THE SAFE ENERGY JOURNAL

SCRAM

No.74 December '89/January '90 £1.00

Hinkley through the looking glass

World warms to nuclear power

Radioactive consultation

The 'light' green alternative

Jam tomorrow

Technology for tomorrow

Atoms in Wonderland

COMMENT

SPONTANEOUS celebrations taking place in Somerset, Suffolk and Gwynedd may, unfortunately, prove to be premature. The Government insist they "remain committed to a strong nuclear component". The decision "does not mean that nuclear power is to be phased out".

The combination of privatisation and nuclear economics may have proven to be explosive, but the nuclear industry will use the next five years "to look at other options than replicating Sizewell" and develop the next generation of nukes which they will promote as the answer to acid rain and global warming - the so-called 'Safe Integral Reactor'. The UKAEA have already announced their intention to build a prototype at their Winfrith site in Dorset.

BRITISH NUCLEAR FUELS will shortly publish their feasibility study looking at options for the replacement of their reactors at Calder Hall, near Sellafield, and Chapelcross, near Dumfries. Both sites produce plutonium for Britain's nuclear weapons, and the Scottish site has the added honour of producing tritium to improve their explosive yield. Whatever the Department of Energy decides about the civil nuclear programme, the military will still want their plutonium fix.

In October the Secretary of State for Scotland gave outline planning permission for the fast reactor reprocessing plant (EDRP) at Dounreay in the far north of Scotland. Although it doesn't seem very likely that EDRP will ever be built, it will only take a small revival in the fortunes of fast reactors, eg. massive subsidies from the French and Japanese Governments, for such a plant to get back on the agenda.

WHATEVER happens to nuclear power in future, we still have the waste they have already created to deal with. Dounreay and Sellafield are both in line to become, what the Americans would call "a National Sacrifice Zone". The science behind current assessments of repository safety is so full of holes that no-one can be certain the waste will stay put until radioactive decay renders it 'safe'.

Pro-nuclear to the core, the SSEB are refusing to release 300 acres of land at Chapeldonnan in Ayrshire, where they have planning permission for a new nuclear station - essentially sterilising the land in an unemployment blackspot.

NOW IS NOT the time for anti-nuclear campaigners to give up and go home. If nothing else, we must campaign for a sane energy policy. Currently the Government spends about £16 million a year on researching alternative energy sources, while they spend at least ten times that on nuclear fission alone. Will they re-direct the nuclear budget? We suspect not. They have already reduced the Energy Efficiency Office's budget this year in real terms, despite Thatcher's rhetoric about global warming.

This may all sound rather depressing, but coming back down to earth after winning a battle often is. It is to everyone's credit that the Government has been forced to admit a temporary defeat. But pro-nuclear forces will be regrouping in the hope of finding a much depleted anti-nuclear movement in 5 years time.

On a more optimistic note, the last word in this editorial belongs to 'Power in Europe', the Financial Times Newsletter, to whom we owe a great deal for publicising many embarrassing leaks during the run up to privatisation: "It might be arguable that the decision is not intended to cause the phase out of UK nuclear power. Whatever the intention, however, that will be its effect."

The **SCRAM Safe Energy Journal** is produced bi-monthly for the British Anti-Nuclear and Safe Energy movements by the **Scottish Campaign to Resist the Atomic Menace (SCRAM)**. Views expressed in articles appearing in this journal are not necessarily those of SCRAM.

CONTRIBUTIONS

We welcome contributions of articles, news, letters, graphics and photographs, which should be sent to SCRAM at the address below.

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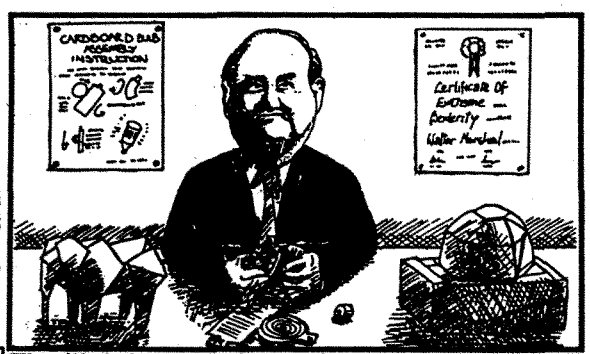
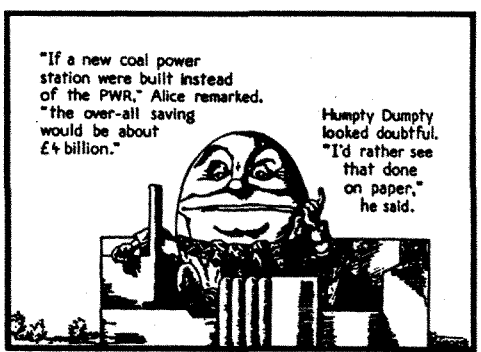


Dennis Martin

☐ The 'light' green alternative



Terry Mulvihill

☐ Atoms in Wonderland

Dennis Martin

☐ Front cover

Hinkley hangover

JOHN WAKEHAM, Secretary of State for Energy, announced on 9 November that nuclear power was not to be included in the Government's privatisation plans for the electricity industry after all.

He also cast a shadow of doubt over the whole future of the nuclear programme when he said "the non-fossil obligation will be set at a level which can be satisfied without the construction of new nuclear stations beyond Sizewell B." Objectors, however, were shocked to learn that the CEGB had decided to press ahead with their application for consent to build a PWR at Hinkley Point in Somerset.

They had been expecting the CEGB to withdraw their applications for all three of the planned PWRs, leaving Sizewell B, which is already under construction, as the only member of the 'small family'. The Board, however, only withdrew their applications for Wylfa B and Sizewell C.

Christopher Wilcock, of the Department of Energy, wrote to the Hinkley Point C Inquiry to clarify the Government's position. In his letter he said "investment approval would not be given for new nuclear power stations beyond Sizewell B. That will remain the case at least until the review of the prospects for nuclear power in 1994."

When the Inquiry resumed on 21 November, after several postponements, Lord Silsoe, the CEGB's QC explained that "the availability of Consent [for Hinkley Point C] would be of great value ... to the review which is foreseen in 1994."

Jonathan Milner, on behalf of the Consortium of Opposing Local Authorities, called the CEGB's position "completely untenable ... any continuation would purely amount to a face saving exercise."

It is extremely unlikely that Britain would go for the same (Sizewell B-type) Westinghouse 4-loop PWR design if, after 1994, it made the decision to re- start the nuclear programme. Even John Collier, chairman designate of the new state-owned nuclear company, says "the pause allows us to look at other options than replicating Sizewell." So, it is difficult to understand why the CEGB want to proceed with the Hinkley Inquiry. Power in Europe, the Financial Times Business Newsletter, offers this explanation: "either the last few years have taught the CEGB nothing, or else someone is attempting a rather elaborate and expensive practical joke." □

Sizewell doomed?

FOLLOWING Wakeham's speech, the wisdom of continuing with the construction of Sizewell B has become a hot debating issue. Most commentators predict its inevitable demise. Opponents have shown that it is not only uneconomic, at a cost to the nation of around £1 million a day over its 35 year life, but it is also totally unnecessary.

New estimates, calculated by Gordon MacKerron, an Energy Analyst at Sussex University, for FoE, Greenpeace and the Council for the Protection of Rural England (CPRE), show that Sizewell B is now so expensive that the excess cost of building and running it, compared with a gas-fired alternative, would be up to £362 million per year. This money could pay for energy efficiency measures which would save as much electricity as Sizewell B could generate, and reduce consumers' bills at the same time.

MacKerron's figures take account of the fact that Sizewell B will now be even more expensive than the higher cost announced before the postponement of the Hinkley Inquiry, because of the need to load all of the costs of the PWR programme onto one station.

Sizewell was originally put forward as the least cost option. However, three factors have worsened the economics since the project was first proposed:-

1) Its capital costs have risen by 25% after inflation, even before it was clear the other PWRs would not go ahead.

2) Fossil fuel prices have fallen in real terms.

3) The cost of capital has risen from 5% to 8% in the public sector, and National Power are to use 10% in the private sector.

Using the cost of capital endorsed by National Power, ie. a 10% real rate of return, MacKerron calculates that the cost of electricity from a combined cycle gas turbine would be between 2.25p and 2.5p per kWh. On the other hand Sizewell generated electricity will cost between 5.5p and 8p per kWh. At the CEGB's expected rate of performance Sizewell will generate just over 6.5TWh per year. Hence, using very conservative assumptions, MacKerron calculates the cost of pursuing Sizewell over its 35 year life to be between £1.75 billion and £3.2 billion.

The three opposition groups conclude: "The message is clear: Sizewell B's construction should be halted now and the site restored. The massive resources saved should be pumped into an ambitious energy efficiency programme to reduce the environmental impact of electricity generation."

It is clear that there is no conventional economic case for proceeding with Sizewell B. Earth Resources Research (ERR), therefore rushed out a report* which asks the question 'Do other means exist to meet the predicted demand for capacity by the year 1994, when Sizewell is currently expected to meet its design performance?'

ERR conclude that in the short-term electricity requirements could be met by developments already taking place. The Scottish Boards are already expected to upgrade the interconnector with England so that they can export 1GW extra. ERR estimate that around 10GW of combined cycle gas-turbine plant have already been mooted, (National Power and PowerGen have already applied for planning permission for 2.5GW) yet for the purposes of this analysis they assume that only 4GW are installed by 1995.

In the longer term a modest programme of energy efficiency and load management would be required. Recent research by ERR indicates the potential for a 20% reduction in electricity demand by the year 2005 as opposed to the 25% increase in demand by the same date according to a 'business as usual approach'.

Given the development of technologies such as load switching (whereby a signal is sent through the mains which turns off equipment, as agreed by consumers, at times of peak load), it seems reasonable to expect the potential for load management to increase.

ERR conclude that the demand for electricity up to the end of the century could easily be met without commissioning Sizewell B.

The question that many MPs must be asking themselves is 'why didn't the Sizewell Inquiry report find against approving the station, if it has become such an economic disaster less than 3 years later?' □

*** "A Reappraisal of the Capacity Requirement for Sizewell B in the Light of Recent Developments." Jackson & Sweet. ERR 258 Pentonville Road, London, N1 9JY.**

Torness a £2,500 million mistake

IN THE WAKE of the Energy Secretary's announcement came the admission from the Scottish Office that Torness, which was officially opened in May by the Prime Minister, was a £2,500 million mistake and should never have been built.

The two Scottish AGRs at Hunterston and Torness along with the Hunterston A Magnox station will now remain in the public sector. The remaining debt incurred in building them - almost £3,000 million - will have to be written off.

In the same way that the Department of Energy appear to be disclaiming responsibility for nuclear power, and are making Walter Marshall the 'fall guy,' the Scottish Office are letting it be known that they now regard Donald Miller, SSEB Chairman as having a far too blinkered pro-nuclear view.

Meanwhile Torness has other problems. Reactor 1, which has been operating at half power, will be in hibernation for at least four weeks this winter, and reactor 2 will follow its lead.

The reason is the perennial problem of refuelling. The machine which is supposed to allow on-line refuelling, and hence to make Torness more economic to run than earlier AGRs, has yet to pass the industry's standard tests. The cost of replacing the lost output of each of the reactors has been estimated by the SSEB at £30,000 per day. □

Chernobyl legacy again

A SCOTTISH OFFICE sponsored radioactivity survey* has revealed some disturbing new 'hot spots' from Chernobyl, including "a previously unidentified area of heavy contamination" at Glen Spean, near Fort William, and plutonium contamination near Helmsdale, 30 miles south of Dounreay.

