the UK about the proposed expansion.

Opposition to Dounreay from the Nordic Countries does not stop in Norway. Sweden, Iceland, Denmark and the Faroe Islands are all concerned. In November, an international conference of the North Sea will be held in London. Reprocessing at Dounreay is likely to be placed high on the agenda.

Accidents Will Happen...

The new year got of to bad start with a run of accidents at Sellafield. Nearly every part of the nuclear industry has had it's share of mishaps over the last two months. None was catastrophic, but all had serious safety implications.

SELLAFIELD

● The fabrication plant for fast reactor fuel was the scene of the first of three incidents at the plant in a fortnight. On Monday 19 January, twelve workers in building B277 were contaminated with plutonium and uranium oxide. Two of them were still being monitored following an accident in the same building last March.

The accident occured when a pressure gauge was being checked during maintainance. Although seven other workers in the area at the time were not affected, "one or more" of those contaminated recieved a radiation dose above the annual permitted level.

● The following week the loss of part of a fuel pin, on its way to the storage ponds, was announced. CORE inform us that it was PWR fuel from either Japan or South Korea.

● The third incident was at the notorious B205 building, which was heavily criticised by the NII in their report last year. Highly radioactive waste leaked from a pipe into a concrete sleeve. The sleeve carries steam in a closed circuit to keep the waste hot. Although no radioactivity was released into the atmosphere, the leak will create severe problems for decontaminating the steam circuit.

● In January, compensation was payed by BNFL to the families of three workers who died of cancer. An agreement between BNFL and the unions allows the company to pay compensation without accepting any liability.

SPRINGFIELDS

● In June, uranium ore concentrate spilled onto the roads inside the site. No-one was contaminated and the roads were hosed down, flushing the radioactivity into the storm drains which empty into a brook.

● In February, production of AGR fuel was suspended, when a pin ruptured, releasing uranium into a furnace.

DOUNREAY

● A worker died when he returned to a building to get some tools he had left there overnight. A bottle of argon gas had leaked in the pit where he had been working and he was asphixiated.

Ventilation machinary was not in operation, because the area was supposed to be empty, but there were no warning signs to that effect.

HINKLEY POINT 'B'

● Remote handling equipment for removing spent fuel rods from one of the AGRs failed in early January, stranding a fuel rod inside the reactor.

The fuel was being placed in bottles, when a lid got jammed. Engineers at the site were unable to restart the machinery and had to develop special equipment for removing the rod. The problem was exacerbated because equipment needed to dismantle the assembly housing was already out of action. This meant that the rod had to be stored for several weeks until the equipment was mended, leaving the CEGB unable to find the cause of the original fault.

HUNTERSTON

● The AGRs at Hunterston have had to reduce power output by 8%. Carbon deposits on the fuel pins have increased their operating temperatures. The same problem has occurred at Hinkley B.

WYLFA

● A backlog of over 800 tonnes of spent fuel has built up in temporary storage ponds. If the fuel cannot be removed to Sellafield for reprocessing, the station will have to close as there is no spare storage space.

The backlog has arisen because of cracks in the support stucture of a crane used for handling containers of spent fuel. The cracks were found following an earthquake in 1984. The crane has been inoperable ever since.

● A control rod which fell into the reactor core on 9 January caused the station to close down temporarily.

TRANSPORT

● Two nuclear trains were involved in incidents. The first occurred when a train travelling from Sellafield to Barrow crashed into a car at an unmanned level crossing. The car's occupants were taken to the hospital at Barrow. For years, anti-nuclear campaigners have been calling for crossings on nuclear waste routes to be staffed.

● The second incident happened at sidings in Gloucester, when the first two wheels of a wagon carrying spent fuel rods from Oldbury to Sellafield left the track.

● In Germany, a lorry carrying six tonnes of uranium hexaflouride crashed near the city of Freiberg in Lower Saxony. The "hex" was on its way from France to the fuel fabrication plant at Hanau. "The containers were not damaged and there was no risk," according to the German environment ministry. It appears that the driver was asleep at the wheel.

BRADWELL

● Cracks in the metal supports between one of the reactors' boiler tubes have caused an extended closure. The reactor has been down since last November. In the past the ageing magnox station has had problems with fuel rods, the reactor's casing and the underground containment area. A CEGB spokesman denied that any of these were causing problems at the moment.

SECURITY

● The ease with which terrorists and sabateurs could gain access to nuclear plants was demonstrated when a retired pilot visiting Trawsfynydd pulled out a mock gun in the control room. He said: "Imagine what havoc a dedicated terrorist could cause".

HATCH

● Operator error and plant failure combined to allow over 500,000 litres of radioactive water to empty out of a storage pond at the Hatch nuclear station in Georgia, USA last December. The water contained over 50 times the maximum permissible concentration for release of several isotopes.

An operator closed a valve in the spent fuel storage pond, allowing contaminated water to spill into the area between the site's reactors. A faulty leak detection alarm failed to sound. Workers at the site, unaware of the leak for over 11 hours, added more water to the pond when they noticed that the water level was low.

About a third of the water was contained in the reactor buildings. An estimated 300,000 litres passed through a storm drain and ended up in marshy land inside the site. Over 450 cubic metres of soil and almost 200,000 litres of water were removed from the marsh for treatment as radioactive waste.

YUGOSLAVIA

● Yugoslavias only nuclear reactor, at Krsko, has shut down indefinately. The anouncement came after the plants 36th emergency shutdown since it started in 1981.

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Whilst we would like this list of "incidents" to be comprehensive, we do not hear of every accident. Any information and press cuttings will be gratefully recieved.

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STOP THE PLUTONIUM REPROCESSING PLANT AT DOUNREAY

The Shetland Campaign Against Dounreay Expansion is holding an International Conference in Lerwick on 3rd-5th July.

The issues to be covered at the conference will include:

* The fast reactor programme *
* The proposed reprocessing plant at Dounreay *
* The effect of the Sellafield reprocessing plant on Cumbria, the Irish Sea and Ireland *
* The economic importance of the North Sea and the threat from Dounreay. *

The conference will also discuss and plan an international campaign against Dounreay.

Speakers will be coming from:
Faroe, Norway, Iceand, Germany, Belgium, Ireland and Britain.

Send off the form for more details.

* *

Shetland CADE Conference, Lerwick, 3rd-5th July 1987.
Please send me details of the conference plus travel and accommodation information.

Name .. . .
Address . . . .
. . . .
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RETURN FORM (OR WRITE DIRECT) TO:
SHETLAND CADE, ALBERT BUILDINGS,
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Sizewell Reactions

The Layfield Report of the Sizewell B Public Inquiry recommended the. go ahead for a Westinghouse PWR at Sizewell in Suffolk. The adjournment debate held in the House on 23 February heard many arguments against the go ahead, but construction may still begin before the next election. In these two articles LINDA HENDRY reviews the Report;. and PATRICK GREEN looks at the radiological implications of the PWR.

The Summary of Sir Frank Layfield's Report makes disappointing reading for Sizewell objectors, apart from where he complements them on the high quality of their work with few resources. In places it must also jar the nerves of the Government and the nuclear industry, for they are all criticised for something or other, but they win and we don't.

Even Sir Frank believes that, were it not for the "national interest", on environmental grounds Sizewell B should not be built on that stretch of coastline, referring mainly to the visual environment.

So, what is the National Interest? As a Green, I put global interests first, and that means no nuclear power, anywhere. As a Scot, I am not impressed by Sizewell dealing only with England and Wales when Scotland has an overcapacity of electricity and would have to take the evacuees, and the fallout, if Sizewell became another Chernobyl.

But local objectors must be happy with some of the recommendations for fewer roads, better landscaping, evacuation plans and so on.

COST-BENEFIT SAFETY

As an objector who specialised in uranium, I am satisfied by the two paragraphs in the summary, but disappointed he did not include the illegality of uranium bought from Namibia. But he did admit that "improved safety standards and stricter environmental standards are likely to lead to an increase in the price of uranium" (2.213) and "the whole of the nuclear fuel cycle should be taken into account in assessing the proposal" (2.314). Yet that last point is forgotten.

Having sat through the Windscale Inquiry, Sir Frank has a low opinion of Sellafield: there is a need for "significant improvements in safety at Sellafield ... if spent fuel ... is to be reprocessed without giving rise to intolerable risks. There must be public confidence in the safety of Sellafield if the wider use of nuclear power ... is to win public support." (2.108)

The objectors lamentably failed to convince the Inspector of any difficulties in decommissioning the reactor (perhaps because we hoped it wouldn't be built). Even more surprising, he is completely optimistic about the feasibility of waste dumping as "provision of new sites for low and intermediate level wastes is a matter of urgency" (2.112) although "two members of RWMAC (the Radioactive Waste Management Advisory Committee) should be appointed specifically to provide an independent (sic) expert environmental contribution to the handling of radioactive waste." (2.111)

The CND objectors must be disappointed Sir Frank doesn't accept that consent would "lead inevitably to a great expansion in the production of plutonium" (2.211) although he does believe that records of the isotopic content of civil plutonium should be open to inspection and civil and military plutonium should be reprocessed and labelled separately.

Objectors who felt that prolonging the inquiry would help our case were wrong: Sir Frank felt it enhanced the economic case.

Safety, in Sir Frank's opinion, boils down to cost-benefit: "there should be good confidence that Sizewell B, if built, would be sufficiently safe to be tolerable, providing that there is expected to be economic benefit sufficient to justify the risks incurred" (2.126) but "there is a great need for better organisation" (2.132) among the many bodies involved in nuclear safety. Also, "far more openness on many of the problems which are of acute public concern and sensitivity would be of great value." (2.132)

I cannot believe the Nuclear Installations Inpectorate is as impartial as Sir Frank does; after all their jobs depend on nuclear power existing to be inspected. I also feel he may have been "brainwashed", in the nicest possible way, by his gang of assessors.

But, the economic case could have clinched the whole thing in our favour *if only there had been alternatives*. "The evidence showed that CHP/DH (Combined Heat & Power/District Heating), the Severn Barrage, advanced fossil fuel technologies, renewable energy sources ... were not likely to be developed in sufficient time" (2.136). But, "because CHP/DH cannot be shown *now* to be an alternative ... on cost-saving grounds is not to dismiss its potential importance" and "insufficient use is made of its potential here." (2.167)

Sir Frank does not deny that "expenditure on research in renewable and advanced fossil fuel technologies has been too low, and that higher Government expenditure in the past would have advanced their commercial development" (2.168). Thus, the Nuclear Lobby, having a generation or two's start on the anti-nuclear lobby, win by already being in the corridors of power.

QUAILS IN ASPIC

Sir Frank believes that "it would help public understanding if ... the Government published ... how the distribution of funds between these fields was determined, and showed that the economic potential of renewable and other forms of energy was taken into account in deciding the allocation of funding" (2.168) and agrees "that some individual (conservation) measures would be more cost effective ... The Government should consider a more consistent approach in ... subsidising conservation." (2.170)

Small crumbs of comfort in a wasteland of despair. I had hoped for better from Sir Frank when I met him at Snape Maltings during the inquiry, but I should have known from the quails in aspic at the buffet on the first day that his world is a different one to mine.

What can we do? Read and remember the 14 Recommendations which represent "the mimimum which should be done if consent is to be given" (109.82), then lobby and agitate to ensure that they are complied with; keep our fingers crossed and/or pray for a change of government or a reassessment of the economics of nuclear power: for how can it really be economic here if it isn't in the USA? □

When discussing the radiological impact of Sizewell B, Sir Frank Layfield makes three important recommendations: namely that Sizewell A & B should be considered together (2.81); the 1mSv (milliSievert) public dose limit should be applied (2.74); and the cancer mortality risk estimates used by the International Commission on Radiological Protection (ICRP) should be doubled (2.71).

If any of these recommendations were actually implemented they would have the result of ensuring that Sizewell B would fail to meet current acceptable risk criteria, or the Central Electricity Generating Board's (CEGB) own criteria for setting target doses for members of the public. The following major criticisms can be therefore made of the report.

* The current CEGB and Nuclear Installations Inspectorate (NII) target doses are based on 1/30th of the 5mSv limit. If they are reassessed to 1/30th of the 1mSv limit, ie. to 0.033mSv, the doses arising from the combined discharges from the site to the most critical group (0.134mSv) would not meet this target.