The survey, carried out by the Institute of Terrestrial Ecology (ITE), was designed to complement the 1986 survey of Scotland carried out in the immediate aftermath of Chernobyl. That survey looked at only 79 sites, with none in Orkney or the Hebridean Islands. This latest project took samples in June 1987 from double the number of sites and covered all Scottish Regions.

Caesium-134 (Cs-134) contamination from Chernobyl was particularly high in soils from Shetland, parts of the central and southern Highlands and south west Scotland. "Exceptionally high levels of activity (more than 4kBq/m2) occurred in Glen Spean, around Aberfoyle, in Glentrool Forest, and along the south coast of Galloway."

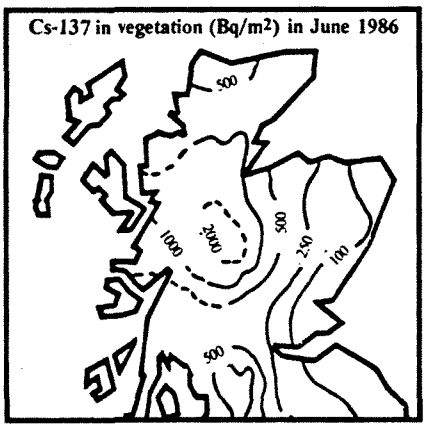
Similarly, "some exceptionally large values [of Cs-137] were recorded - more than 20kBq/m2 in Glen Spean and Glen Trool, and around 15kBq/m2 near Aberfoyle and in south Galloway."

In vegetation there was "an outstandingly large count of 1833 Bq/kg from Glen Spean" for Cs-134 and "a remarkable count of 4972 Bq/kg" for Cs-137. High levels were also recorded in North Uist, near Callander and in Arran.

The report's authors conclude a "previously unidentified area of heavy contamination has been located" with a "major deposition of radiocaesium at the eastern end of Glen Spean in the Central Highlands".

The survey has shown that the uptake of radiocaesium by grassy vegetation is "ten times greater on peaty soils than it is on mineral soils". The authors also point to the need for more information on the movement of radiocaesium through the upland ecosystem and into the human food chain.

ITE were not required to address the radiological implications of their data. The Scottish Office, however, admitted that "a number of the measurements of caesium nuclides are close to, or . . . in excess of the GDL". The Generalised Derived Limit (GDL) is the activity which could give rise to the maximum permissible dose, given reasonable assumptions about diet, and radionuclides in the environment are supposed to warrant further investigation if they reach 25% of the GDL. Nevertheless



Lord James Douglas-Hamilton, Scottish Office Minister for the Environment expects "the public will be reassured by the results of this research".

One area which suffered high depositions of caesium from Chernobyl was Shetland. Of the seven samples taken on the Islands the highest was from Hillswick which registered 12kBq/m2 of Cs-137 in soil. Local farmer, Mike Williamson collected samples of his cows' milk to be analysed for caesium between February 1987 and April 1988. By April 1988 the caesium level had dropped to 1.7Bq/ltr. At that time the Department of Agriculture and Fisheries for Scotland said it wasn't worth continuing the checks. Mr Williamson had not been informed about the radiation in the soil on his farm and could not understand "why it is not reflected in the milk". The question is if the Cs-137 level in the soil was 12,000 Bq/m2 in June 1987, what was the level 1 year earlier immediately after Chernobyl, and how close was it to the level of 35,000 Bq/m2 when milk from that farm should have been banned?

The ITE survey also looked at plutonium contamination. With the clear exception of one site, the main source of plutonium was fallout from nuclear bomb tests. However, at the site near Helmsdale, the ratio between the different plutonium isotopes found was "strongly indicative of pollution with the by-products of fuel reprocessing".

Similar plutonium has been found in barley on the north coast of Caithness and is thought to have been transferred onto the land by sea spray. However, the Helmsdale site is 4km inland and may be too far from the sea for there to have been significant transfer by wind-blown spray. The authors conclude "this site and surrounding area, may warrant further investigation". The Scottish Office have, in fact, asked ITE to return to Helmsdale.

In 1986 the UKAEA sponsored a study into the incidence of leukaemia in Caithness and Sutherland, which revealed that in the area around Helmsdale four children had died from the disease between 1958 and 1982, when only one death would have been expected.

The UKAEA say "it is unlikely that this (plutonium) could have come from Dounreay". Penny Boyle of the Caithness-based Nuclear Reprocessing Concern Group said, this "suggests the possibility of an exposure route which has not been identified up until now". □

*** "Radioactivity in Scottish Soils and Grassy Vegetation" by Miller et al. ITE Banchory Research Station.**

Waste flask contamination

RADIOACTIVE contamination discovered at Fairlie station, where spent fuel flasks from Hunterston are transferred to flat bed railway trucks which take them to Sellafield, has led to calls for the removal of the contaminated ballast and more frequent and extensive monitoring.

Although the SSEB declined to allow monitoring of the fuel flasks, the lifting crane or the flat bed railway truck, they permitted samples of track ballast to be removed for laboratory analysis. The radioactive ballast was discovered by Strathclyde's Regional Chemist's Department.

Caesium-137 levels were 30 times greater than the highest post-Chernobyl concentrations found in Strathclyde soils and 100 times the average level. The Regional Chemist concludes: "Levels of activity by conventional standards do not appear to pose a serious hazard to members of the public". However, Ayrshire Radiation Monitoring Group (ARM) say the levels are "unacceptably high in an area which is relatively insecure as regards access by children and animals".

ARM point out that when similar levels were discovered at Bridgwater railway sidings near Hinkley Point, in Somerset, the CEGB removed the ballast and agreed to monitoring every 6 months with officials from the Department of Environmental Health, British Rail and the CEGB. ARM want the contaminated ballast removed and more frequent monitoring to be carried out at Fairlie, preferably including monitoring of the flasks and flat bed trucks.

The SSEB say that although the station "is neither widely contaminated, nor occupied full time, and despite the improbable nature of the health hazard which would arise from consuming quantities of grit, the SSEB would remove grit which recorded activities greater than 4Bq/cm2, in accordance with its long standing good neighbour policy." The contamination recorded with hand held equipment was equivalent to about this level, yet at the time of going to press no grit had been removed.

■ Meanwhile, the Scottish Radiation Monitoring Groups have formed a federation to enable resources and expertise to be pooled, and to establish standard procedures.

Federation co-ordinator Alan Richards, from the Radioactive Pollution Survey for Wigtownshire, said it is "clear that they have lied for years about the real costs of nuclear power. People are determined to show how much has been covered up about . . . the effects of radioactivity upon us and our environment." □

US waste mess

THE OPENING of the Waste Isolation Pilot Plant (WIPP), in New Mexico, has been delayed yet again (SCRAM 72). The underground facility designed to test disposal methods for transuranic and defence mixed waste is considered essential for national security. Originally scheduled to open in October 1988, the plant is not expected to open before July 1990.

The US Department of Energy (DoE) was surprised by strong public opposition to WIPP, at public hearings held in seven states during May, June and July. Focusing on the many unresolved problems with the site, not least of which is that brine has been discovered seeping into the repository, the opposition has forced the delay.

More than 1,000 people gave evidence at the hearings on the draft supplemental environmental impact statement. The vast majority stressed the need for WIPP to meet standards set by the Environmental Protection Agency, to comply with other environmental laws, and to ensure safe transportation of wastes through more than 20 States.

This latest delay has prompted a White House search for interim storage sites for the waste generated at DoE's Rocky Flats plutonium trigger facility. That site will reach its waste storage limit by February. Idaho Governor, Cecil Andrus, has refused to allow any more waste into the State to be stored at the National Engineering Laboratory. Colorado Governor, Roy Romer, has said he will not allow Rocky Flats to continue operating unless other storage sites are found by March. The DoE are now desperately looking for interim storage sites. One option is to farm the waste out to seven different States.

■ Meanwhile, Secretary of Energy, James Watkins, has announced a two year moratorium on exploratory shaft work at Yucca Mountain, the proposed high level waste repository in Nevada. Part of the problem for the DoE is the refusal of the State to grant air quality and water permits.

Yucca Mountain project manager, Carl Gertz, says "should the State still refuse to issue appropriate permits, then the department must initiate litigation procedures and/or propose legislation that would enable the field studies to begin".

Nevada's reluctance to issue the required permits has "emasculated" the DoE's plans, according to Watkins. He says that it would take 2,000 government lawyers working four years to litigate against the State.

The moratorium follows a series of startling revelations about the ability of the Yucca Mountain to safely isolate high-level waste.

John Trapp, a geologist with the Nuclear Regulatory Commission, believes the likelihood of volcanic activity during the dump's first 10,000 years is so high that "this is not the site at which we should be trying to license the first high level radioactive waste repository".

This echoes what DoE geologist Jerry Syzmanski said two years ago, about earthquakes at Yucca Mountain: "serious consideration should be given to abandoning Yucca Mountain".

Despite these serious blows to the programme, support in Congress has not waned - representatives know that the revival of the nuclear industry depends on opening a dump, and if that dump isn't in Nevada it might be in their State. □

High level waste disposal 'safe'

A SIX YEAR safety assessment, sponsored by the European Commission, has found "no reasonable doubts about the safe disposal of vitrified high level radioactive waste".

The Performance Assessment of Geological Isolation Systems (PAGIS) is the first multinational attempt to get to grips with the high level waste (HLW) problem. PAGIS evaluated the radiological impact of disposal in clay, granite, salt and beneath the seabed. The project looked at 10 potentially favourable sites.

According to a report in the November issue of Atom, the Journal of the UKAEA, "None of the scenarios showed any release to man and the environment over extremely long periods".

The largest suitable clay deposits occur in France, Denmark and West Germany. PAGIS concluded that "a clay formation could ensure long term safety". Belgium expects to open its first industrial site for HLW in 2001 in a clay deposit.

Suitable granite formations are located principally in France, West Germany, Spain, Scotland, Cornwall and northern England. Calculations for the study site in France showed "no significant radioactivity is expected to reach man in less than one million years after disposal".

Salt formations which are potentially suitable for HLW disposal are widespread in the EEC. The study site was the salt dome at Gorleben in West Germany. The assessment concluded that "waste would be contained in a dry environment within a salt dome" for millions of years until eventually dissolved by brine. (The salt formation in New Mexico where WIPP has been built has been described as "one of the driest places on earth" - yet it is already leaking brine.)

The map printed by Atom shows a dozen or so salt domes in southern Scotland between Edinburgh and Glasgow. However, these turned out to be a printing error. A spokesperson for the European Commission said "some dust grains during the printing process of the PAGIS report are probably responsible" □

The other nuclear cycle

SCOTLAND Against Nuclear Dumping (SAND) are organising a sponsored cycle ride between the two potential dump sites. It will start from Sellafield on 21 June 1990 and arrive at Dounreay on June 30. Cyclists will travel via Glasgow (23rd), Edinburgh (24th), Perth (25th), through the Grampians to Inverness (27th), and on to Dounreay. SAND are looking for cyclists, local organisers, a cook and a van.

Contact: Jo Angus 06803-300418
Sue Bradshaw 06516-745 □

Caithness 'No!' to Nirex waste dump

ANTI-DUMPERS in Caithness were jubilant after the results of the referendum on plans for a low and intermediate nuclear waste repository at Dounreay were announced.

The referendum, conducted by the Electoral Reform Society on behalf of Caithness District Council, showed that 74% of the voters were opposed to Nirex's plans. Caithness Against Nuclear Dumping spokesperson said "The time has come for Nirex to get out and stay out".

Nirex, however, have no intention of getting out. Spokesperson Liz Morgan- Lewis said the result "confirmed. . . there was a significant measure of support in Caithness for the proposal".

The UKAEA, acting as agents for Nirex, are awaiting a decision by the Secretary of State for Scotland on whether he will overturn Highland Regional Council's refusal to grant planning permission for test boreholes. □

Sellafield test bore problem

WORK ON the first of the two test boreholes at Sellafield has been abandoned because of drilling difficulties. The drilling, being carried out by BNFL on behalf of Nirex, is to assess the suitability of the local geology for the burial of low and intermediate level nuclear waste. The first borehole did not reach its planned depth. A replacement will now have to be drilled a few hundred yards away, provided planning permission can be obtained.

Dounreay chimaera

British Nuclear Fuels and the UKAEA have been granted outline planning permission to build the European Demonstration Fast Reactor Reprocessing Plant (EDRP), at Dounreay, by the Secretary of State for Scotland, Malcolm Rifkind, despite doubts that it will ever be built.

At the time of the original application, in 1985, it was expected that up to three demonstration commercial fast reactors would be built - in France, West Germany and the UK. However, the industry now only expect to build a single demonstration reactor (EFR). They are hoping to begin construction in 1997.

"Even this programme will require reprocessing facilities on a larger scale than can be accomodated in existing prototype fast reactor reprocessing plants," according to the November issue of AEA Times, "the recycling of fast reactor fuel on a commercial scale, will certainly be needed, although on a longer timescale than originally envisaged."

Kerr MacGregor, Scottish National Party Energy Spokesperson, echoed opponents feelings saying "it is highly improbable that the EDRP will ever be built in Caithness." He also expressed suspicions that the timing of the announcement had something to do with influencing voters in the run-up to the referendum on nuclear dumping (see p4). "It is no accident," he alleges, "that after waiting for almost two years, he [Malcom Rifkind] chose to announce his decision just when the people of Caithness were going to the polls. . . the EDRP bait was being dangled in a bid to persuade [them] to take the nuclear rubbish which nobody else wants."

At peak capacity, EDRP is designed to treat between 60 and 80 tonnes of highly radioactive spent plutonium fuel, which would have to be transported to Dounreay from Europe. As many as 200 aircraft movements would be required to return the plutonium dioxide powder to fuel fabrication plants.

The International Atomic Energy Agency (IAEA) have the job of regulating the safety of the flasks used to transport the plutonium and to detect any diversions of material from facilities or during transit. Jonathan Spink of the European Proliferation Information Centre (EPIC) says "there is a real possibility of diversion of separated plutonium during transit. . . progress on the international security regulations is poor."

Lower standards

Flights of reprocessed plutonium from Prestwick Airport to Japan have now been virtually ruled out, because of US regulations on transport safety (SCRAM 73). IAEA regulations are not nearly so stringent. Although currently under review, they are only expected to require a flask to withstand an impact test at 85 metres per second. The US regulations require an impact test at 129 metres per second.

If EDRP does go-ahead "shipments of plutonium through the skies of Britain and Europe will take place using casks which in the US would be prohibeted by law," concludes councillor Ian Leitch, chair of the Nuclear Free Local Authorities.

Opponents of the EDRP plan were also angered by Malcolm Rifkind's disregard for evidence of a raised incidence of leukaemia among young people living near Dounreay. "What exactly do these people want?" asked Lorraine Mann of Rosshire Against Dounreay Expansion, "There are children who are seriously ill. There are children who are dying."

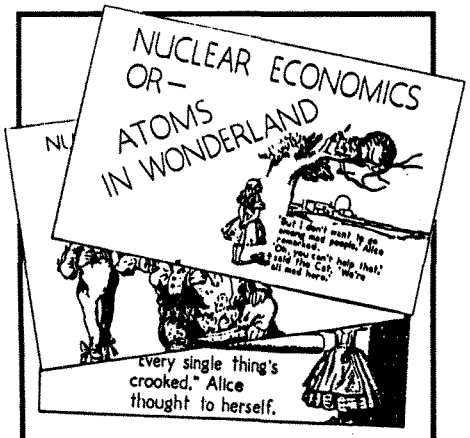
The EDRP Inquiry Reporter (Inspector in England and Wales) recommended, in 1987, that no decision should be taken until the Committee on Medical Aspects of Radiation in the Environment (COMARE) had published their report on the high incidence of leukaemia near Dounreay. Their report was published in June 1988, and concluded that the evidence "tends to support the hypothesis that some feature" of the reprocessing plants at Dounreay and Sellafield was causing an "increased risk of leukaemia in young people living in the vicinity of those plants." The Committee recommended that further investigations be carried out.

The Secretary of State, however, "has noted that neither the COMARE report nor the evidence submitted to the inquiry was able to demonstrate a causal link between the operations at DNE (Dounreay Nuclear Establishment) and the raised incidence of leukaemia in Thurso." Rifkind therefore decided that "it is of great importance that these further studies should be completed [but] there is no evidence that the operation of EDRP would lead to an increased incidence of leukaemia."

Orkney and Shetland Islands Councils have both announced their intention to appeal against the Secretary of State's decision.

The prototype fast reactor is scheduled to close in 1994, and its associated reprocessing plant three years later, as a result of cuts in funding by the Government. The UKAEA, however, are hoping to win a stay of execution by securing funding from Europe and Japan. □

● We still have some copies of "Dounreay Expansion: The Case Against" written by SCRAM for Nuclear Free Zones Scotland. 70p + 25p p&p.



Sets of 12 post cards "Nuclear Economics - Atoms in Wonderland" by Terry Mulvihill (several of the illustrations appear in this journal), are available at £2 per set from:

Stop Hinkley Expansion (SHE), Hockpitt Farm, Nether Stowey, Bridgwater, Somerset.

Nuclear Power - Planning for Emergencies

". . . a serious loss-of-coolant is practically impossible."

(Mr B A Semenov, the Russian Head of the Department of Nuclear Energy and Safety at the International Atomic Energy Agency, discussing the Chernobyl plant in June 1983.)

A National Conference

Tuesday March 6th, 1990 - The Mechanics Institute, Manchester

For more details contact:

Nuclear Policy and Information Unit, (NP-PE Conference), Manchester City Council, Town Hall, Manchester M60 2LA

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Objectors were astonished to learn that the CEGB is pressing ahead with its application to build a PWR at Hinkley Point - even though the Government have made it clear no new nuclear power stations will be sanctioned for at least five years. As we go to press the Public Inquiry is struggling on to the bitter end. JAMES GARRETT, a freelance journalist based in Bristol has followed the exhaustive hearings over the last 15 months.

Hinkley through the looking glass

HINKLEY POINT C nuclear power station has been revealed as a white elephant, as its 23,500 registered objectors have always maintained it to be, in what has been a spectacular justification of the Public Inquiry system.

As the 15 month-long public inquiry drew to a close, it became increasingly clear that Britain's second pressurised water reactor (PWR) would never be built. Two other PWRs, Wylfa B in Anglesey and Sizewell C in Suffolk, have been officially scrapped. Ironically, this devastating blow to Britain's nuclear industry - one from which it is unlikely to recover - has been dealt not by the thousands of objectors, but by the Government's traditional allies in the 'City', fuelled by information from the inquiry.

Alarmed by reports of the cost of both construction and electricity output spiralling out of control, potential investors in the privatised electricity industry told the Government they wanted nothing to do with nuclear power. The Government has been forced to bow to the pressure.

More conventional opponents of nuclear power are delighted that the predictions they had been making since the start of the Public Inquiry, on October 4 1988, have been proved correct. "However, the scale of our vindication comes as a surprise. In fact it's mind-boggling", said Danielle Grunberg, joint co-ordinator of Stop Hinkley Expansion (SHE), the umbrella group for small groups and individual objectors.

Opponents of Hinkley Point C have been fortunate in that the inquiry has run in tandem with the electricity privatisation programme. The Government's energy policy and National Power's plans for a third nuclear power station on the Somerset coast have therefore been subjected to close scrutiny by the City and Parliament.

Rising cost

The prospect of Hinkley Point C being cancelled began to loom just as the hearings in the Somerset College of Agriculture, Cannington, were due to end in September. Brian George, National Power's PWR programme director, announced that the cost of building the first PWR, at Sizewell, had already risen by 10%, adding an extra £169 million to the final bill. Hinkley Point C would probably cost 3-4% more, said Mr George, although he wasn't in a position to "quote hard figures".

The inquiry inspector, Michael Barnes QC, adjourned the inquiry for six weeks and demanded answers to a number of detailed questions about the implications for Hinkley Point C of the cost escalation.

Mr George provided a 12 page statement for the inquiry when it resumed, for a further fortnight, in early November. However, he prefaced it by saying, "I must emphasise that both the review of the Sizewell B estimated cost to completion and the preparation of the final estimate for Hinkley Point C are not complete." Objectors were angry at the prospect of further cost increases being revealed once the inquiry had finished, too late for them to comment.

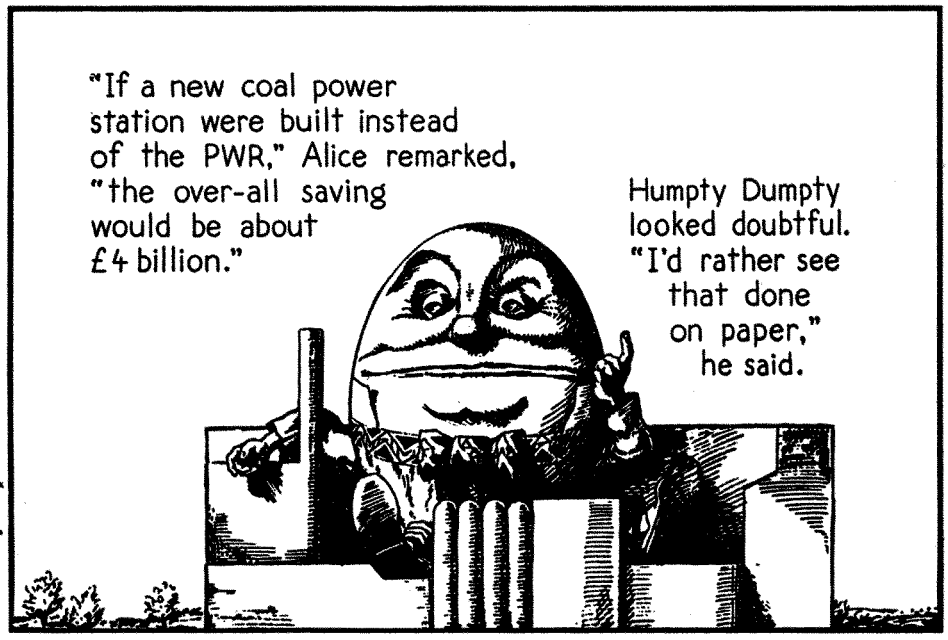
The Council for the Protection of Rural England (CPRE), which always insisted that National Power's cost estimates were too low, accused it of having a "hopelessly flawed" approach to nuclear power station planning and building. Robin Grove-White and Gordon McKerron for the CPRE told the inspector, "there are likely to be no economic or 'security of supply' benefits from Hinkley C, sufficient to outweigh its far-reaching environmental impacts."