* Sir Frank states that if the target doses are revised as a result of a change in the ICRP risk estimates then the doses to the public would still be within the new target: this is simply incorrect.

If the higher public dose limit of 5mSv is reduced by a factor of two, to 2.5mSv, the CEGB's target on present criteria (1/30th of the limit) would be 0.083mSv. If the 1mSv limit is enforced, and this is revised to 0.5mSv, the target dose would become 0.02mSv. In neither case would the doses from the two plants meet these targets: Sizewell A would exceed them on its own.

* In calculating the risk to a member of one of the critical groups, Layfield has not considered the contribution to the dose from Sizewell A, and has not used a revised ICRP risk estimate. He has further ignored the evidence that the risk may be higher still. If this is done, the resulting annual risk of developing a fatal cancer is not acceptable by the industry's own standards.

The dose from the site as a whole to the most exposed critical group is 0.134mSv. The annual risk of developing a fatal lung cancer from this ranges from 1:300,000 *(1)* to 1:150,000 *(2)*. An acceptable risk on CEGB criteria is less than 1:1,000,000.

* Layfield only provides an annual fatal cancer risk figure of 1:3,000,000 arising from the dose from Sizewell B only, but then ignores the larger lifetime risk from this annual dose. Radiation damage is additive, and it is a person's lifetime dose that determines their actual risk of developing fatal cancer.

The annual dose from Sizewell B, to the most exposed critical group, is 0.025mSv; this represents a 1mSv lifetime cumulative dose. The fatal cancer risks from this exposure alone range from 1:50,000 *(1)* to 1:25,000 *(2)*. This risk will be in addition to any risk from exposure to Sizewell A.

* The doses whch arise from discharges from the site appear to be seriously underestimated. The "maximum" dose from direct radiation arising from the operation of Sizewell A is given as 0.033mSv. It appears that no direct radition will arise as a result of Sizewell B, which is highly unlikely.

Layfield states: "The CEGB and the NII agree that it is reasonable to assume that no person is likely to receive an annual dose of more than 1/30th of the dose at the site fence. This gives an estimated maximum annual effective dose equivalent from direct radiation of 0.033mSv." (32.36)

However, CEGB and National Radiological Protection Board (NRPB) data show that the maximum possible direct radiation dose at the perimeter fence is 4mSv. The 0.033mSv figure is based on 1/30th of the "weighted mean annual dose" at the perimeter fence of 1mSv. Consequently, the figure given by Layfield is based on 1/30th of a weighted average, and is not the maximum possible dose.

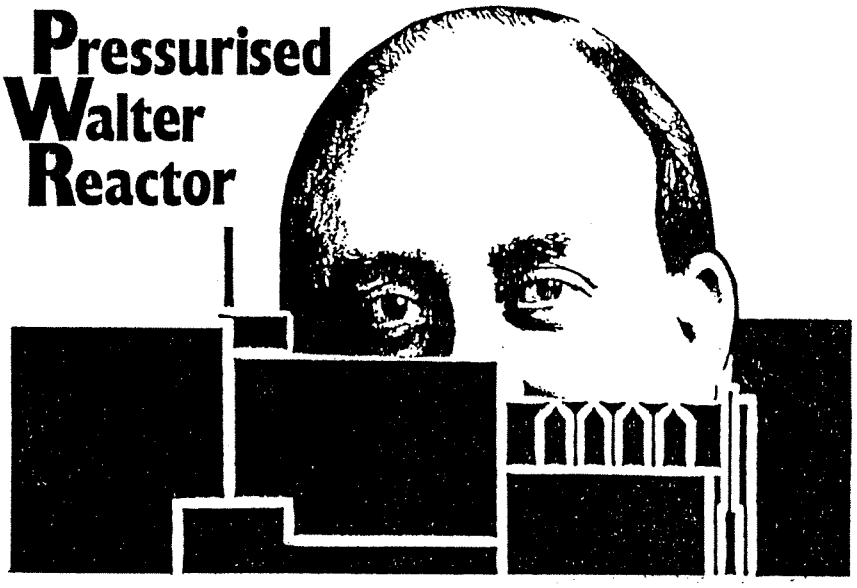
On the CEGB's own criteria, the maximum dose should be 0.133mSv. If this figure is used when assessing the total dose to the critical group, the resultant maximum, 0.232mSv, dose for the critical group would not meet even the existing 0.170mSv target dose. This discrepancy means that the risk to the critical group will have been underestimated.

* Layfield has underestimated the consequences for the workforce by using an annual average dose figure he admits he has no confidence in, and by ignoring his own recommendation to increase the ICRP estimates.

Even using his 5mSv dose figure, it can be shown that over the next 40 years (the planned reactor life) between 2.5 and 5 radiation-induced fatal cancers would be expected in a workforce of 500, ie. up to 1% of the workforce can expect to die as a result of their radiation exposure, which is clearly unacceptable. Layfield expects 1.2 cases of fatal cancer.

He further provides no estimate of the likely non-fatal cancer consequences of this exposure; up to 7.7 non-fatal cancers would be expected *(3)*, and further underestimates the genetic consequences for the workforce; at least one case of genetic damage would be expected amongst the offspring of exposed workers *(4)*.

Considered singly or together these criticisms are sufficient for rejecting the conclusions of the Layfield report as intellectually dishonest, since he states that Sizewell B should not be built if the risk are not shown to be acceptable. There can be no justification for building Sizewell B in terms of either the risks to members of the critical group or to the workforce. □



1 *Based on twice the current ICRP risk estimate for fatal cancer.*
2 *Based on BEIR III fatal cancer risk estimates.*
3 *Based on BEIR III non-fatal cancer risk estimates.*
4 *Based on UNSCEAR 77 risk estimates for genetic damage.*

NIREX Plans Inadequate

A visit by representatives of the Bedfordshire, Humberside and Lincolnshire County Councils Coalition to European radioactive waste disposal sites last year has reinforced their doubts over the NIREX plans for a shallow waste repository for low level waste. STEVE MARTIN reviews the report of their visit*.

The Coalition's visit was prompted by their deep concern over the possibility that sites at Elstow, Killingholme, Fulbeck and Bradwell may be chosen for the disposal of radioactive waste, following last year's announcement that they were to be investigated by NIREX (the nuclear waste agency).

They returned more convinced than ever that the NIREX plans for shallow trench burial of low level radioactive waste (LLW) are ill-conceived and inadequate.

The visit took in Sweden, West Germany and France; and they concluded that all three countries are more advanced than the UK in the development of policies and practices for the disposal of radioactive waste.

They examined several aspects of each country's programme:

* nuclear waste policy;
* disposal routes planned;
* costs of the proposals;
* public acceptability.

Their findings were compared to the policies and plans for this country.

IMPRESSIVE & WELL ADVANCED

The tour members endorse the conclusions of last year's Select Committee report on radioactive waste:

> "First, that the UK is well behind other nations in its research and development programme on geological disposal ... Second, there is a strong tendency to move towards geological, more containment based, options for all kinds of waste, including LLW."

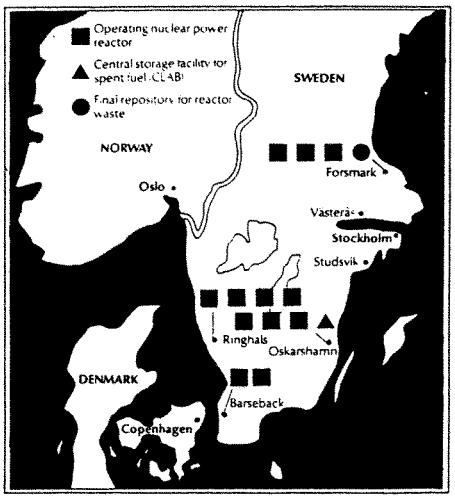
Further, the countries visited have well developed policies for low and intermediate level wastes, whereas the UK's policy is sadly lacking.

Sweden's plans are particularly impressive and well advanced: apart from very low level wastes (with activities about 1% of UK limits for LLW) all radioactive wastes are destined for deep geological disposal. The tour members could not agree with the NIREX claim that Sweden has chosen shallow repositories for its low activity wastes.

What impressed them most about Sweden was their willingness to discuss their plans and answer the many questions put to them.

The Germans were also open about their plans. They have chosen deep disposal for *all* their waste.

The head of the waste disposal agency told the Coalition that the German public would not accept shallow burial as an option. Both countries felt that public fears should be accepted, not dismissed as they are in this country.



SWEDISH NUCLEAR FACILITIES

The French low level disposal method was regarded as the least impressive of the three examined, and could not be recommended for the UK. But, it was still thought better than that proposed for the UK. France is often cited as an example of what our shallow burial sites will be like; the delegates felt that it was so different that no comparison could be made.

COST EXAGGERATED

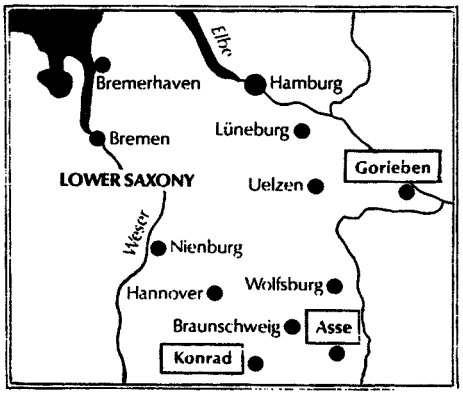
One notable aspect of their Centre de la Manche site is the provision of both surface and sub-floor drainage. This allows any radioactivity which diffuses through the dump to be collected and monitored before discharge; the NIREX designs include no such provision.

On safety grounds, the NIREX plans were ill regarded by the people the delegates spoke to. The integrity of the waste containers was particularly criticised; the German officials did not believe NIREX's drums would survive more than 50 years, even in the extremely dry conditions of the disused Konrad iron ore mine into which much of Germany's waste will be emplaced.

Both Sweden and Germany have shown that it is possible, and much cheaper than NIREX and the Government would have us believe, to construct underground repositories. The Swedish short lived waste (less than 30 year half life) facility is estimated to cost £125 million and will take 90,000 cubic metres of waste: the expected volume for disposal by 2010, the date by which they hope to phase out nuclear power. This works out at £1400 per cubic metre. The total unit cost for the German proposal is £740, and the overall cost of the French system is about £670 per cubic metre.

The Department of the Environment, in the "Assessment of Best Practicable Environmental Options (BPEOs) for Management of Low- and Intermediate-Level Solid Radioactive Wastes" report published last year, assumed costs for "deep cavity disposal" of £2600 per cubic metre, nearly twice that of the Swedish design. The difference is due, in part, to the DoE's assumption that only small volumes of high level waste will require such a disposal route; the inclusion of *all* wastes will greatly reduce the unit cost.

The DoE supports the NIREX shallow trench system which has the much lower unit cost of £125 for LLW. This corresponds to an average annual cost of £6.3m, which is considerably less than the £20m which the French spend each year at Centre de la Manche. Clearly, either the DoE figure is optimistic or the cheapness is at the expense of safety.



REPOSITORIES IN W. GERMANY

The Coalition members believe that NIREX should provide accurate costings so that more rigorous comparisons with overseas plans can be made. They also feel that greater effort should be made to work with the public, accepting that a disposal route must be worked out even if nuclear power is abandoned tomorrow: "there is now a greater need than before for NIREX and the nuclear authorities to present a convincing solution in order to gain public acceptability."

*The Disposal of Radioactive Waste in Sweden, West Germany and France; prepared by ERL (Environmental Resources Limited) for the County Councils Coalition.

Dealing with Waste

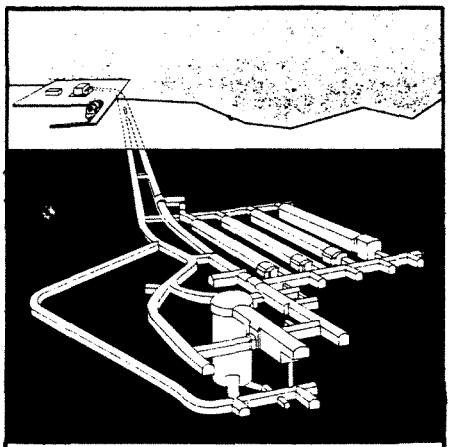
With the long term storage, and eventual future vitrification, of high level nuclear waste, and the current investigations into disposal sites for low level waste, the nuclear industry likes to believe they have solved most of their nuclear waste problem. They are now looking at the remaining, intermediate level waste. GEORGE PRITCHARD argues that the solution being sought is inadequate, and he puts forward an alternative.