Leaking

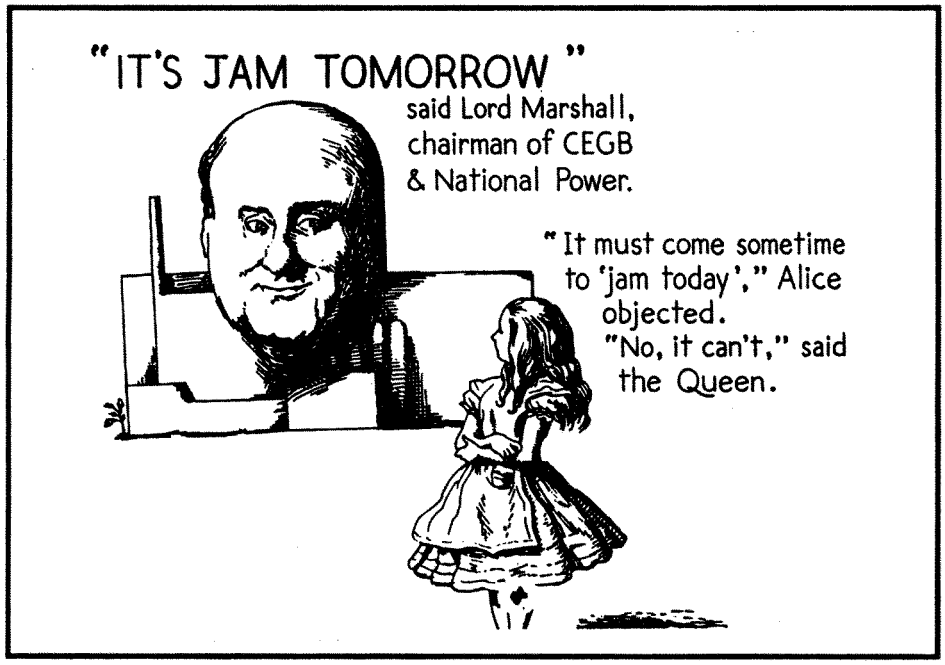
As if National Power's plans were not in 3enough trouble, there was a further flurry of the leaked documents, which have characterised the privatisation of electricity, claiming that the cost of electricity from Hinkley was likely to be far more than National Power had told the inquiry. It had reportedly issued private estimates that electricity from PWRs would cost between eight and ten pence per kilowatt hour (kWh). The inquiry had been told it would cost 2.2p/kWh.

In addition, the cost of dismantling existing reactors has risen from 3 billion, an estimate given by former Energy Secretary Cecil Parkinson, to around 15 billion - the cost of the entire electricity industry, under the privatisation proposals.

National Power had not had such a bad time at the Inquiry since December '88, when it was forced to admit that it would be cheaper to build a new



Cartoons by Terry Mulvihill



coal-fired power station than Hinkley Point C. But worse was to come - in the form of Energy Secretary John Wakeham's statement to the Commons that Hinkley C wasn't needed, and money to build it wouldn't be made available.

Economic arguments tended to dominate the Inquiry, partly because of the privatisation debate, partly because National Power's figures would not stand up to close scrutiny.

However, nearly half the Inquiry was spent examining issues such as safety, the transportation and management of waste and local matters. As the first nuclear power station to be proposed following the Chernobyl disaster, Hinkley Point C was the centre of considerable argument over safety issues.

Further risks

The Consortium of Local Authorities (COLA) opposing Hinkley Point C, said the PWR "has the potential to cause a catastrophe involving hundreds of thousands of people." They highlighted a build up of radioactivity in Bridgwater Bay and linked it to the four nuclear reactors already in operation at Hinkley Point. That meant, said COLA, that the public faced increased exposure to radiation.

Another risk which COLA accused the Board of ignoring was that of an aircraft crashing into the power station. Just one and a half miles away from the power station site is the Lilstock military bombing range. On one occasion the hearings had to be suspended as jet bombers heading for the range flew low over the inquiry hall.

The 24 local authorities making up the consortium, mostly from the West Country and Wales, also criticised the lack of co- ordinated emergency planning. Current plans were, they argued, "fragmented and there is no overall co-ordinating body", even though it was three years since the Chernobyl accident. Inquiry inspector Michael Barnes decided to visit Chernobyl, causing civil servants at the Department of Energy and National Power officials to raise their eyebrows. His reaction won't be known until he publishes his report.

Call for coal

Numerous cheaper, safer alternatives to Hinkley Point C were proposed. The Coalfields Communities Campaign and the National Union of Mineworkers urged National Power to invest in new coal-fired plant fitted with the latest filters to cleanse smokestack emissions. Susan Hickey, of the Bonneville Power Administration in the USA, told the inquiry that energy conservation actually worked, making investment in Hinkley Point C unnecessary.

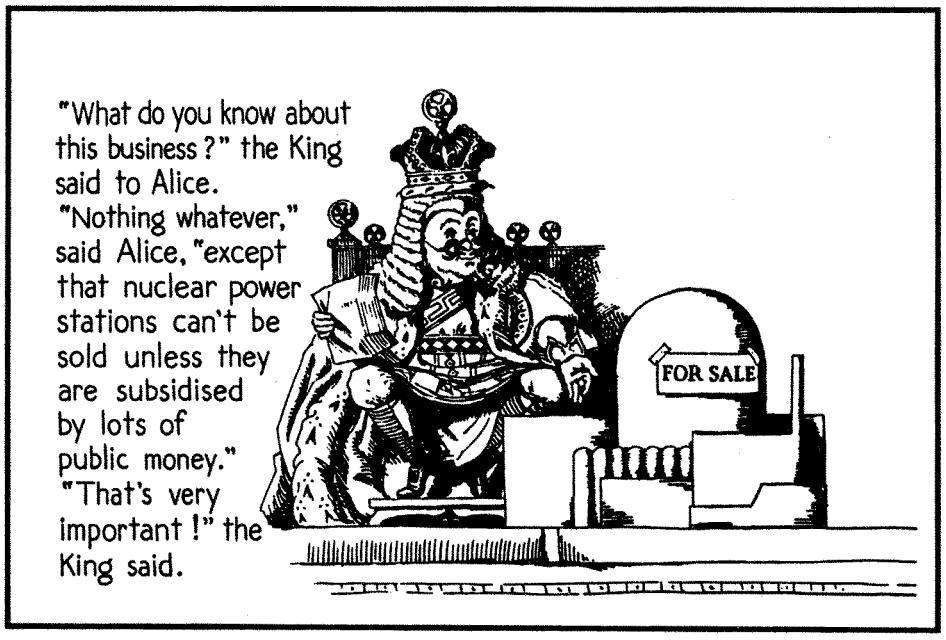
In the north-western USA two planned PWRs lie half-built, never to be commissioned. A further six have been cancelled, and several coal-fired stations will also never be built. "We pay people to save instead", she said. "We pay 85% of insulation costs. In one experiment, we spent $700 million and saved 220 megawatts, equivalent to a small coal plant." It was an argument which had National Power baffled. Its only response was that it was the government's responsibility to promote energy conservation, not that of the energy producer.

Renewables

Donald Swift-Hook, the CEGB's former head of research into wind energy, argued in favour of greater investment in renewable energy forms, as did numerous private objectors.

The Public Inquiry dragged on for nearly another month after Mr Wakeham's statement to Parliament. National Power said it still wanted to apply for permission to build Hinkley C at some stage in the future, after the review in 1994 promised by the Secretary of State.

However, a General Election will have to be called before then, which raises the prospect of a change of government. No Party, other than the Conservatives, is committed to nuclear power; so there may not be any review. And opponents of Hinkley C believe that, in any case, there is no possibility of the Inspector or the Secretary of State approving the application anyway. The statement that there is no need or funding for Hinkley C is taken by many objectors as the final decision, delivered a few months early. □



Global warming and its possible consequences is one of today's most pressing environmental issues. It has been eagerly siezed upon by those who seek to restore the tarnished image of the nuclear industry. Dr NIGEL MORTIMER, an energy consultant and Senior Lecturer in Minerals and Resource Economics at Sheffield Polytechnic, examines the nuclear panacea and finds it notably lacking.

World warms to nuclear power

SPEAKING on B.B.C. television a year ago the then Secretary of State for the Environment, Nicholas Ridley, stated that, "There is absolutely no doubt that if you want to arrest the Greenhouse Effect you should concentrate on a massive increase in nuclear generating capacity. Nuclear power stations give out no sulphur and carbon dioxide, so they are the cleanest form of power generation". Despite subsequent qualifications to these views, it is obvious that Mr Ridley was acting as the stalking horse for a Prime Minister and a Government that clearly favour nuclear power. Those responsible for the public relations campaigns of the nuclear and related industries have taken a more subtle, yet no less emotive approach.

Faced with a widening gulf between image and reality over nuclear economics, safety, radiation hazards, nuclear weapons proliferation, decommissioning and waste disposal; the greenhouse effect and global warming has provided a welcome lifeline for beleaguered public relations staff. In expensive double-spread advertisements, British Nuclear Fuels plc proclaim, "The Greenhouse Effect. We have the power to prevent it" and nuclear power is portrayed as "a source of clean energy for the future". Mindful of rules governing factual content in advertising and wary of an audience that has become better informed through bitter experience: National Power, one of the intended successors to the Central Electricity Generating Board, explains in its recent publicity that, "Although not implicated in either the greenhouse effect or acid rain, nuclear power generation does, of course, present its own set of environmental concerns". Thus, the basic concept of nuclear power as our only saviour from the threat of global warming is gradually being introduced to a public disenchanted with the nuclear industry yet eager for simple solutions to world problems.

Nuclear panacea

This strategy of persuasion is not new. It is familiar to those who have taken part in the debate over energy policy in the UK, in recent decades. Nuclear power has been heralded as the only solution to fuel shortages during the 1960's and to rising fuel prices and fears of fossil fuel resource depletion in the 1970's. As was pointed out by the more rational and independent analysts of the time, such problems could not be solved by expanding nuclear power. Instead, other factors, such as cheap oil imports during the 1960's, and the development of cheap natural gas supplies and oil production from the North Sea, coupled with improvements in energy efficiency during the 1970's, proved to be considerably more influential than nuclear power.

However, those who realised this and dissented against the popular image of the nuclear panacea were dismissed and labelled as anti-nuclear heretics. Undoubtedly, the same fate awaits those who are questioning the latest excuse for committing yet more scarce resources to the development of nuclear power. Some, such as Dr Bill Keepin and Dr Greg Kats, have already demonstrated that the rapid expansion of nuclear power on a global scale is impractical and that more effective options are available to control carbon dioxide emissions (Ref. 1).

Despite such efforts, two fundamental questions which are central to the whole debate about nuclear power and global warming remained unanswered. These were, "Does nuclear power contribute to carbon dioxide emissions?" and "Can nuclear power provide a realistic long-term solution to global warming?". In order to answer these two questions, Friends of the Earth commissioned a study begun in January '89 which resulted in evidence being presented to the Hinkley Point "C" Pressurised Water Reactor (PWR) public inquiry in July (Ref. 2).

In order to answer the first question, it is important to realise that all activities currently result in the emission of the greenhouse gas carbon dioxide due to the combustion of fossil fuels, either directly in the activity itself or indirectly during the provision of goods and services consumed by the activity. Hence, although nuclear power does not emit carbon dioxide directly, associated emissions occur due to fossil fuel combustion during the construction of the power sta tion, the manufacture of components and the operation of the nuclear fuel cycle.

Energy analysis

Using appropriately adjusted results obtained from studies involving a technique known as energy analysis, preliminary estimates of the effective release of carbon dioxide were derived for a selection of energy technologies and energy efficiency measures. Results, showing the average annual amount of carbon dioxide emitted for a given amount of electricity, either generated or saved, equivalent to the lifetime output of a 1,000 MW PWR (171TWh), are summarised in Figure 1. The relative contributions to current carbon dioxide emissions from a typical PWR

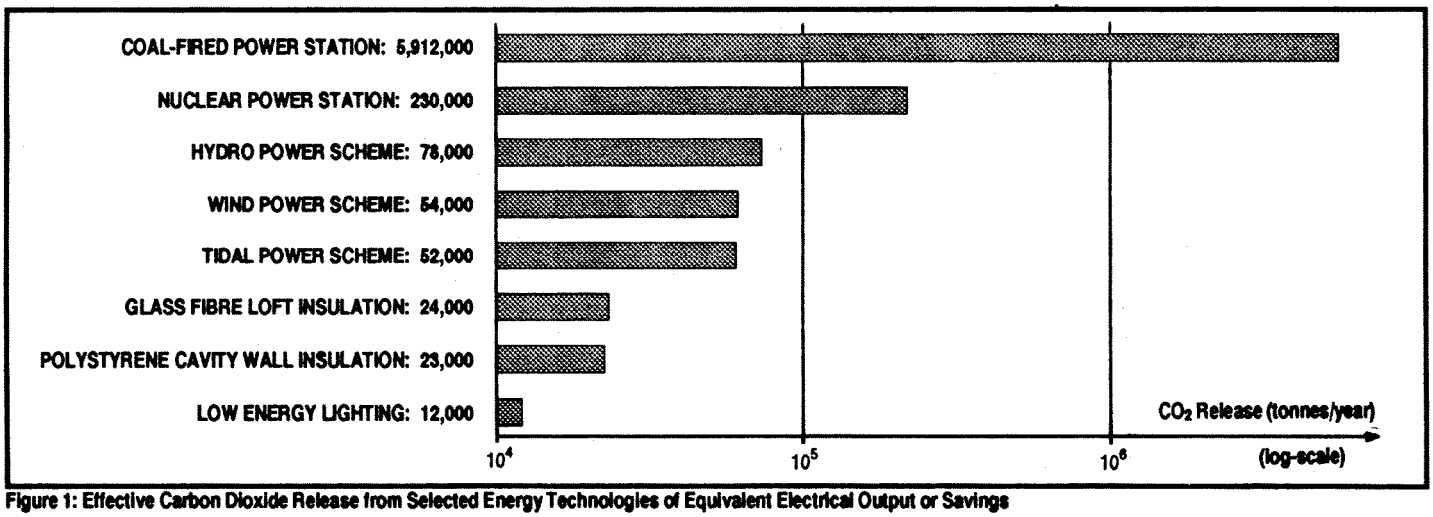


Figure 1: Effective Carbon Dioxide Release from Selected Energy Technologies of Equivalent Electrical Output or Savings

and associated fuel cycle over its entire 35 year life are illustrated in Fig. 2.

The results clearly indicate that the selected renewable energy technologies and energy efficiency measures release considerably less carbon dioxide than currently-operating PWR nuclear power stations. However, nuclear power does, at the moment, offer dramatic reductions in carbon dioxide emissions over electricity generation from conventional coal-fired power stations. Even greater savings might seem possible when it is realised that the bulk of carbon dioxide emissions associated with nuclear power at present arise from fossil fuel-fired power stations that are providing the majority of electricity used in uranium fuel enrichment.

Such enrichment is mainly achieved using the gas diffusion method which will eventually be replaced by much more efficient techniques which include the gas centrifuge method. If this occurs and all the electricity used for construction, manufacturing and fuel cycle operation, including enrichment, is provided solely by nuclear power stations then the carbon dioxide emissions from nuclear power might be reduced from the present average figure of about 230,000 tonnes per year to approximately 21,000 tonnes per year. This estimate can be taken as representative of the ultimate nuclear power system, based on existing technology, which provides electricity for all needs.

Long-term solution?

Given time to achieve all the necessary requirements, such a system would seem to offer an attractive solution to carbon dioxide emissions and subsequent global warming. However, at this point, it is essential to consider the second fundamental question which asks whether nuclear power is a long-term solution. A key concern in the world supplied by electricity entirely generated by nuclear power would be the adequacy of uranium resources. Although there is currently a glut of uranium on world markets due to slack demand in the nuclear industry, high quality uranium resources in known deposits are relatively limited. The quality of uranium resources can largely be characterised by the percentage uranium content in the ore, referred to as the ore grade. As the ore grade falls, the amount of energy used in ore mining and processing rises, and, hence, the amount of carbon dioxide released by burning fossil fuels in non-electrical applications should be expected to increase. The likely variation of carbon dioxide emissions with uranium ore grade is illustrated in Figure 3. The bands shown in this diagram indicate the range of uncertainty and differences in assumptions used in the calculations. However, it can be seen that the relationship between carbon dioxide emissions and uranium ore grade is quite strong and, it is particularly apparent that, if the ore grade falls to anything less than 0.01% uranium oxide then the nuclear power system could release as much carbon dioxide as fossil fuel-fired power stations. This ore grade can be regarded as a limit to the use of nuclear power as a solution to global warming.

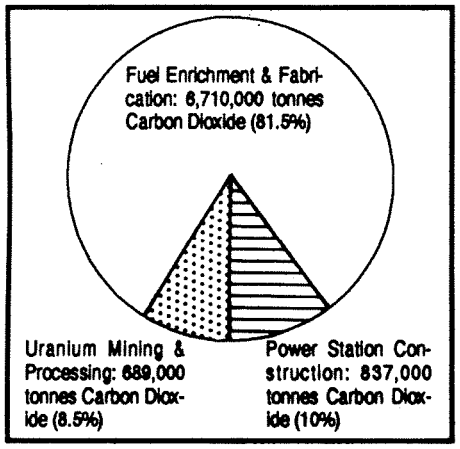


Figure 2: Contributions to Carbon Dioxide Emisions over the life of a Typical PWR Nuclear Power Station

Limited resources

The imposition of such a limit restricts known resources for nuclear power in the western world to just under 6,000,000 tonnes of recoverable uranium. Such resources could sustain the current modest nuclear generating capacity, which accounts for only 10% of total installed output worldwide, for about 150 years. However, it is implicit within the case for nuclear power, as well as in the above calculations, that nuclear generating capacity would have to grow rapidly and eventually provide all our electricity requirements in order to make any noticeable contribution to carbon dioxide abatement. Limited high quality uranium resources undermine the ability of nuclear power to achieve this, since a resource of 6,000,000 tonnes of uranium would only be able to support a world generating capacity solely based on nuclear power for no more than approximately 23 years. Hence, nuclear power, incorporating existing technology, does not provide a sustainable solution to carbon dioxide emissions and global warming.

But what of fast breeder reactor technology which is considerably more efficient in its use of uranium? This, as the United Kingdom Atomic Energy Authority has already noted (Ref. 3), is vital to any case for nuclear power. However, such a case must be set in context of what is practical in the foreseeable future and the likely timescale of global warming. Present consensus suggests that realistic solutions to carbon dioxide emissions must be implemented within the next 30 to 50 years to reduce the impact of global warming.

The possibility of introducing a massive worldwide programme of fast breeder reactors within such a timescale would depend on many technical factors. However, leaving these to one side, the essential considerations are the availability of plutonium and the system doubling time, which is the time taken to provide sufficient plutonium, in the form of usable fuel,

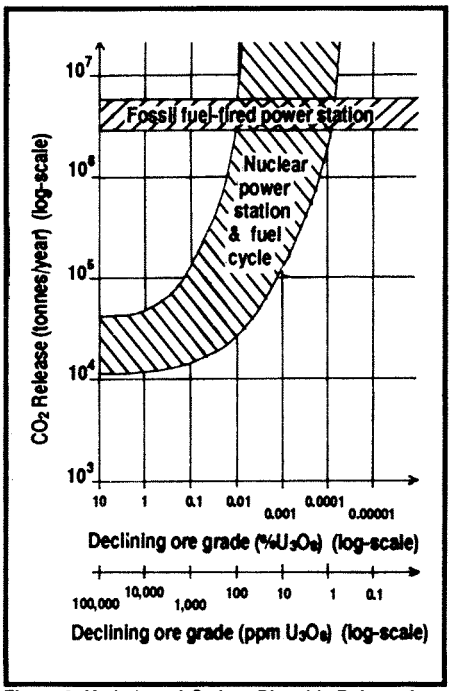


Figure 3: Variation of Carbon Dioxoide Release from Nuclear Power with Ore Grade

for a new fast breeder reactor from the blanket of an existing fast breeder reactor. In this context, nuclear power based on fast breeder technology could only be regarded as a realistic and sustainable solution to global warming if short system doubling times, of the order of 13 years, could be achieved now. Since system doubling times currently exceed 20 years, such a target is clearly well beyond present capabilities.

Any serious examination of nuclear power will conclude that this technology has only a very limited role to play in countering global warming. Other options, including fuel switching and the use of renewable sources of energy, are currently available to provide realistic means of reducing carbon dioxide emissions. The most important options, however, consist of energy efficiency measures which can be introduced quickly and can achieve sustainable savings from a huge diversity of applications in a cost-effective manner. In the fight against global warming, the priorities for action are clear (Ref. 4). Unfortunately, we still run the risk of having attention and scarce national resources diverted - by the illusions on offer from nuclear power - away from the practical strategies that could be adopted and implemented now. □

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Radioactive consultation

Major amendments to the 1960 Radioactive Substances Act have been proposed by the Government in a document published in May '89. Yet, evidence suggests, few people in industry and local government have seen or even heard of the proposals, which will affect the way radioactive discharges from non-nuclear sites are authorised.

PATRICK GREEN, Friends of the Earth's Radiation Consultant, argues that the changes are a case of too little too late. Giving Pollution Inspectors extra powers is very laudable, but not much help if they don't have the resources to use them.

THE nuclear industry is not the only radioactive polluter of the environment (SCRAM 65 & 73). In the UK some 1600 non-nuclear sites are authorised to discharge radioactivity into the environment on a routine basis, as regular readers of SCRAM will be aware. However, little or no information about these discharges or their environmental impact is publicly available. The 1960 Radioactive Substances Act (RA 1960) makes it a criminal offence to disclose such information. It is now 29 years since the Act came into being, yet only recently has the Government recognised that the Act needs amending.

In the last issue of SCRAM it was revealed that the DOE recently issued a consultation document proposing a number of amendments to the RA 1960, which are expected to be incorporated into the Government's Green Bill. They included:

(1) Removal of crown immunity under the Act, except for the MOD.

(2) Local Authorities to set up a public register of authorisations issued under the Act.

(3) Regulatory departments and Local Auth- orities to have powers to disclose details of contaminated land.

(4) Wider powers for Inspectors.