The British nuclear power programme is at a crossroads. The problem which it faces now is the one which it has always refused to face in the past: nuclear waste.

The 1976 Sixth Royal Commission on the Environment (the Flowers Commission) recommended that no large programme of nuclear power stations should be built until the problem of the waste has been solved.

The Government and the nuclear industry would say that, with vitrification and storage, they have solved the problem of high level waste. And, the present investigations, they say, will lead to the answer to the low level waste problem, although the people around the sites involved would obviously disagree.

Now the time has come to look at intermediate level waste. NIREX, the nuclear industry's consortium for dealing with this problem, has issued contracts to a number of companies to do desk studies into disposal under the sea bed. This would be accomplished by either sinking a shaft on land and tunnelling out to create a chamber 10 or so miles off the coast, or by driving a tunnel at a slope from ground level and creating a chamber at the end of it.



SWEDISH UNDERSEA PROPOSAL

So what have I got against these proposals? Firstly, very little is known about earthquakes off the coast of Britain, although several have been recorded with a strength of 5 on the Richter sale. However, what *is* known about earthquakes is that the nearer to the surface one gets, the more damage is caused. Therefore, to dump radioactive waste 100 metres below the sea bed, with no way of monitoring or retrieving it, is absolute insanity.

The second reason that I oppose the NIREX proposals is that they are intending to rush ahead without the required research having been carried out.

END REPROCESSING

I would put forward the following policy for dealing with our nuclear waste:

* We must stop producing it. To achieve this, all our nuclear reactors should be phased out as quickly as possible.
* The House of Commons Select Committee on the Environment's recommendations on reprocessing spent nuclear fuel should be carried out. I believe this would lead to an end of reprocessing.

Once these two decisions have been taken then we must all work towards finding an answer to the problems of dealing with the waste that has already been produced: not by rushing ahead regardless, but by a careful, long term programme of research.

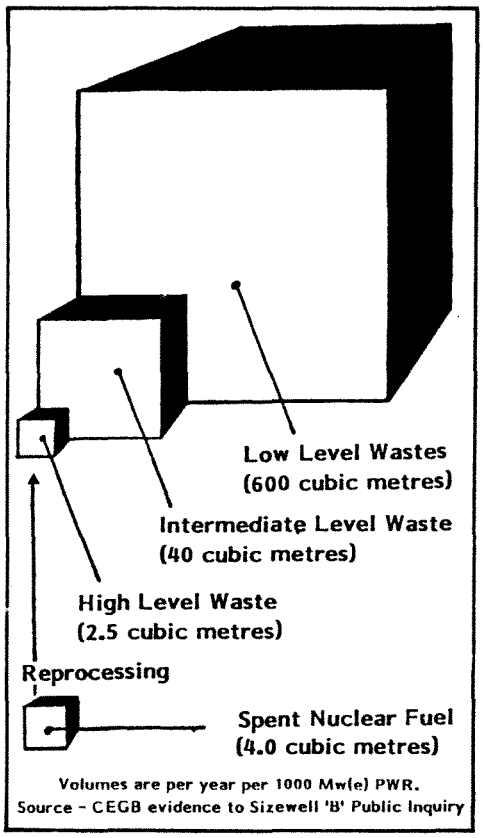
No nuclear waste of any kind would be disposed of until this research has been completed. The present low level waste site investigations would be part of the long term programme, just as the site on my doorstep in Cornwall would be.

INTENSIVE RESEARCH

What would this research programme have to achieve?

* A site, or sites, that would be able to contain the longest-lived radionuclides for a timescale beyond our comprehension.
* To convince the mass of the population that it is so.

So how can this be achieved? Firstly, the cost argument must go out of the window. At present the cost of dealing with nuclear waste is tied to the cost of nuclear electricity: the NIREX solution must be *cheap* so as not to make nuclear electricity too expensive!



Volumes are per year per 1000 Mw(e) PWR.
Source - CEGB evidence to Sizewell 'B' Public Inquiry

Secondly, a number of computer programmes should be tested to give greater confidence in the predictions. These should include:

* ground fissuring,
* isotope travel through rock,
* the ability of the geology, both in the near surroundings and further afield, to absorb these istopes,
* the effect of earthquakes on the containment structures and on the host geology.

Site specific studies would include:

* the study of the hydrology for the presence of ground water,
* the effect of decompression of the ground rock,
* the chemistry of both water and rock to ascertain their effect on the containment structures.

Other studies into the concrete, irons and other materials will have to be done. These are just a few of the things, I am sure other people can come up with more.

I believe that we have the engineers and scientists in this country to deal with the problem. However, the restraint on the cost of nuclear electricity will always stop them. Do away with that restriction and they may find the answer. Also, let's deal with all waste as if it is high level: that way we hope we will not be putting at risk the future of this planet.

Exploding the French Nuclear Myth

The French nuclear power programme has been held up by proponents as a model of efficiency and cost effectiveness which we should follow. The real picture is rather different. In this article, a shortened version of his report for Friends of the Earth*, PHIL DAVIES looks at 3 aspects of the French nuclear programme and points out some reasons for the unique French devotion to nuclear power - and the price they are paying for it.

Over the past 15 years France has taken unparalleled steps towards complete dependence on nuclear power. The achievement is remarkable: in 1973 40% of French electricity came from oil, and the rest from hydro, coal and a small percentage of nuclear. In 1985 59% came from nuclear, 21% from hydro and 20% from fossil fuels, of which virtually none was oil. By 1990 the nuclear portion will be 74-80%.

This unique transition is due to the deliberate policy of *"tout electrique, tout nucleaire"* which began in the 1960s and is rooted in the strong partnership between state and industry which acts to minimise public debate. The motivation was independence in energy and defence.

MASSIVE FOREIGN DEBT

This independence has been secured at a price: a massive foreign debt, which electricity sales are unlikely to repay. Electricite de France (EdF), the state-owned electricity utility, is $33billion in debt, and the President of EdF admits that revenue from sales is sufficient only to pay the interest, not the debt itself.

The size of this debt has had a substantial impact on their balance of payments deficit (EdF has been the largest foreign borrower on Wall Street during the 1980s) causing the National Debt to increase to $50bn in 1983, making France the world's third largest debtor that year, after Mexico and Brazil.

In 1973 EdF forecast a 10% annual demand increase, and ordered a rolling programme of PWRs from Framatome, the French reactor manufacturer, in two series: 900MW and 1300MW. By the end of 1985, nuclear capacity reached 39,000MW, and it will be between 55,000 and 60,000MW by the late 1990s.

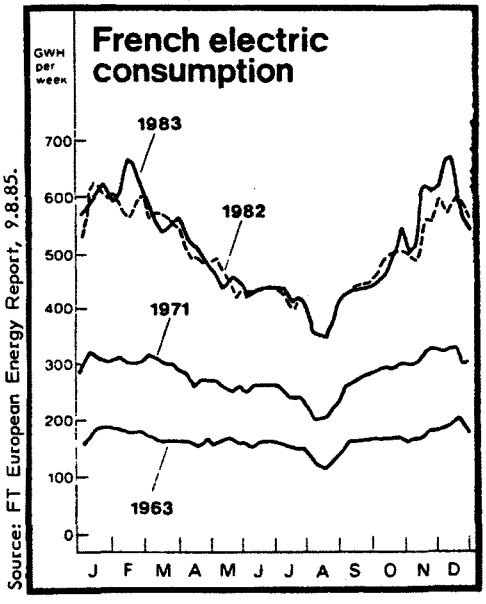
The apparent success of this programme is due to in part to the lack of available channels for effective opposition. In many cases local opposition has been limited by the offer of new roads, houses, schools etc, and cut-price electricity (the latter now illegal).

The apparent cheapness of French nuclear power can be put down to the use of a standard design, thereby reducing capital costs. The scale of the ordering programme geared up Framatome to produce 6 reactors a year. But the standardisation has led to three adverse effects: overcapacity, industrial inflexibility and generic faults.

A Government report in 1982 concluded that France already had sufficient capacity to meet demand in 1990; that annual consumption by then would be 370TWh (1 terawatt hour = 1 billion kWh) instead of the 450TWh forecast by EdF; and that no more nuclear stations should be built. Because of opposition from the industry and some unions, the Government only managed to cut orders from 3 to 2, and then to one a year.

The EdF President has admitted that they will have 3-5 reactors too many in 1990; the CFDT union claims that the number will be 12. In 1984, 3 reactors were shut down for long periods because they were not needed.

This overcapacity has led to a desperate drive to sell the surplus electricity; and the Government refuse to allow the tariff increases needed to pay off the debt.



Source: FT European Energy Report, 9.8.85.

EdF is aggressively promoting increased electricity consumption, rather than merely selling to meet demand. They have set up an advisory service for industry which includes the offer of loans for new installations. Their target is to sell 50TWh a year more electricity than the 1984 level, by 1990. This target will be hard to meet as industrial demand from 1975 to 1983 rose by only 1.2TWh a year.

On the domestic side EdF hopes to convert 170,000 homes a year to electric central heating by 1990; only 66,000 were converted in 1983. The programme has been criticised by the Government energy conservation agency as destructive to the concept of energy efficiency.

The consequence of this plan is a great seasonal variation in demand, because electricity is used for heating (see graph). Nuclear power is particularly unsuited to these peaks and troughs: it is designed to meet the base load demand.

This means that the stations are forced to operate in another role, that of "load following". This increases stress on components which may shorten reactor life, and have adverse effects on on the economics: "once it becomes necessary to follow daily load variations ... the high capital cost of nuclear power tells to its disadvantage" (Donald Miller, SSEB Chairman). There may also be safety implications.

It has also led to a complex tariff system in an attempt to manipulate demand. French nuclear power is not dirt-cheap as we have been led to believe: in 1983 industrial prices were the third lowest in Europe, yet domestic prices were the third highest.

France also needs to sell another 50TWh a year to foreign customers. So far only half only that target has been reached. Although the contracts are confidential, there is no doubt that the tariffs are set to undercut the customers' own costs. It is likely that the price is below French production and capital costs.

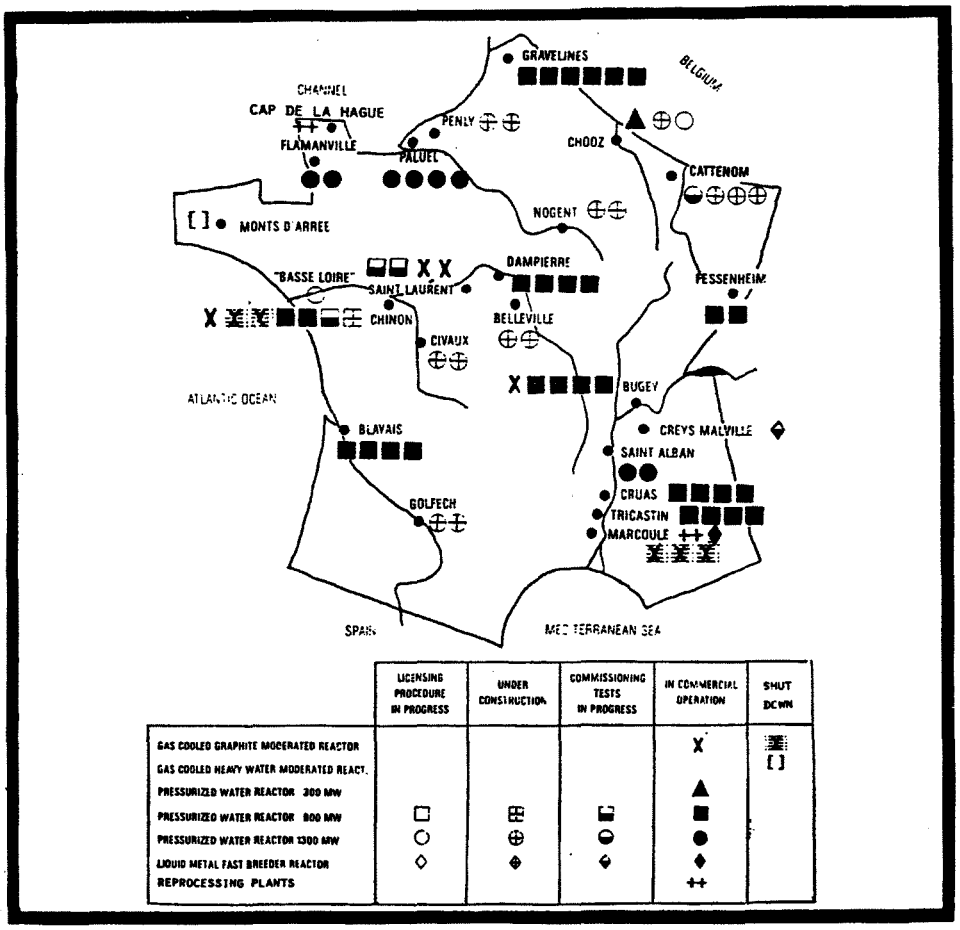
SERIOUS SAFETY PROBLEMS

The standard design has led to the same faults appearing in several reactors at once, requiring them all to be shut down for expensive repairs. Between 1982 and 1984 20 reactors were shut down because of damage to control rod guide tube braces, which cost £100m in lost output.