(5) Operators to be made liable for costs of administering the Act.

Further concern

While these proposals are a vindication of the Friends of the Earth (FoE) campaign and are to be welcomed, they do not answer all FoE's concerns over radioactive discharges from non-nuclear sites. In many ways what has not been said in the consultation document is as significant, if not more so, than the actual proposals. With this in mind one is entitled to ask: how serious are the Government about controlling radioactive pollution? Taken at face value, the document could be a case of too little too late.

Efficient regulation of pollution of any type is not brought about by legislation alone. There must be a genuine commitment to tackle the problems. Unfortunately, it is in this respect that the Government's stance must be directly questioned: the problems with RA 1960 stem from inadequate legislation coupled with an unwillingness to tackle the real problems.

One of the main problems has been that pollution inspectors have not had the powers, or resources, to force compliance with the Act, particularly regarding crown premises, such as hospitals. While the consultation paper has partly addressed this issue, by giving inspectors new powers and removing crown immunity, nothing has been said about resources or the number of inspectors. At present HM Inspectorate of Pollution (HMIP) has 22 principle inspectors in England and Wales responsible for radioactive substances and 5 senior inspectors, including the chief inspector. Consequently, each inspector is responsible for, on average, 568 premises.

Inadequate inspection

The target inspection rate is to visit all authorised premises every nine months. In reality, most premises are only inspected, on average, once every two years or less. Such an inspection rate is unlikely to ensure compliance in keeping discharges down - it does not matter if inspectors are to be given new powers to order drastic changes in the way an operation is conducted, because without regular inspections breaches of the law are unlikely to be discovered.

[The Scottish equivalent to HMIP is HM Industrial Pollution Inspectorate (HMIPI), who have a staff of 20, including 13 inspectors. However, owing to the secrecy surrounding the activities of HMIPI, it is not possible to estimate the number of sites they cover.]

The question of resources is equally relevant to organisations such as the many hospitals authorised to discharge radioactivity. The removal of crown immunity is not sufficient to ensure higher standards of pollution control within the health service. Additional resources must be made available, otherwise meeting higher standards of pollution control from existing budgets can only mean that patient care suffers.

The Department of Environment consultation paper proposes that local authorities should establish a public register of authorisations under the Act. This will only detail the amount of radioactivity that companies are allowed to discharge. It will not give details of the actual amounts discharged, or state whether anyone is exposed to radiation as a result. Nor will it identify whether radioactivity is accumulating in the environment, as is the case on the River Thames where the thyroid glands of swans are contaminated as a result of hospital discharges. To

provide such information, a detailed programme of radiation monitoring of the local environment is required.

At present, most of the non-nuclear sites do not carry out any radiation monitoring of the environment (although some may monitor at the point of discharge). Worse still, HMIP does not monitor around these sites either.

In 1987, 27 years after the Act was introduced, ICI was awarded a DoE contract to undertake a monitoring programme in the vicinity of 'selected' premises. So far this data has not been published. Significantly, the consultation paper does not discuss monitoring of discharges. The Government should make radiation monitoring a statutory requirement. Perhaps industry has complained that this would be too expensive to implement, or perhaps the Government fear what monitoring may discover.

Contamination disclosure

Apart from hospitals and factories, exposure to radioactivity may also arise from contaminated land sites. The consultation paper proposes that HMIP should have powers to force disclosure that land is contaminated. In other words for the first time they will be allowed to publicly state that land is contaminated. While this is an improvement, nothing has been said about who is responsible for cleaning up the contamination. FoE's experience of contaminated land shows that this is totally insufficient. Under the present proposals it is literally up to the owners of the land if they want to clean it up or not.

Obviously, some companies will undertake a rigorous programme of decontamination which puts safety first. A good example is the operation at the former Laporte Site in Ilford, Essex (SCRAM 65) which, as a result of FoE involvement, is being decontaminated to a standard higher than that required by the law.

However, not all companies display such responsible attitudes. Some in fact, by their failure to take action, show their complete contempt for the safety of the local residents.

For instance, FoE recently learnt of another similar site which is in Hounslow, London. The difference this time is that no authorisation has been issued under the RA 1960 for the site, although the owners, the local authority, plan to sell it for development. In fact, HMIP have decided that no authorisation is required. This site is also next to a housing estate. Over 50% of the site is contaminated with radium, on average to about 20 times background levels. Hotspots up to 170 times background have been identified. The response of the local authority to FoE concerns has been to weld shut the gates, which were previously open, although nothing is to be done about the perimeter fence which is badly damaged.

The authority hopes to sell the site to a property developer before christmas, who have no decontamination plans before they develop the site as an industrial estate. This is clearly unacceptable but, perfectly legal.

'Polluter pays'

Giving HMIP powers to disclose that land is contaminated is not going to force such site owners to act in a responsible manner. The consultation paper talks of the 'polluter pays' principle, but only in connection with recovering the costs of administering the Act. The "polluter pays" principle should mean exactly that.

The proposals in the consultation paper are an obvious improvement on the Act as it currently stands. However, they are still insufficient to ensure efficient regulation of discharges from non-nuclear sites. If the Government is serious about amending the Act the following changes should also be made:

(1) Any information about particular authorisation should be available on demand. The right to know must be incorporated into law. Section 13 of the RA 1960 must be repealed.

(2) Holders of authorisations must undertake a monitoring programme of their discharges. This information must be published annually.

(3) There must be independent verification of this monitoring data.

(4) HMIP must assess the total environmental impact of all authorisations in an area, and not consider them in isolation.

(5) Producers must have absolute liability for their waste and should be responsible for any environmental damage (the 'polluter pays' principle). This includes contaminated land.

(6) Discharges should be limited by the use of the best available technology, that is all discharges must be as low as technically achievable.

(7) Where public exposure as a result of any discharge of radioactivity cannot be kept beneath acceptable levels then the activity must cease. Coupled with this requirement, all exposures must be justified. Again if organisations cannot justify their need to discharge waste then the activity must cease.

(8) All authorisations must be available for public comment and should not be issued until the waste producer has demonstrated that systems exist to manage the waste safely in an environmentally responsible manner.

(9) HMIP must be given sufficient powers and staff to enforce the Act. Heavy penalties must be used for breaches of authorised limits or for situations where gross environmental pollution results.

Responsibility

Some may argue that these demands are unreasonable. However, such statements beg a fundamental question. Namely, what price public safety? If industry and the medical establishment are going to use radioactivity, and there is no doubt that radioactivity is a useful tool, they must manage the waste responsibly.

The Government through the consultation paper has acknowledged that the current level of regulation of radioactive pollution from non- nuclear sites is inadequate.

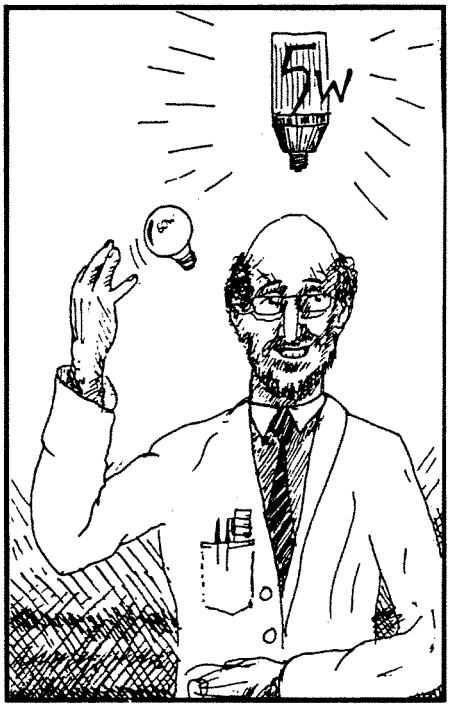
However, the current proposals are not sufficiently far reaching. Unless they are coupled with a real financial commitment to control radioactive pollution, the Government's statement on controlling radioactive pollution cannot be taken seriously. and are not worth the paper they are written on. Underneath the green gloss it seems little is changing. □

Former Laporte site in Ilford, Essex

Photo: Friends of the Earth

What, where and why? DAVID OLIVIER* gives consumers the information they need on energy efficient lighting, which could lead to massive reductions in greenhouse gas emissions and radioactive waste production.

The 'Light' Green Alternative



UK DOMESTIC lighting, alone, produces 7 million tons of carbon dioxide a year. At 50p a 100 watt bulb may seem cheap, but during its brief life it will require 100 kilowatt-hours of electricity to power it, costing over £6.

In the home, we really should throw away our ancient incandescent bulbs and use eco-friendly compact fluorescents. But, what type should you buy from the confusing range of lamps on offer, and where, indeed, can you find them?

The Philips SL compact fluorescents have been around since 1980. They are large heavy objects that unsuccessfully try to imitate an ordinary light bulb. They have a pinkish light, a faint annoying flicker, and take ages to reach full brightness: I wouldn't want one in my living room. Nor can the Thorn 2D really be recommended. Its serpentine shape is best hidden by a huge paper globe, though it can be a losing struggle to coax it through the hole at the top; thus losing in practicality what it gains in aesthetics.

Flicker 'n' hum

Fluorescent lamps with electronic ballasts are a newer development. They use a high frequency oscillator to control the current rather than a simple, but bulky, coil of copper wire. The high frequency means they come on after about half a second, without the normal hiccups, and do not flicker or hum. These more recent fluorescents have a warm 'yellow' light, a reasonable imitation of incandescent colouring, weigh less, and are 25-35% more efficient than lamps with the older types of ballast. They are also more tolerant of repeated starts, so it is probably worth switching them off if you leave a room for over 10-15 minutes.

The 16, 24 and 32 watt Wotan Circolux 'bulbs' have been around since 1984, although you could be forgiven for not knowing. Concealed behind shallow ceiling lampshades, which they generally fit, they are pleasant and serviceable. The only problem is the bulk of the bulb. It is a 200 mm wide circular loop of fluorescent tube, with the electronics and bayonet cap or screw fitting in the middle, and fits few paper globes or table lamps.

The Wotan Dulux EL and rival equivalents, launched in late 1986 and 1987, are a further advance. The stick-shaped lamps do not fit really shallow shades, and like other compact fluorescents so far, they cannot be dimmed. But in other applications, they provide any light output you are likely to want, matching incandescent bulbs which use 5-5.5 times more electricity.

Eventually, after a long life, you must discard the whole unit, ballast and all. Separate electronic ballasts would make more long-term sense, because they should last 5-10 times longer than the tubes. Dimming ballasts would be even better. However, though the big firms happily sell you 5, 7, 9 and 11W tubes, the only source I have found of matching electronic ballasts for domestic use is a small Swiss firm, Jurg Nigg.

Value for money

Despite the present price tag, and annoying limitations, even the compact fluorescents with built-in electronic ballasts are tremendous value for money.

Consider a 26W fluorescent bulb replacing a 150 W incandescent bulb. Over an 8,000 hour lifetime, it consumes 208 kilowatt-hours of electricity. So, the 'life cycle' cost of bulb plus electricity is about £29. Incandescent bulbs last typically 1,000 hours, so in 8,000 hours I would have to buy eight bulbs and 1,200 kilowatt-hours of electricity. The 'life cycle' cost is about £80.

Calculations for lower-powered lamps show about a 50% saving. Replacing all those incandescent bulbs by compact fluorescents reduces your total lighting costs by typically 50%, and as much as 65%! In a year, replacing a 100W bulb that's on day and night in a dark hall by a 18W fluorescent saves over £30, i.e. twice the cost of the fluorescent bulb. Even the government makes a profit, as it levies VAT on energy-efficient lighting equipment but not electricity.