More serious faults, such as pressure vessel cracking and steam generator corrosion, which could have disastrous results also occur generically. The cost of closing down the whole series for repairs would be so large that EdF would be likely to skimp on safety rather than allow this to happen.

There has been a series of accidents at French nuclear plants, many resulting in large exposures to workers. An accident at the Le

NUCLEAR ESTABISHMENTS IN FRANCE



Bugey reactor in 1984 was caused by an electrical failure, and a loss of coolant accident (which could have led to a core meltdown) was narrowly averted.

This accident went unreported for 2 years, but was described as "the most significant event in relation to safety in a PWR," on a par with Three Mile Island, by EdF's head of safety. It was unknown in PWR engineering safety analyses.

A recent report by Greenpeace International described 6 areas of safety deficiency in the 900MW and 1300MW series. These included: electrical supply and insulation faiiures; single control room for two reactors creating confusion; low quality braces resulting in breakages; "two-phase" water/steam mixtures; pressure vessel integrity; and steam generator tube corrosion and leakages.

There is an ongoing controversy about PWR generic safety issues, many of which remain unresolved: only 32 of the 79 safety issues identified by the UK Nuclear Installations Inspectorate at the Sizewell Inquiry were resolved at the time the Inquiry closed.

The reprocessing plant at Cap de la Hague is probably safer than Sellafield; certainly the discharge levels and worker exposure are routinely lower. But the large volumes of waste stored on site, which Sellafield would discharge, represents a real risk.

La Hague's accident record in the 1970s, when the plant was dealing almost exclusively with Magnox fuel, was bad. Workers were exposed to high levels of radiation during reprocessing, and a serious fire cut off the power supply when no back-up generation was available. More recently the plant has mainly dealt with PWR fuel and, despite an apparently improved safety record, the collective radiation exposure in 1984 was the highest in its history (728.1 man-rem).

Generally information on la Hague is difficult to obtain. The strongly anti-nuclear CFDT union led a strike in 1976 against existing safety conditions. Since then, many activists have been transferred, and the workforce is now threatened with redundancy if they campaign on safety, or talk to researchers.

NUCLEAR WEAPONS LINK

The nuclear weapons programme dictates nuclear power policy to an alarming degree; the authorities do little to conceal the close links. Deliberate political and strategic decisions play an important role in the justification of nuclear power. The Superphenix fast reactor project and the role of the Atomic Energy Commission (CEA) are two areas in which these links are most obvious.

According to the EdF magazine *Energies*, Superphenix "will produce enough plutonium for about 60 atom bombs a year. Under these conditions Superphenix becomes of course the technical basis of the French nuclear military force."

The 1200MW Superphenix has been built by an international company called NERSA. EdF holds 51%, the Italian ENEL holds 33%, and the rest (16%) is held by SBK, a West German company co-owned by British, Belgium, Dutch and German utilities. The core is to be supplied by these countries in these proportions, and France claims the right to 51% of the plutonium bred in the blanket, to be used as they see fit.

None of the three applicable international aggreements against proliferation - the Euratom Treaty, the US-Euratom Agreement, of the Non-Proliferation Treaty (which France has not signed) - is drafted in such a way as to prevent French military use of this material.

The CEA is responsible for both civil and military nuclear energy. COGEMA (100% CEA owned) runs the fuel cycle services (enrichment, reprocessing, and military reactors - like the UK's BNFL) and provides the material for nuclear bombs and nuclear fuel.

The civil justification for reprocessing does not stand up. On safety, the Nuclear Energy Agency of the Organisation of Economic Co-operation and Development (OECD) has recently reported that spent fuel can be stored safely under water for up to 50 years; and on economics they state that the reprocessing cost "is not offset by the value of the materials produced."

France has an independent nuclear strike force; and all stages of the nuclear fuel cycle are carried out within French borders. From the structure of French institutions alone it is apparent that these military and strategic political considerations, rather than civil and economic ones, are the main determinants of French nuclear operations.

The French path to almost total dependence on nuclear power has been greatly facilitated by the lack of a critical forum for serious debate, the centralisation of French society, and by economic inducements to host communities.

The consequences of this programme are potentially disastrous. A French Chernobyl in one reactor could be replicated in any reactor of that series: they would all have to be shut down; there would be an immediate energy crisis. The US Nuclear Regulatory Commission estimates that there is a 45% chance of another Three Mile Island type accident in the US in the next 20 years; French PWRs are based on US designs.

The international trend away from nuclear power has accelerated since Chernobyl. Where does that leave France - and the countries on its borders?

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* "Nuclear France: Power at any Price?"; £1.75 from: FoE, 377 City Road, London.

Radiological Protection?

The Chernobyl disaster has shown that the official radiation monitoring agencies are ill-prepared and under-resourced to cope with a major nuclear emergency. THOM DIBDIN reports on an NRPB conference, and suggests that one way to avoid people's suspicion of official monitoring is to initiate a major independent monitoring programme.

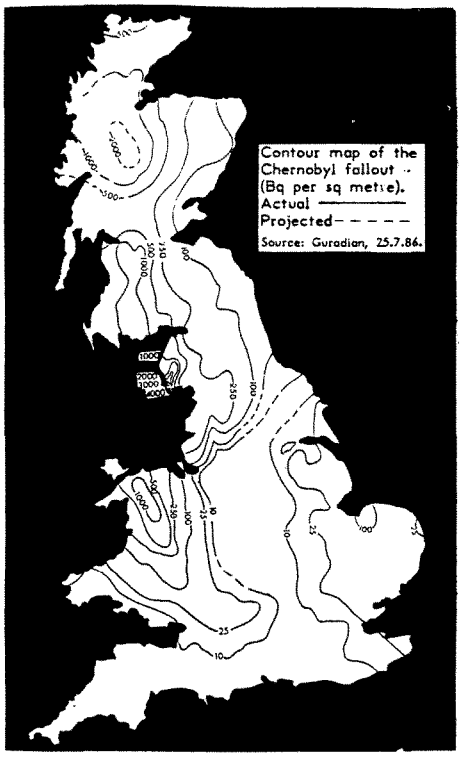
On 8 January, in a warm and plush lecture hall at Strathclyde University, the National Radiological Protection Board (NRPB) defended their response to Chernobyl. The presentation, as sanitised as the out of season flowers that decorated the room, largely dealt with uncontentious issues surrounding the Chernobyl aftermath. There were, however, some notable slip-ups, particularly in the field of independent monitoring.

Post Chernobyl, the NRPB faced the unenviable task of coping with a bureaucratic enigma: there was no set monitoring procedure. Although the UK has a procedure for dealing with a civil nuclear emergency, as Chernobyl is a foreign reactor this could not be set in motion. We have a bilateral agreement with France, in case of a French accident, but this had never been practiced. So the NRPB set its role in the UK under the aegis of an emergency plan for an accident "outside the immediate area".

The worst problem facing the Board was one of communications. They did not realise the severity of the accident until the media reported the high levels of fallout in Sweden. When the cloud hit Britain, they had to cope not only with a sudden rush of monitoring for the Government, but also an unprecedented demand for information from the press, public and Parliament. With their limited resources the Board coped very well, but this is not the point.

NO HARD INFORMATION

Following an accident, monitoring takes on two objectives: to ascertain when counter-measures, such as controlling milk, need to be taken; and to report what is happening. It has become clear that the two prime objectives were not fulfilled: in the Commons in May, Frank Cook MP said that the NRPB told him that "it would have been a good idea to keep children in on Saturday, when it rained"; at the seminar, Dr. Dixon said that the drinking of ewes' milk by children should have been banned, but "one year olds shouldn't be drinking ewes' milk at any rate"; and the public, unable to obtain hard information from official sources, including the NRPB, jammed the switchboards of the environmental pressure groups. The SCRAM Journal was delayed for a full month, as we were constantly on the phone giving out information to the press and public.



There are, however, mitigating circumstances for the Board. The wide area of fallout meant that they had to advise and monitor Britain's Embassies in most of Europe. This involved telling, over the phone, non scientists how and where to take samples. The scale of the fallout was unprecedented, but a radiological "protection" board should be able to cope with any and every nuclear emergency.

Lastly, the meteorological conditions that sent the radioactive cloud up to Sweden, down to northern France and then back up over the UK were very rare. But it must be said that the explanation, given by the NRPB's Dr. Clark at the seminar, as to precisely why the highest level of fallout just happened to be around Sellafield, was not entirely convincing.

So how would the NRPB cope with another nuclear catastrophe? Despite having learnt some valuable scientific and communications lessons, it was clear from remarks made by Dr. Clark, that the NRPB do not understand the importance of keeping people informed about how the fallout could be affecting them personally, thus allowing them to take precautions. Chernobyl clearly showed that different areas suffered vastly different effects, and the NRPB were not able to cope with this. Whilst accepting this, Dr. Clark unequivocally rejected one of the major alternatives: that of independent monitoring.

If the NRPB is unable to cope with a major nuclear accident, then an alternative must be found. Local Authorities already have a statutory remit to monitor any problems which might have a health effect on the local community. Several Authorities have set up local monitoring schemes. Notably, the Convention of District Councils on the Forth Estuary are examining the effects of the Rosyth dockyard and, if it comes on stream, the Torness nuclear power station. Local Authority monitoring also has the benefit of being seen to be independent. Many people distrust the NRPB because of their role in advising the nuclear industry.

LOCAL BASELINE SURVEYS

Independent radiation monitoring has several other benefits, which make it more attractive than NRPB monitoring. A nationwide scheme would cover all those parts of the country which currently have no monitoring, because they are lucky enough not to be near a nuclear establishment. This would relieve the dependence on the electricity boards and the military. It is quite clear that no one knows how Chernobyl effected the Scottish Highlands and Islands: any warnings of potential effects were extrapolated from data for other parts of the country. For people not to be aware of the dangers is scandalous.

A comprehensive local "baseline" survey would, if started immediately, have the benefit of being able to pinpoint those areas which can provide a trigger for counter-measures to be taken. If the level of caesium at a particular point, is still high after Chernobyl, then it is reasonable to expect that the fallout following a future accident would also be high.

The Seminar was well attended by representatives from Local Authorities, who were not taken in by glib statements that grouse (of a feathered not liquid kind) is safe to eat. It is now up to them to use the institutions that already exist, such as the Nuclear Free Zones, to set up a nationally co-ordinated system of independent local radiation monitoring. Chernobyl has shown that just because you don't live next door to a nuclear installation, doesn't mean that you wont get caught out in the fallout.

BEAT the Draught

The Bristol Energy Centre is a rare combination: it spans environmental concerns about scarce resources, pollution and centralised high technology; and social concerns like poverty, inadequate housing, cold and fuel debt. MARK ELLIS describes the Centre's activities. This article first appeared in December's issue of *Heating Action Bulletin*.

The Bristol Energy Centre offers practical help and advice, working demonstrations, workshop facilities and courses, as well as a continuing campaign advocating widespread domestic energy conservation as a way of improving living standards and reducing the demand for fuel.

As part of the voluntary sector the Centre has the commitment and enthusiasm of volunteers and workers, plus local community contacts and the independence to work for the solutions we believe in - a coherent energy policy at local and national level.

The Low-Energy Demonstration House was the first conversion in the derelict terrace that we lease from the City Council. It is a working demonstration of ways to reduce running costs which can be used in either renovation or new-build. It is not intended to be an *ideal* house, but rather to show ideas and techniques that could be used in conventional housing. Features range from secondary glazing, draughtproofing and household tips, to mechanical ventilation and solar water heating systems.