What's more, over its 8,000 hour lifetime, this one light bulb avoids the production of about 20 cm^3 of high and low-level radioactive waste, if it displaces nuclear power, or over 100 kilograms of carbon dioxide, in the case of coal-generated electricity.

LIFE CYCLE COST OVER 8,000 HOURS

	Incandescent Bulb (150W)	Compact Fluorescent (electronic ballast, 26W)
Bulbs:	eight at 54p £4.32	one at £15.52
Electricity:	1,200 kWh £75.60	208kWh £13.10
TOTAL	£79.92	£28.62
SAVING		£51.30 (65%)

NOTE: Recommended trade prices for bulbs, including VAT.

If we all gain, why are these bulbs so badly marketed to ordinary mortals? John Lewis, BHS and other High Street retailers have massive displays featuring over 300 incandescent bulbs and about 3 fluorescents. In each store, a dozen compact fluorescent bulbs sit forlornly in their packets on the bottom shelf, despite the fact that the rest of the store is 99% fluorescent lit. The best display of Philips SL's is not in a retail store but along the tunnels of the London Underground Circle Line.

And, why is more advanced technology not promoted at all? The above are all lamps with conventional ballasts. These should really have been superseded by the electronic ones long ago. In England, only the Ryness chain of shops, and electrical wholesalers on industrial estates, seem to stock the electronic versions. The sales pitch is dismal and doesn't spell out the monetary savings, the environmental benefits or the better 'quality' of light compared to lamps using the older ballasts.

There is more than a suspicion that the lighting manufacturers are dragging their heels in design work and in promoting this technology to householders. This also happened in the USA until the government took the initiative.

Aesthetics

Europe is dominated by a few large manufacturers; Philips, Siemens ('Wotan' here), GTE Sylvania, Thorn/EMI and GEC. They have developed fluorescent tubes in large sizes for offices and design has concentrated on giving the maximum amount of light without much thought for the aesthetic shape of the bulb. The commercial market is quite big enough to make a good living without indulging in new design work or running down incandescent bulb factories.

People are extremely fussy with regards to lighting in homes, pubs and restaurants. This has not been lost on those who market the incandescent bulb, they are happy to supply all kinds of elegantly sculpted bulb profiles. Philips have begun producing antique carbon filament bulbs again, for those ultra-fussy people with Edwardian interiors. Perhaps it is time for designers to come up with a whole range of elegant energy-efficient lampshades to go with the lamps.

In the USA, things are more advanced. General Electric have even managed to double the output of normal incandescent bulbs by coating them with the same infra-red reflective coating that is used on low-loss windows. It lets the light out, but reflects the heat back onto the filament to keep it hot. These bulbs are expected to go into production later this year.

US lighting has been revolutionised by the intervention of the government and the regulators of the electricity utilities. Ten years ago, there was no interest among the big manufacturers in developing an electronic ballast, even though the benefits were obvious. They couldn't be bothered. The US Department of Energy then gave grants to some small companies to do the work. Only in 1984, when a large food company offered massive finance to those backyard inventors, were the traditional manufacturers frightened into action.

Today there are millions of electronic ballasts at work in the USA, and the most energy-wasting ballasts have been made illegal. This is saving the output of several large power stations. Researchers estimate that government intervention pushed the technology forward by 5-10 years.

Least cost planning

As many readers will know, US electricity is mostly sold by small private and municipal utilities and consumer-owned cooperatives. Many are heavily regulated by the state authorities and are compelled to consider more efficient electricity use on an equal footing with building new power stations. This is called 'least cost planning'. Many utilities have chosen to save electricity.

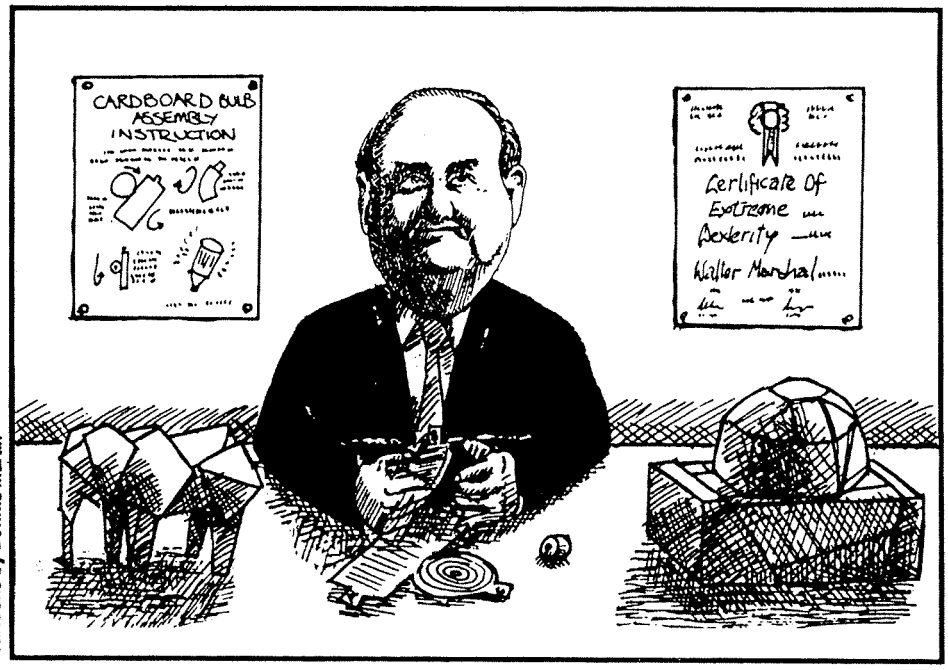
When these compact fluorescents first went on the market in the USA, they were as expensive as they are here. Few householders bought them. But now some electric utilities buy them in by the million, at about a third of the trade price, and sell them at rock-bottom prices to their consumers. To encourage sales, one utility mailed out cardboard models of the bulbs, to ensure that customers could get them into their light fittings. Another gave away a free slide rule so that they could do the sums and make sure they weren't being fiddled.

A few publicly-owned utilities, both in the USA and Denmark, rent out energy-efficient bulbs for about 10p/month. In return, you can expect to save at least 25p on your electricity bill. When it blows, you take it back to the showroom and get another one. This is actually what Edison did in the very first days of electric lighting - he sold illumination, not electricity. In the extreme, rather than build a new power station, one private utility in California just gave low-energy bulbs away.

Here, the House of Lords fought hard to amend the Electricity Bill to encourage more efficient use of electricity. I find a certain irony in this, as on recent visits to Parliament I counted 20 kW of low-efficiency incandescent bulbs swinging in the massive chandeliers, en route to committee rooms whose ancient fluorescent lighting systems are steadily wasting electricity like others throughout the country.

How do I take seriously a Government which relies on people investing their own money in energy efficiency, but which can't be bothered to use energy-efficient lighting in its own buildings? □

* DAVID OLIVIER, a consultant specialising in efficient energy use and renewable energy systems, is Principal of Energy Advisory Associates, tel. Milton Keynes (0908) 220182. He is currently planning a dwelling which will demonstrate state-of-the-art energy efficient technologies to a UK audience.



Cartoons by Dennis Martin

Jam tomorrow

Four designs were 'entered' into a US Department of Energy (DoE) sponsored technical competition, earlier this year, to design a simpler, safer and cheaper nuclear reactor. The 'prize' was a $50 million grant towards the cost of developing the design. The competition entrants were a UK-American consortium with the Safe Integral Reactor (SIR); Sweden's Asea Brown Boveri-Atom with the Process Inherent Ultimate Safety (PIUS) reactor and two American designs from Westinghouse and General Electric.

STEVE MARTIN, Press and Parliamentary officer for the National Steering Committee of the Nuclear Free Local Authorities assesses the results of the competition and asks 'is there any such thing as a safe reactor?'

CYNICS were right: US public funds for nuclear development are not to be freely distributed amongst European competition. The $50 million research subsidy, is to be awarded to the two US designs. Both European-led bids failed.

The two winning designs are the Westinghouse Advanced Passive 600MW PWR and General Electric's 600MW Simplified BWR (Boiling Water Reactor). They will also provide their own funds and receive grants from the US Electric Power Research Institute. Both companies have received US Department of Energy (DoE) funding before. The Government money is seen as an injection of investment into the ailing US nuclear industry. Not since 1975 - four years before the Three Mile Island accident - has a nuclear power station been ordered in the US without subsequently being cancelled. Because of safety fears since TMI, reactors have become increasingly complex and therefore expensive, and the commissioning process has become tortuously slow as licence hearings examine every detail of design. To help ease the log jam the Nuclear Regulatory Commission is to "streamline" the licensing process, merging construction and operating permit examinations.

DoE interest is in a reactor less heavily dependent on engineered safety systems, which can fail or be mishandled by power station operators, but instead they want reliance on passive systems to prevent the reactor overheating. The real impetus behind this high profile debate on novel designs is twin-pronged: first the reactor engineering design and construction companies are in a cut-throat international market competing to gain dwindling orders and; secondly the new designs are likely to be cheaper and quicker to build than conventional designs. A spin-off from this would be the possibility of supplying units to the developing world where, we are told, energy demand is to increase and nuclear power will be the solution to the potential exacerbation of the greenhouse effect.

A consortium of four UK and US companies - Combustion Engineering, Stone and Webster, Rolls Royce and Associates and the UK Atomic Energy Authority (UKAEA) - was set up to enter the competition for DoE funds. They have not since disbanded.

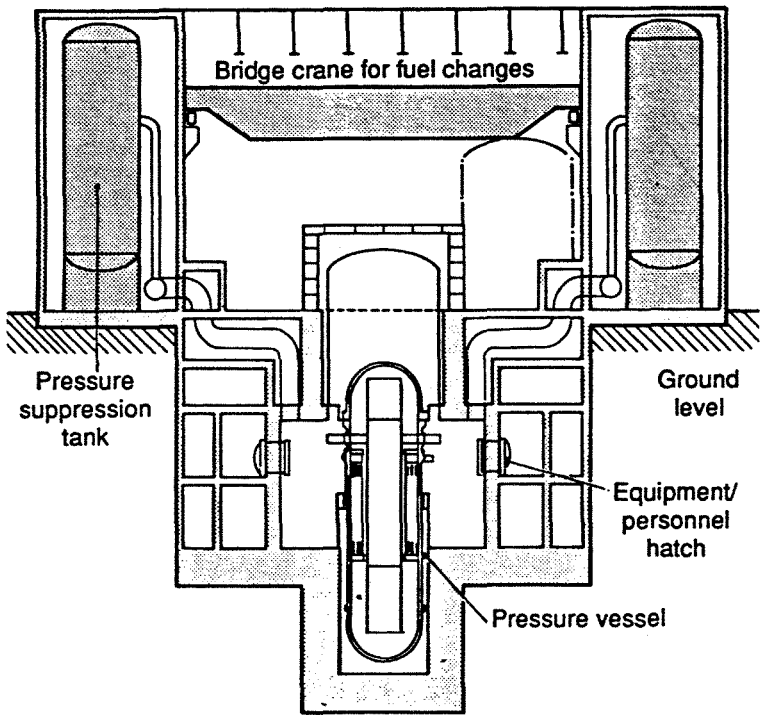
The SIR being developed by the consortium is a 320 MW(e) modular-type PWR - units can be combined to provide power stations of varying sizes, to suit regional requirements. A prototype plant could be built at Winfrith in Dorset, the UKAEA's reactor research centre. Unlike conventional PWRs, which use highly complex engineered systems to remove decay heat to provide emergency core cooling and contain fission activity in core damage accidents, the SIR is designed to rely on primarily 'passive' means (such as gravity, natural convection and stored energy) to achieve these objectives. Also, the pressure vessel is to hold all of the components of the Nuclear Steam Supply Side, obviating the need for exposed pipework which could rupture. It is intended that the entire pressure vessel will be located underground, which would free the design from the requirement to meet stringent seismic precautions.