ADVICE & TRAINING

Based in the front room of the Low Energy House, is an independent service open to the public five days a week offering advice and information on basic energy saving techniques; materials and equipment costs and pay-back periods; as well as grants and benefits. This service is used by public and private tenants, home owners, builders and architects.

The team of five energy advisers organise our training courses for local council staff and tenants' associations, and are also involved in carrying out a trial energy audit on a local authority estate.

We have been running an MSC draughtproofing team - the Bristol Energy Action Team (BEAT) - for three years now. At times it has grown to about 40 employees, but recently local projects in Bath and East Bristol have become independent in the interests of promoting small localised projects run by active local sponsors. We now have a small team working from the site which concentrates on installations for the DHSS and can offer support and training to new projects.

The Energy Advice Team provide a back-up service to clients of BEAT, offering detailed energy advice and information on benefits, as well as monitoring the effectiveness and durability of the draughtproofing measures.

COMMUNITY SUPPORT

The Community Energy Workshop was established to provide basic training, in addition to practical and theoretical energy related courses and facilities. Training is too often the preserve of formal education or industry, and courses on energy matters are rarely offered. An independent, friendly workshop helps fill the training gap.

The workshop was a two-up, two-down terraced house which we converted into a ground floor workspace containing benches, power tools and hand tools, a kitchen and an office. It was opened in September 1985 with the support of the local authority.

Courses offered regularly include:

* Computer-aided Low-energy Design;
* Save Energy at Home;
* Beginners' Guide to Nuclear Power;
* Energy Management;
* Keep Warm This Winter.

A selection of basic skills courses is also available,

We have a series of projects and activities planned that fall into two basic categories: *consolidation* and *development*. Having built up our services and facilities over the past three years, we have to work at getting them established and financially stable, gaining more support from the community and recognition from the local authority.

This includes gaining funds to employ a larger proportion of the workforce on a long-term basis and to undertake more conversion work on the house to provide extra workshop and office space and possibly a retail outlet. In addition, we may well expand BEAT to work in conjunction with the City Housing Department to carry out packages of insulation work on council estates

For a long time we have dabbled in energy education. Now we are exploring the formation of a unit to provide a teachers' resource library and a schools liaison worker.

However, the area of greatest development has undoubtedly been co-operation with the council. With the formation of a Housing Energy Working Party as an advisory body (comprising the voluntary sector, fuel boards, DHSS, local authority and tenants' federation), a recognised route for proposals and discussion with the City Council has been established.

For us, this has created the opportunity to initiate trial audits on council property, training courses for council staff and tenants' associations, and a country-wide energy exhibition, organised in conjunction with the major local authorities, the fuel boards and the tenants.

BUSINESS SPIN-OFFS

Obviously, despite all the time it involves, working with the council offers us not only access to the largest single landlord in the area, but also the possibility of financial stability whilst keeping our independence.

The Bristol Energy Centre employs 21 MSC workers (part and full-time); 3 full-time co-ordinators, one each for the energy centre, the workshop, and the technical and advice services; and 1 part-time welfare rights worker.

In addition to the Energy Centre, a number of businesses have been set up as associated projects: notably the Greenleaf Cafe and Wholefood shop, Greenleaf Bookshop, Greenleaf Builders, Low Energy Supply Systems, and Windcheaters (draughtproofing). In some cases these have provided employment for workers leaving our MSC team.

Bristol ENERGY Centre

101 and 109, PHILIP STREET, BEDMINSTER, BRISTOL BS3 4DR

Leicester & London Heat Schemes

The Leicester Combined Heat and Power Consortium are the first of the three "lead city" consortia to publish the results of their deliberations. PETE ROCHE looks at the summary of their findings, and compares it with the work undertaken on CHP in the London Boroughs of Southwark and Tower Hamlets.

There is every indication that an independent Combined Heat and Power (CHP) company will be set up to build and run a Leicester project in early 1987. The company will generate electricity and heat, and plan to extend their network so that, in time, the whole of Leicester will be supplied with heat.

Implementation of the project will depend on the availability of finance, which will come from two sources: shareholders and banks or leasing companies. The bulk is likely to come from leasing companies who buy the equipment on the heat company's behalf and rent it to them. Lloyds Merchant Bank will help put together these complex financial arrangements.

It was considered essential to begin the project by establishing a sound base of large consumers from which the system could expand. Detailed surveys of over 250 potential major heat consumers were carried out. Leicester has the advantage of a large number of hosiery manufacturers, along the banks of the River Soar, who use steam. Other customers could include hospitals, the University and Polytechnic, City and County Council premises, commercial property, and four council housing developments which are currently served by "group heating". The electricity would be sold to the Grid, which is already established on the existing power station site.

MODERN PIPEWORK

Two separate pipe networks will be established, one distributing steam for the hosiery industry, and the other hot water for heating. Pipework systems in the UK have a bad reputation due to the poor design, installation and maintenance of many systems built during the 1960s and '70s housing boom. But, Scandanavian experience shows that modern designs, correctly installed, can be maintenance-free for a number of decades. The report identifies several routes for the pipes, involving minimum disruption, along canal and river corridors and existing and abandoned railways.

The heat supply will be metered by integrated heat meters, which measure flow and temperature differential. The group heating schemes will be connected via a heat exchanger to the present boiler plant. Individual domestic connections will not be made in the initial period. However, there is a high density of terraced houses around the pilot zone, and it is hoped that connections to this private domestic market will be made as soon as is practicable. Card operated pre-payment meters will be encouraged in this market.

Several fuel options were considered; those preferred are:

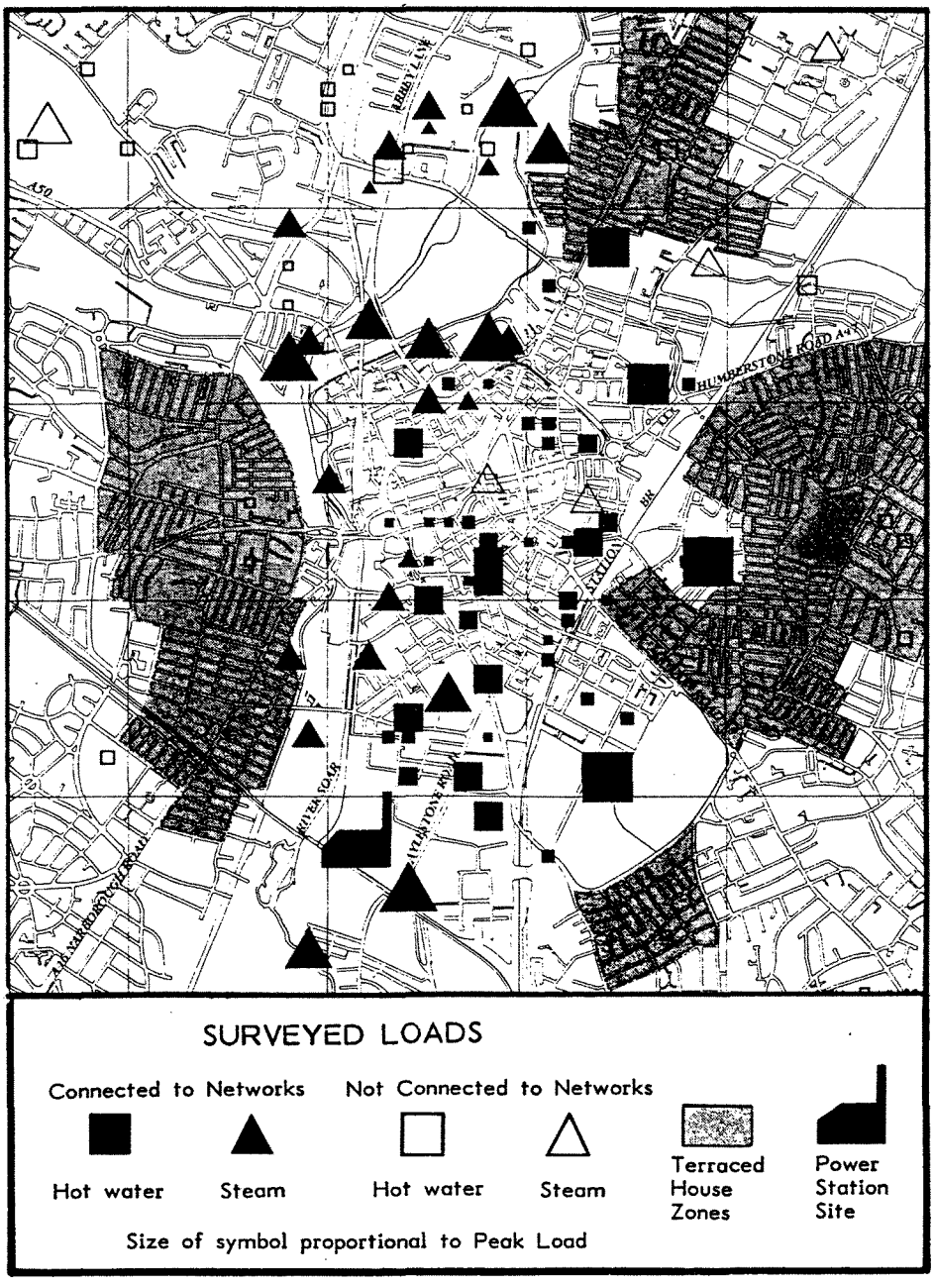
* to purchase the existing power station and modify it to burn natural gas as well as oil and add waste heat boilers and steam turbines.
* to build a new conventional coal-fired station on the same site.

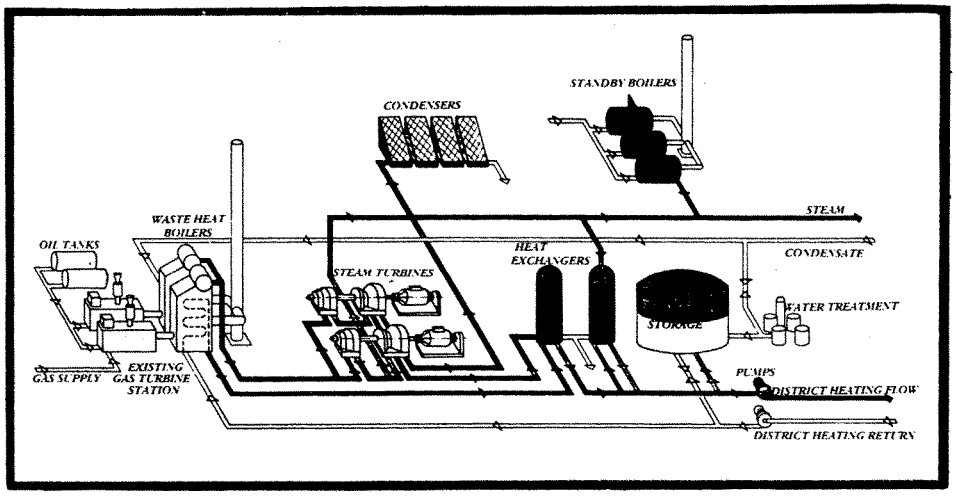
A combination of the two, and the inclusion of a refuse incinerator plant, were also considered.

The coal option has the advantage of keeping the ratio of electricity sales income to fuel cost constant, but the real rate of return would only be about 3%; the gas option would produce a 10% rate of return, but the fuel cost is not so closely tied to electricity prices. The multifuel option could be a good compromise, with a 7% rate of return.

Refuse incineration could not be considered as the main plant due to the limited volume available and the low disposal costs. However, a small incinerator could provide

HEAT LOAD IN LEICESTER





SCHEMATIC OF LEICESTER GAS TURBINE OPTION

power for off-peak distribution of heat and steam, in place of heat-only boilers, and could supplement the peak load. This would increase fuel savings and revenue from electricity sales. Further studies are required to determine whether the extra capital expenditure would be justified.

It will be necessary for the private utility to have certain legal powers, in particular the authority to lay mains under the public highway. The Government is currently studying all aspects of this with a view to introducing the necessary legislation. Meanwhile those members of the Consortium who already have these powers are seeking arrangements *so that work can begin before the legislation is enacted.*

Finally, any new plant will be equipped with the "best practicable means" of keeping emissions below the level needed to comply with current and anticipated European standards.

"A PEOPLE'S PLAN"

The London Boroughs of Tower Hamlets and Southwark were indentified in the 1982 W S Atkins report as promising areas for CHP development. The GLC and the two Boroughs set up a Joint Advisory Committee for CHP to submit a bid to Government for grant aid. Despite not being awarded lead city status, they decided to carry out as much of the investigatory work as possible.

Unlike Leicester, the bulk of the initial consumers would be local authority tenants because the two Boroughs have a large number of existing group heating schemes. The GLC, therefore, decided to involve potential consumers and other interested parties in a consultation process leading to the publication of "A People's Plan for CHP". At the same time engineering and financial studies were undertaken.

The main issues which arose during consultation were:

* What would be the result of constructing a scheme, in terms of both increased employment and disruption?
* Would there be adequate control over the use of heat in the home?
* Would heat be separately metered, or would charges be "pooled"?
* Who would build and operate the system?

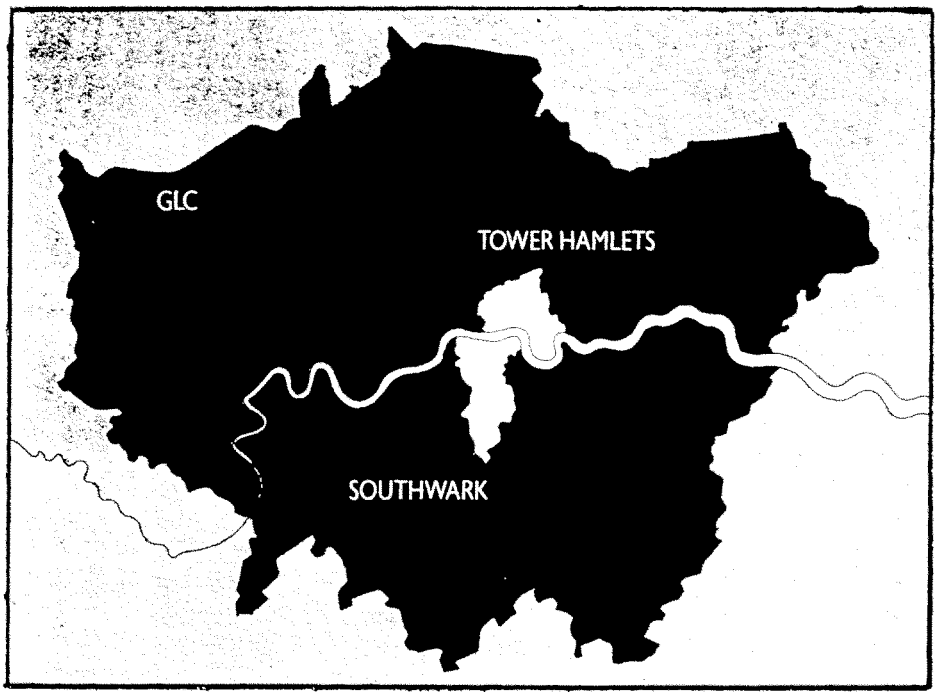
Two firms of engineering consultants were asked to look at suitable core schemes for Tower Hamlets and Southwark. It was stipulated that such schemes should not only be economically viable on their own, but should also be capable of further development into a larger London scheme. The preferred option for Tower Hamlets would be a refuse-fired scheme, as the current cost for long distance transport and landfill is high. In Southwark the scheme would be either gas turbine or coal-fired boilers.

Although the work is not as advanced as in Leicester, it is clear that a core scheme in each Borough would have a good likelihood of success. The report recommends that design studies are continued to the tendering stage; that power station sites are secured against alternative use; that possible grants and loans are identified; and the negotiations with fuel boards and potential customers continue.

FURTHER REPORTS DUE

The end of March is the deadline for the publication of the reports from the other two lead cities, Belfast and Edinburgh. If ever there was a case for public investment, CHP is it. Moreover, despite the Government's reticence to fund CHP adequately, there is now a real hope that we may soon see CHP schemes start not only in the lead cities, but also Newcastle, Sheffield and London where the consortia have "gone it alone".

Thanks to sheer bullheaded enthusiasm rather than Government energy policy, the dream of cheap efficient heating may soon become a reality, but there are still many hurdles to cross before then.



LOCATION OF LONDON STUDY AREAS

Leicester Combined Heat and Power Consortium: Summary Report Autumn 1986.
The People's Plan for Combined Heat & Power; the GLC Popular Planning Unit, March 1986.
Combined Heat & Power for London; Joint Advisory Committee, March 1986.

Energy and Jobs from European

A Commission of European Communities (CEC), report identifies biomass as a potential source for some 10% of the EEC's total energy requirement. The report identifies several specific areas for energy production, investigated by the CEC in its "energy from biomass" research and development subprogramme. Central to this is the Italian Large European Bioenergy Project (LEBEN). THOM DIBDIN reports.

As the world's energy supplies dwindle, the exploitation of renewable sources of energy becomes increasingly crucial. The sun, wind, tide and waves are all potential sources of energy, but there is one resource which already provides a major portion of the developing world's energy, and is seriously underexploited in the developed countries: biomass. The EEC's third non-nuclear energy R&D programme, which concentrates on biomass as an energy option, is developing the LEBEN project as a "test bench" for an integrated agro/energy approach.

Over the last ten years the CEC has been involved in experimental research to identify and optimise the best use of biomass as an energy resource. Biomass production is seen as a positive step for agriculture because, unlike the market for conventional crops, the energy market is non-saturable.

BIOFUELS & ELECTRICITY

Both biological and thermal conversion of biomass have been studied. These would produce biofuels such as ethanol as well as electricity from bagasse (crop residues) and energy crops. This work has now reached the development stage, where the project will put the experiment to a practical test.

The project will be carried out in the Italian region of Abruzzo, east of Rome. Abruzzo has a Mediterranean climate, reaching from the capital Avezzano in the mountains down to the Adriatic shore. It has a diverse agricultural economy, incorporating forestry, market gardening, and olive groves.

LEBEN incorporates three essential concepts: the need for more energy; the need for more jobs; and the need for energy resources that are environmentally sensitive. Biomass will be derived from agro/forestry residues such as olive clippings and forestry wastes; energy crops from unexploited marginal land (which is not currently used because of agricultural surpluses); and the reallocation of farm land for energy crops.

SPECIAL SKILLS TRAINING

To grow, harvest and process these crops and waste, 150 new jobs will be created, with another 900 in supporting and associated industries. Although the derived biofuels are not completely clean, they represent a dramatic decrease in sulphur and other emissions over coal and oil.

The biomass will be used in two ways. Firstly for ethanol production using a species of grass called sweet sorghum. About 200,000 tonnes of Sorghum a year will be grown on agricultural land around Avezzano. Sorghum has the advantage of cropping two or three times a year, it also has the high sugar content needed for fermentation to ethanol. Conversion will take place in a centralised plant, and the ethanol used as an octane booster in unleaded petrol.

Secondly about forty pyrolytic converters will be placed around the region. These are scheduled to convert bagasse and energy crops, such as broom grown on marginal land, into oil, gas and charcoal at the rate of one tonne an hour. The gas produced will be used to fire the converter where chipped biomass is partially burnt in the absence of air. The oil and charcoal are mixed with more conventional fuels and additives to form a viscous emulsion which will fire a centralised power station.

An existing, 27MW power station is being converted and upgraded to accept the emulsion. Waste heat from the station will be used in an industrial centre for plant production with a capacity of 19 million plants a year. Although most of the centre will be taken over by a greenhouse complex for early fruit and flower production, a support and education centre for the whole project will also be incorporated.

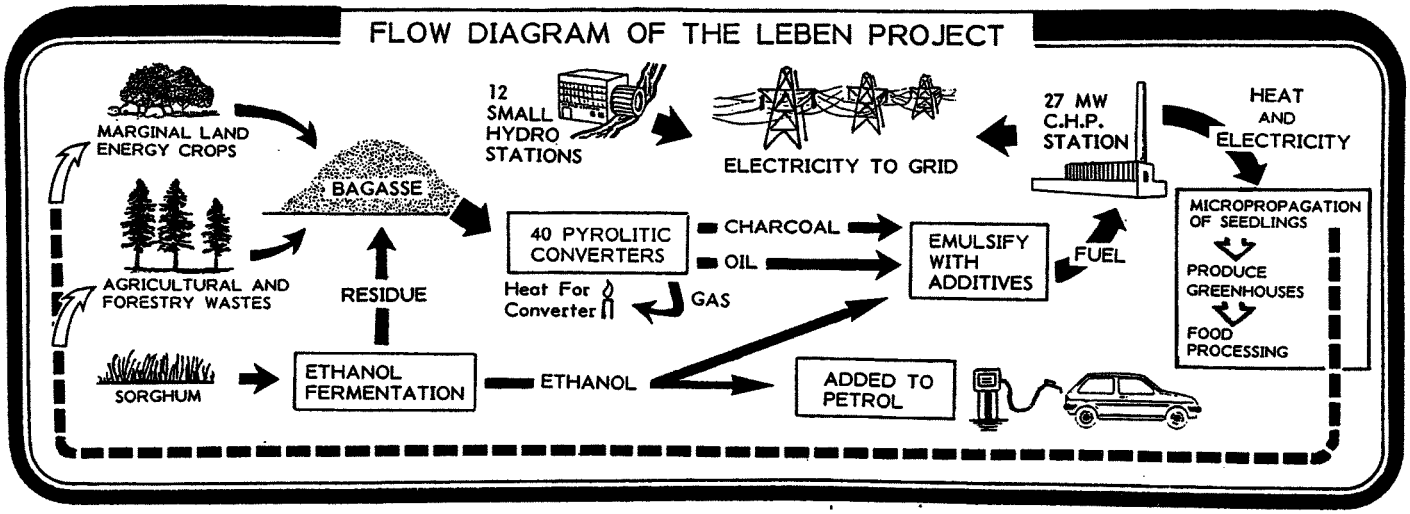
Support will be given in the form of micro-propagation of broom and sorghum seedlings and the educational aspect will be directed not only to training local workers in the special skills needed for the project, but also for training programmes for personnel from developing countries.

INTEGRATED PROJECT

As well as electricity from the thermal station, 12 small hydro-electric stations are proposed. These will supply power for several associated agro-industries, such as drying, freezing and processing agricultural produce. Some of the waste heat from the thermal station will also be used in these ventures.

One of LEBEN's major strengths lies in the integrated nature of the project (see diagram). To reduce the risks associated with large

FLOW DIAGRAM OF THE LEBEN PROJECT



Bio Waste

Location of LEBEN Project

projects, a modular approach is being proposed, this will also make the introduction of new technologies easier and reduce transport costs. The creation of rural jobs, use of waste from forestry and agriculture, and the exploitation of unused land are all positive developments.

The cost is high (over £80 million), as one would expect for an experimental scheme, but the price of the products is relatively low; for example the cost of ethanol is about 60% less than previous EEC estimates.

MORE DEBATE NEEDED

Although the CEC document is very positive, the scheme has several potential problems which are not identified: the environmental disruption caused by marginal land being brought into production; soil infertility due to over intensive crop production; displacement of food crops; and deforestation. Conversely, the problem of forest fires, which cause havoc in the Mediterranean area, will be reduced due to the removal of undergrowth and "loppings" for the project.

The CEC hope that if LEBEN is a success, then some ten similar projects will be started in Italy, 100 throughout Europe and over a thousand in the developing world.

Given the scale of LEBEN, its possible applications world wide and the potential problems that such intensive agro-energy projects could pose, the whole area needs much more debate, particularly from those more directly concerned with appropriate energy technologies. SCRAM look forward to receiving comments and further articles on the subject for inclusion in future issues.

Appropriate Technology

Wind

Potential wind generation costs of as little as 2p per kilowatt hour are heralded in a positive new report* from the British Wind Energy Association (BWEA).

The wind could, if part of a planned energy economy, generate as much as 20% of the nation's electricity, according to the report. To achieve this potential, the report sets out a programme for commercial and state funding for wind energy.

Before reading the report, it is worthwhile glancing at the inside back cover, which lists the chief members and executives of the BWEA. Apart from some well known lecturers on appropriate energy systems, such as P. Musgrove, of Reading and J. Twidell, of Strathclyde, the list is almost entirely made up of representatives from industrial manufacturers of wind machines and the electricity boards. These companies would stand to make a fortune if the report's recommendations are taken up. This does not belittle the report: rather it sets it firmly in a commercial framework.

The proposals in the report form a five point programme for investment over the next five years:

- Developement of individual machines (£40M);
- Wind parks on land (£50);
- Off-shore wind turbines (£5M);
- Small turbines and island systems (£40M);
- Underlying research (£37M).

Although the existing research, development and demonstration projects make up a "sound basis from which to expand", the BWEA argue that a substantial step-up to at least six times the present national programme is now required.

The BWEA has a firm basis from which to argue for this investment. Worldwide interest in wind power is increasing, with many manufacturers having gained valuable experience in selling wind turbines to the Californian market. It is this experience, of installing large numbers of machines in a short time, with strong guarantees of reliability and performance, which is cited as a basis that large wind farms could, if ordered and installed now, provide electricity at a cheaper rate than any other form of power generation.

The BWEA belive that wind power has been misunderstood by those who ridicule it by questioning its ability to provide "firm" power. The report points out that the average wind speed over the country does change dramaticaly over short periods of time. It is highly unlikely that there would be a sudden becalming of the whole country, as wind travels with the weather, in fronts. A series of large wind parks would therefore smooth out any fluctuations. The BWEA do not see wind generation as the sole power source, but as part of a mixed energy economy.

With the increasing international interest in wind power, as shown at EWEC '86 (*SCRAM 56*), it is good to see this report coming from the UK, despite its obviously commercial influence. Wind power, both on and off-shore, in large and small scale, arguably provides the greatest potential for benign generating systems in the future.

* *The report: "Wind Power For The UK", is available from the BWEA, 4 Hamilton Place, London W1V 0BQ. Price £5.*

Appropriate Technology

Gas

SWEDEN SEEKS "DEEP" GAS

Vattenfall, the Swedish state power board, hopes that gas from a controversial test borehole in central Dalarna will replace the energy lost by closing down Sweden's nuclear installations.

If the borehole is successful, 800bn cubic metres of gas could provide most of Sweden's energy for the next few decades, allowing time for further research into renewable energy technologies.

In a national referendum in 1980, forced by massive public concern following the Three Mile Island accident, the Swedes voted to phase out all of their nuclear power by 2010. The Swedes, who have the world's highest energy consumption per capita, draw 42% of their electric energy from 12 nuclear reactors.

Exploration in the area was prompted by the "Deep Gas Theory" of Prof. Gold of Cornell University. Gold believes that the methane is not of biological origin, but was trapped under the mantle during the Earth's formation. The hole is being sunk in the area known as the "Siljan Ring", which is Europe's largest meteor crater. The theory is that the meteorite fractured the mantle, allowing gas to seep up to just below the surface, where it has collected under huge granite capping rocks.

Many geologists give little credence to the possibility of success: the geological conditions are not those usually associated with gas drilling projects. However, Dr. Gold's theories are supported by Mr. Hefner, head of the GHK companies who are undertaking the drilling: "I look at all the evidence and data collected by Vattenfall and they have every bit of positive information except sediments. I think it should be drilled ...."

Vattenfall is now committed to drilling the hole to a depth of 7.5km to incorporate Prof. Gold's supposed "interesting" depths of 5km and 7km. Problems were encounterd at 4km, when the borehole began to crumble. It is now necessary to use concrete to strengthen the hole. Although success in this venture is far from guaranteed, it has provided valuable hard rock drilling experience for geothermal and hot-rock technologies.

It is estimated that to drill to a depth of 7.5km will cost £15 million, of which 75% has been met by private investment. The managing director of Anathema, a private company with 10% interest in the drilling said "We need to drill more boreholes. Two boreholes is the minimum. That would cost £12 million, which is what the lunch coupons on a North Sea oil rig costs these days."

Succeed or fail, this is the kind of investment and pioneering spirit which is required to provide a solution to the world's energy problems.

Biomass

A biomass process being successfully used in County Antrim could, if widely applied, provide the current peat requirements for the whole of Ireland.

The new sophisticated plant, developed by Doctors Gornall and Wood, is being used at a large monastry farm in County Antrim. The process of mixed digestion uses two of agriculture's most noxious by-products: farm slurry and silage effluent. It converts them to a peat-like compost, which the farm sells for between £2000-£4000 per month; high energy gas, used to heat the farm and monastry valued at £1000 per month; and nitrogen-rich liquid fertilizer which is returned to the land. It is estimated that the plant, will have paid for itself in three years.

Although this innovative plant is in North Ireland, it has valuble implications for energy production in Eire. The Irish Electricity Supply Board uses peat in eleven of its power stations, to provide 14% of its electricity.

The process is reported to be capable of providing a perpetual substitute for the dwindling natural peat supply.

Insulation

1986: Monergy year, was marked more for its "breakfast briefing's" than its energy savings, when primary fuel consumption rose by 2.7%.

Only two of the thirteen years since the first energy crisis have registered a bigger increase.

According to Goverment figures, at least a 20% fuel saving could be made by a properly implemented Energy Efficiency Programme. Why then, with the Goverments "obvious" financial and technical expertise, have they slashed 20% from the home insulation scheme?

In October last year a group of seven charities, including Age Concern and Help the Aged wrote to Mr Peter Walker, the Minister for Energy, asking him to form an "active partnership" with them, to prepare for the winter. The Goverment promised them a reply, but has still not done so.

Mr Andrrew Warren, director of the Association for the Conservation of Energy, commented in December that this year's insulation grant budget had fallen from £35m two years ago to £24.5m. In the next financial year only £15m would be available to the 8 million people in receipt of benefit. At that level it would take 50 years to insulate every home.

Referring to the advertising campaign, Mr Walker stated "We have created the word 'monergy' to expose how a waste of energy, is a waste of money". Clearly Satchi & Satchi have been more successful at selling the word "monergy" to Mr Walker, than Mr Walker has been at implementing Energy Conservation for the nation.

Wind

WIND POWER FOR QUEEN MUM

The Queen Mother is reported to be planning to introduce wind power to her Caithness "home", the castle of Mey.

It is thought that her inspiration is the Burger hill wind station on Orkney, although economics may have played their part. If planning permission is given, then the Castle estate will be the second in Caithness to use wind turbines for private power generation. It is not known whether the estate plans to sell surplus electricity to the grid under the 1983 Energy Act.

The barren north of Scotland is ideally suited for many forms of appropriate technology. With the Royal Family's proven track record for trend setting, it is hoped that one spin-off of the Queen Mother's proposals will be to increase the use of wind generation in the area.

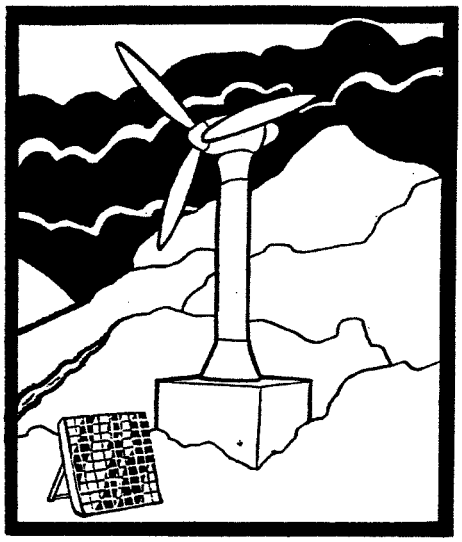
FLYWHEEL

Tests using a flywheel to remove fluctuations in the output of wind generators, have begun on a wind swept hill north of Newcastle.

The tests which involve a 400Wh flywheel, 60kW wind turbine and a 30kW diesel generator are being conducted by IRD, Bristol Polytechnic and BP. The system uses the variation wind speed, to produce a stable power output. When the wind is strong, excess power is transferred from the wind turbines to the flywheel, taking it to a maximum of 16000 rev/min.

When the wind drops, the flywheel will be able to supply up to 160kW for a few minutes to suplement the power from the wind turbine. If the site remains calm the flywheel will continue to supply power until the diesel generator can start.

Rayner Mayer of BP's engineering research branch thinks that this system will be of benefit to isolated communities or countries with a weak grid system.



WIND AND SOLAR COMBINE

GEC research and development has shown that hybrid power systems are more reliable and cost effective than extending the Grid in some remote areas.

A hybrid system requires fewer back-up batteries than a system only using only one type of power source. A system using a combination of photovoltaic and wind generators, would be of particular use at high altitudes. During the winter, when the amount of solar radiation is low, the available wind energy can be used to compensate this deficit.

GEC have developed a software package for assessing both the suitability of a site for hybrid systems and the output of each individual component. This will minimise the seasonal fluctuation in the power output.

Although the installation costs of diesel generators are lower than those for a hybrid system, fuel and maintenance costs are high. Over a twenty year life time, the hybrid is cheaper, as it requires little maintainance, and there are no fuel costs.

Conference

A conference, on the alternatives to a nuclear future, is to be held at the Centre for Energy Studies, Southbank Polytechnic, London, on the 28th, 29th and 30th of April. These dates have been chosen to follow the publication of the Layfield Report and to mark the anniversary of Chernobyl.

Among the many prominent speakers, who cover the full spectrum of energy, enviromentalism and political view points will be Clive Ponting, Dr Alice Stewart and a representative of the Swedish Energy Department.

For further details phone: 01-928 8989 Ext 2596.

D/H

THREAT TO DISTRICT HEAT?

A coal-fired district heating scheme in Penicuik, MidLothian, is threatened with closure by British Coal.

British Coal want to replace the scheme with individual coal fired central heating units, because the residents "don't get heat and have never got heat". The residents do not agree: one person said that he had always got heat and hot water "at the flick of a switch". Because the houses are built around the scheme, the replacement would severely intrude into their homes.

Although British Coal declined to say whether they had considered refurbishment as an alternative to closure, they have employed a consultant to look at the scheme's future. Neither BC, nor the District council, who would be responsible for making the final decision to close, would let SCRAM see the report.

Why is the scheme being threatened now, at a time when an Edinburgh-wide district heating scheme is on the cards, and why was it not shut earlier, if, as BC claim, it has never worked?

Reviews

Namibia: a Contract to Kill - the story of stolen uranium and the British nuclear programme by the Campaign Against the Namibian Uranium Contract (CANUC). 80pp, £1.25.
(Available from the Namibia Support Committee, PO Box 16, London NW5).

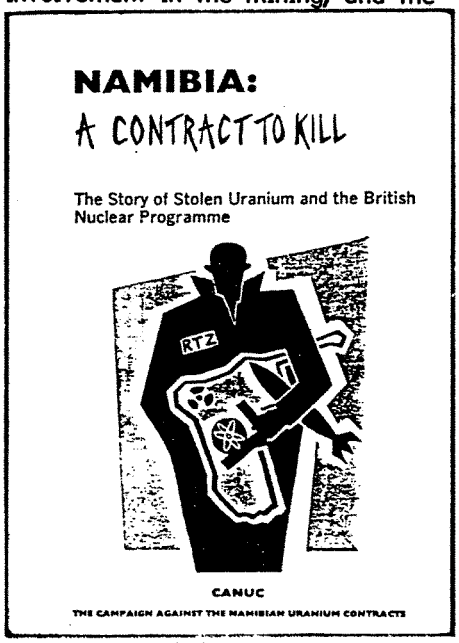
Electricity and Warheads: a guide to the French nuclear industry by Mary Davis; WISE Paris. 112pp, $7.75.
(Available from The French Project, PO Box 493, Northfield MN 55057, USA).

Both books throw light on the more obscure recesses of the nuclear fuel cycle, in which civil nuclear operations act as a cover for nuclear weapons production.

CANUC have written a comprehensive handbook for activists in a racy style. They describe RTZ's activities in Namibian uranium mining as organised crime. The lack of any rival gang leaves little room for suspense in an operation which has been sewn up from the start, with the complicity of the UK government. The first two chapters are devoted to the colonial conditions endured by the Namibian people. They condemn the illegal and opportunistic use which RTZ has made of the South African occupation of Namibia. (Mining and exploitation of other natural resources is outlawed by UN Decree number 1.

The third and fourth chapters painstakingly reveal the British government's attempts to obscure its complicity in the illegal uranium mining. Since there are no restrictions on the use to which this uranium can be put it is used in British nuclear weapons.

The final chapter assesses the campaign by CANUC and others against continued British involvement in the mining, and the



alliances which have been sought with the Labour Party, the trade unions and the peace movement. CANUC argue that a blockade on further imports of Namibian uranium is feasible and would not exact a heavy toll on jobs at BNFL since uranium imports can be re-sourced. Since it appears that the unions at BNFL Springfields are vetoing a blockade by TGWU members elsewhere, all that CANUC ask is that the Springfields branch lifts this veto.

This is a very useful book, successfully tying together several campaigning issues and introducing new material. My only quibble would be with the proof-reading.

Electricity and Warheads is a reference book for research into the French nuclear industry, providing exacting details on all the fuel cycle plants and reactors. It lists sources of information and company addresses, and has a good index with cross-references between the names of organisations and their acronyms (essential in this context). It is a very worthwhile investment for anyone who wants to follow the fortunes of the world leader in nuclear technology and its close links with the French nuclear defence establishment.

I doubt the comment on page 44 that the Comurhex plant at Pierrelatte is the only one "in the world converting reprocessed uranium", since BNFL also has capacity to do so: this might more correctly have referred to uranyl nitrate from high burn-up oxide fuel, which BNFL cannot handle. The list of sources omits refences on financial data other than company reports. There is also little mention of European Community sources. Nevertheless, this is a vital sourcebook and will be well-thumbed before it is superceded.

IAN LEVESON.

When the Wind Blows (PG). Dir. by Jimmy T. Murakami; A Meltdown Production. On general release (85 mins).

Arthur Koestler, in 1950, reportedly said that it is the little things that make up life.

Raymond Briggs has taken this as the starting point for his story of the nuclear holocaust. It begins with a view of the everyday life of Jim and Hilda Bloggs, retired to the country. Hilda is preoccupied with ordinary tasks - vaccuuming and washing dishes, cooking sausage and chips, brewing tea - while Jim takes a country bus to the public library to read the newspapers.

Slowly, Jim becomes aware of the worsening international situation, the imminent threat to National Security, and something called "MAD" - Mutually Assured Destruction. As he props up the doors and ponders on how to arrange them correctly at 60°, Hilda worries about scratches on the paintwork and dirt on one of her best cushions.

Jim wonders why the Authorities' directives for the safety of the population are contradictory; the Government and County Council guides on surviving a nuclear holocaust in simple stages do not always agree: should all materials be removed from the windows, or should they be covered with a sheet? If the inner refuge is constructed from doors, how can they remain closed against the spread of fire?

After the sudden blast and flash the house is wrecked, but that's not so bad, it's not the end of the world as Jim and Hilda are insured. There's nothing to be seen so the danger must be over, unless they drop another one. Fallout: that will be thick like snow, won't it? Only greyer. What better for you, if you are feeling ill after the shock from an explosion, than a drink of fresh rainwater and a stroll around the bomb burnt garden?

As Jim and Hilda physically deteriorate, they slowly realise that they have been struck a final blow. No more electricity, radio, TV, or milk deliveries. Sickness, nothing to drink. Do women go bald in real life? "The powers that be will get to us in the end."

After seeing this film you may wish to go with the first blast, as Jim and Hilda's son recommends, or be inspired to fight against the nuclear insanity.

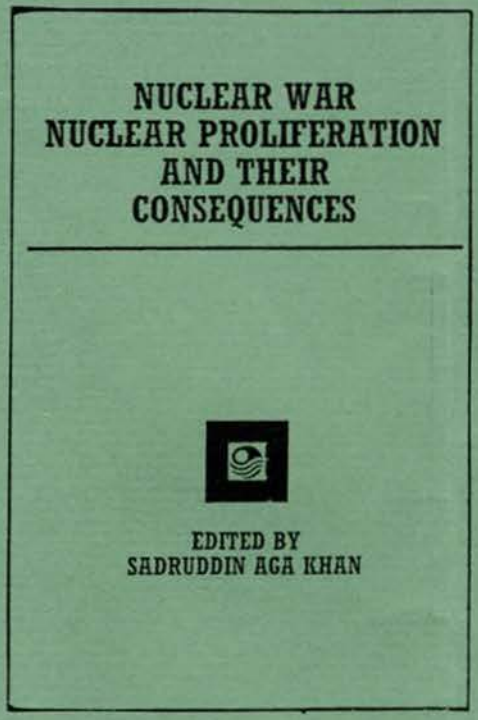
SARAH CANTELO

Nuclear War, Nuclear Proliferation and their Consequences, ed. Saruddin Aga Khan; Oxford University Press. 479pp, £12.50.

This book is the proceedings of a three day conference put on by the *Groupe de Bellerive* at Geneva in June 1985. The papers deal mostly with nuclear proliferation, and anyone interested in the subject should read them. The various authors express themselves clearly and do not use jargon. There are some diagrams explaining nuclear techniques.

There are two thoughts that always arise when examining the Nuclear Non Proliferation Treaty. The first is that no change in the Cold Warriors' arsenals is made, whether another nation rejects or goes all out for nuclear weapons. The second is that the clause in the Treaty which offers nuclear technology to countries rejecting nuclear weapons is self-defeating. As one speaker says, "It is as if a person who gives up smoking is offered a cigarette-making machine as a reward." And the International Atomic Energy Agency, whose main job is to make sure nuclear materials are not being diverted into weapons, has a remit to *encourage* the spread of nuclear technology.

There are newer developments in proliferation to look forward to, especially the plutonium economy described by Frank von Hippel and Michel de Perrot. Perrot envisages



a Europe co-operating to build fast breeders, producing plutonium both for other reactors and for Euro-bombs, thus further blurring the distinction between civil and military nuclear materials. In a flight of fancy he sees a Europe threatening to become a third super-power exerting pressure on the other two super-powers to cool it. Others of us will have glummer fantasies of an alliance between the military, nuclear consortia and a well-armed and over-informed nuclear police.

In his paper on reprocessing plants, Von Hippel says, "Already France and Britain are separating out of spent reactor fuel five tonnes of plutonium *each year*. . . By the year 2000 . . . reprocessing plants will have separated enough plutonium out of civilian nuclear power reactor fuel to make 50,000 nuclear weapons (pp81-84, his italics, though I would have put them in too.) He points out that with all that plutonium about, the time between the idea of a nuclear weapon and its existence wil be very short. The speed from decision to enactment is one of the horrors of modern warfare.

There's going to be an awful lot of plutonium, sailing from Britain and France to Japan under armed escort, and transported around Europe. It's going to be spread out in an accident or compressed into bombs by its legitimate owners or by hi-jackers. Sure as hell, it's going to come back to us.

R M BELL

Low-level Radiation: Questions and Answers by Patrick Green; FoE. 22pp, £1.50.

This is a pamphlet which is long overdue. SCRAM received many requests for information, as I am sure other organisations did, after Chernobyl; but we were unable to give immediate, simple answers.

Patrick Green's work is split into four sections: radioactivity, effects of ionising radiation, risk and radiological protection, and sources of exposure. There is a page of suggested further reading (which doesn't include the SCRAM Journal!)

The section on radioactivity answers the basic questions such as what is a half life? and what is an alpha particle? It also explains what a becquerel is - a favourite question during Chernobyl.

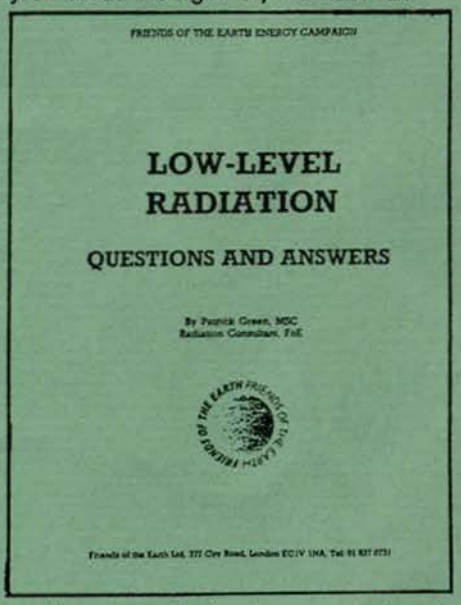
Effects of ionising radiation covers such things as penertrating power of the different particles, how the biological effects arise, radiation dose and the difficult area of trying to prove that a particular cancer was caused by a particular dose. The relationship between the new units (sieverts and grays) and the old ones (rads and rems) is clearly explained.

The third section looks at the different risk estimates used by the ICRP and the other bodies (eg the US Biological Effects of Ionising Radiation Committee and the UN Scientific Committee on the Biological Effects of Atomic Radiation). Patrick shows that these differences are important.

The final section includes the now topical subject of radon gas. Patrick points out that the nuclear industry use the existence of natural radon to justify their radioactive discharges, and argues that this is a "rather peculiar application of scientific logic since it assumes the existence of a threshold dose-equivalent ... which has never been demonstrated." He also says that, just because it is naturally occuring, there is no reason why we cannot or should not do anything about it. The solution requires a political will.

All in all a very useful pamphlet for the campaigner or member of the public with some knowledge of radiation, although it will probably be very confusing for someone with no prior knowledge. FoE is shortly to produce a broadsheet, "Ionising Radiation - a brief introduction", for newcomers.

I feel it would have been a good idea if there was an introduction to this pamphlet - it just dives straight in, without an



explanation of why it was produced, what it is for, or even what FoE is doing on the subject. But, these are minor complaints and are not meant to put you off.

STEVE MARTIN.

APPEAL

The *SCRAM* Anti-Nuclear & Safe Energy Journal is the only periodical dealing *specifically* with nuclear energy and appropriate technologies issues. Subscribers include members of Parliament, local authorities, the electricity industry, trade unions, environmentalists, and academics.

As well as producing the Journal, *SCRAM* is also involved in campaigns. Over the past couple of years we have worked on the Dounreay expansion; the aftermath of Chernobyl, low level radiation and monitoring; lobbying to change the nuclear policy of trade unions and political parties; the "phase out" campaign; and energy conservation and CHP. We also give talks to schools and interested bodies.

However, all this costs money. *SCRAM* relies for the most part on volunteers: we have only one, poorly paid, full time worker. Unfortunately, because of increased costs, we now have to put up the cover price to 60p and the ordinary annual sub up to £10 - the first increase for nearly three years. Other subscription rates have also been increased.

But, even with these new rates it will be hard to make ends meet. We need to raise at least an extra £5,000 this year. So, *SCRAM* is launching an APPEAL for funds.

Please, if you value the service which *SCRAM* provides, send us a donation - large or small. Or, if you prefer, fill out the Banker's Order form below and send it to us - it is a way to guarantee us a regular income, and enables us to budget better. Your help is essential.

THANK YOU VERY MUCH

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Return this form to:
SCRAM, 11 Forth Street, Edinburgh
EH1 3LE. Tel: 031 557 4283/4.

Little Black Rabbit has recently heard about mysterious railway rolling stock.

Some workers travel to and from Sellafield by train, and they always use the same two carriages. Nothing so strange about that you may think; maybe they like the comfortable seats. What is strange is that *only* Sellafield workers use these two carriages: they are padlocked after the workers disembark. At regular intervals the coaches are taken out of service for a while - for decontamination?

If these carriages are kept for Sellafield workers because they become contaminated with radioactive material escaping from the plant then it is right and proper that members of the public should not be exposed to this hazard. But, it raises two questions: are workers being exposed to radiation from the carriages, for which no monitoring is carried out; and is the segregation of these carriages a necessary measure to counter inadequate monitoring at the plant?

It is interesting to compare this practice with that at Dounreay, where workers use public buses on which detectable levels of radioactivity have been discovered. These same buses then take children to and from school.

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Why did BNFL build the SIXEP plant at Sellafield? You could be excused for thinking that the Site Ion-Exchange Effluent Plant was introduced in 1985 as part of BNFL's policy of reducing discharges, which is the reason they put forward at the time. There is another reason.

At an Institute of Mechanical Engineers meeting in Thurso on 12 February Mr M Howden of Sellafield revealed that the cost-benefit analysis carried out for the plant showed that it would only just break even. BNFL went ahead with it, however, for the express purpose of foiling a subsequent government's plans for halting reprocessing: cutting already "safe" discharges shows a willingness to respond to public pressure.

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Little Black Rabbit can only speculate why John Large, the independent nuclear consultant, was called back for a private session with the Energy Select Committee during their examination of Hinkley Point's stand pipe corrosion. The CEGB were not present for this evidence.

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So Torness is nearly finished? Then why are they still taking on "anyone who can turn a screw", according to LBR's sources?