These novel designs are supposed to be safer and simpler; they are certainly simpler but the nuclear industry and its commentators appear to be split on whether they are actually safer. Advocates of the world's prevalent conventional PWR technology are a little fearful of claims that these novel designs are 'inherently safe' - they fear their designs will be branded conversely as 'inherently unsafe'.

The wrong technology

But, are they safer than conventional designs? The simple answer is, no! Much of the published material on them contains statements like "the passive plant offers far greater opportunity . . . to effect wholesale simplification . . . with attendant improvements in construction cost and schedule, plant operability and maintainability"[1]; "the principle driving force . . . offers radical solutions to the economics, licensing and *acceptability* of nuclear plant" (emphasis added)[2]; and "An IAEA overview of advanced LWR technology noted some designs are aimed at increasing plutonium utilisation and/or fuel efficiency rather than safety"[3]. The 'bottom line' appears to be one of producing designs which can be built much cheaper, within 3-4 years, and to last 40-60 years - safety is not the principle motivation. Richard Slember, Vice President of Westinghouse's energy systems business unit, sums up the objective: "Our interest is purely in selling these things"[3].

Observers and industry commentators who have examined these designs and claims of 'inherent safety' generally appear to be of the opinion that 'if safety is the aim, then LWRs are the wrong technology'. All the novel designs use water as a coolant - to take heat from the



Upside-down Safe Integral Reactor takes radioactivity underground

reactor core and transfer it to the steam generators - and as a moderator to slow down the neutrons escaping from the reaction to enable a chain reaction to occur. A serious accident could result in the water turning into steam, with very different qualities and characteristics to water as a liquid - both cooling and moderation could be lost simultaneously. A 'safer' option is to use different materials for coolant and moderator and ones which won't undergo a 'phase change' (eg. water into steam). A possible solution is gas-cooled technology, like the UK Magnox and AGR. However, as admitted in a Nucleonics Week special report such technology has "unquestioned safety characteristics (but), generally poor operating record"[3] - yet another indication that it's economics and not safety which is in the driving seat.

UK backers

The SIR consortium are obviously "disappointed" at losing the competition, and feel theirs is "an exciting design with outstanding potential as a next generation nuclear power plant." In October this year Dr Ian Gibson, the AEA's technical manager of the SIR project, insisted "There is strong management commitment from within the SIR consortium and UK backers have not withdrawn."[4]

The "UK backers" have not been made public, although it is understood that at least four area electricity distribution boards (including East Midlands, Eastern and possibly Southern) have expressed an interest. PowerGen, the smaller of the CEGB private spin-offs, according to the Press, are also interested. A Parliamentary Answer on 21 July refused to reveal detailed terms of the contracts because they were "commercially confidential".

The consortium set about attracting financial support by hosting confidential meetings with Sir Francis Tombs, Rolls Royce chair (and one-time chair of the South of Scotland Electricity Board) and assorted experts, briefing representatives from the Area Boards. Apparently there "has been a lot of interest".

Investors pull the plug

PowerGen's interest stems from the "acknowledgement of the fact that this company cannot afford to turn its back on nuclear energy", according to Roger Jump, deputy Director Designate. However, since the Energy Secretary John Wakeham's statement on 9 November that the nuclear stations will not be sold to the private sector, the future of the nuclear industry seems in more doubt than at any time since Chernobyl. What prompted the historic U-turn was money, in exactly the same way as Cecil Parkinson, the previous incumbent at Energy, pulled the plug on fast reactor research last year. Investors had decided that nuclear power was about as welcome as Bubonic Plague.

Nuclear Power has always been expensive, as environmentalists have been saying for years and the Department of Energy seems to have only just found out.

Where does this leave the SIR? When the Government pulled the nuclear power stations out of the electricity privatisation, it also decided that no new nuclear power stations would be started until after 1994. According to John Collier, Chair designate of the new state-owned company which will run the nuclear power stations in England and Wales, this pause will allow the industry to look at options other than replicating Sizewell. One of these options would be small PWRs which would be cheaper and simpler to build and of "inherently safe" designs which would not require complex safety systems. Following the failure to win the US subsidy, the consortium has been seeking "alternative funding from Europe, the US and elsewhere, with great vigour"[4]. They "intend continuing to press the case for SIR, with the objective of winning the necessary backing to translate it into a practical reactor construction project, hopefully with the first plant being built in the UK"[4].

The verdict of 'the City' on privatising nuclear power does not bode well for investment in developing a new design. The question remains whether PowerGen and/or the Area Boards will remain committed to funding the project now that the US DoE s decided not to fund it, and the UK Government has decided not to privatise nuclear power. Perhaps National Power will be interested in funding the SIR if it does turn out to be cheaper than Sizewell B.

Low priority

Without massive public expenditure a PWR programme of any kind is impossible, and this Government is not renowned for its commitment to public spending. Now that the costs of decommissioning, reprocessing and waste management have become transparent and their enormity has been cited as the prime reason for not privatising nuclear power, and the fast reactor programme has effectively been abandoned, a large-scale commitment by the Government to a novel reactor research and development venture must have a very low priority indeed.

One must presume that SIR will die an early and unpublicised death. One can also hope that its proponents will put it down to experience and concentrate their, not inconsiderable, talents on projects likely to provide real benefits for the planet and its occupants. Like tackling the Greenhouse Effect which nuclear power was supposed to solve. □

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Electricity privatisation and the new fashion of green consciousness have combined and created burgeoning interest in alternative technology. BRIAN HORNE, the Centre for Alternative Technology's Information Officer, introduces the Centre's work and describes the changes they are planning to meet the challange of environmentalism in the 1990s.

Technology for tomorrow

IN 1973, Gerard Morgan-Grenvile conceived the idea of setting up an organisation to investigate and promote the use of environmentally benign technology. With the help of a group of enthusiastic volunteers, the Centre for Alternative Technology was set up in a disused slate quarry on the borders of the Snowdonia National Park. Now, sixteen years later, the Centre is one of the most popular tourist attractions in mid-Wales and employs thirty full-time staff.

Now, of course, everyone is concerned about the environment, or claims to be, and they all want to know about alternative technology.

Environmental organisations are springing up like mushrooms, offering services and advice on all manner of green issues. The challenge for us is to expand to meet the demand without losing our unique identity: to develop what we're good at rather than trying to do everything at once and save the world before break fast. So, first, what are we good at?

The purpose of the Centre is to promote technologies, and uses of technology, that are "sustainable, fair, interdependent, non-destructive, pollution free, cyclic and economical". This is primarily done through our exhibition circuit on site.

Over 50,000 people visit the Centre every year, and are treated to displays of renewable power sources (wind, water, solar, biomass), energy conservation, organic gardening and farming, as well as general information about the reasoning and ideology behind our work. Our bookshop and wholefood restaurant serve to reinforce these ideas as well as providing a service and generating income.

Information service

For people with more specific or detailed enquiries we run an information service, ranging from off-the-peg information sheets to full technical consultation work. Our education service provides a full range of services for schools and colleges, both for day and residential visits. We also run a wide range of residential courses for the general public and for people working in developing countries.

For those who would like to get more involved with the work of the Centre, we have a supporters group, the Alternative Technology Association, which is launching our new newsletter, "Clean Slate".

There are several commercial trading arms, apart from the bookshop and restaurant already mentioned. We have a wholefood shop and restaurant, known as the Quarry Shop, in the local market town of Machynlleth.

Dulas Engineering, shortly to go independent, specialise in the development of electronic control systems, particularly for use in developing countries. They have also developed and are marketing low-energy fridges for medical supplies. Another engineering side-line, Aber Instruments, have already become totally independent and are now based in nearby Aberystwyth.

One of our education officers was instrumental in setting up the Green Teacher publishing co-op which produces the journal of the same name. He has also written a book entitled "Teaching Green" (by Damian Randle, available from all good bookshops, price £7.99).

Community

There is another aspect of the Centre which is less obvious to the casual visitor, and less directly concerned with the promotion of our aims. Many of the employees and their families live on site on a semi-communal basis and try, as much as possible, to live according to the principles and practices we advocate. This community will be greatly affected by any plans to develop the site, and those plans will have to be carefully regulated if we are to maintain the privacy and quality of life of all residents.

So, if we're so brilliant, why change anything at all?

The recent upsurge in concern for the environment is very real, and a lot of people want to know what they, and governments, can do to help. Our experience and reputation make us well placed to provide at least some of that information. There is also a growing quantity of money looking for something green to invest in. Again our experience and reputation make us well placed to receive at least some of that money. We would be failing to do our job if we didn't try to raise money to improve and up-date our service. That is what we plan to do.

The Centre for Alternative Technology is a registered charity and receives no major government funding. Its income comes from a

Centre for Alternative Technology

Canolfan y Dechnoleg Amgen

combination of entrance fees, membership fees, profit from trading arms, don- ations and individual grants. This income covers everything we do at the moment, but what we need in order to expand is a large capital sum, something in the order of a million pounds. We hope to raise that money with a combination of improved grant funding, and a share issue aimed at the ethical investment market. With that money we can carry out the following projects and improvements.

Cliff railway

The most obvious problem with our site at the moment is the steep climb from the car park to the Centre. This we plan to turn to our advantage by building a water powered cliff railway, thus demonstrating a now rare use of renewable energy sources while providing a much needed service. This railway will lead directly into a new exhibition area, incorporating interactive displays on all our specialities, together with up-to-date information at a variety of levels of technicality. The plan involves a basic circuit around a series of exhibitions introducing the various aspects of alternative technology, and of our work.

Running off this circuit, a number of spokes will lead to more detailed displays for the more interested or technically minded.

We plan to up-grade all of our services to cope with the expected increase in visitors and the increasing strain on our educational and information departments. One expansion on the education side is already underway. We have nearly finished building two new cabins to be used for residential school trips. Parties of school children will visit for a week at a time and learn what it's like to live without mains electricity, gas, water, sewage or central heating (just like the rest of us). Another new building, incorporating a range of innovative passive solar features, is also proposed to house our expanding programme of residential courses.

Plans for the information side include a new computer-based cataloguing and searching system, allowing instant access to virtually everything by virtually anybody. This will allow us to operate an information bureau on site, answering all levels of enquiry over the counter. Hopefully this will form just part of an overall system providing computing services for all areas of the Centre.

Wind power

One area where interest is currently growing at a remarkable rate is wind power. There is a requirement in the Electricity Bill for the Area Boards to buy 20% of their electricity from non fossil fuel sources, a clause initially intended to protect the nuclear industry from competition from the cheaper conventional sources. As a side effect, however, anyone who wants to set up an independent wind turbine and sell electricity to the Board will be competing only with expensive nuclear energy.

We reported this market opening to our local paper, the Western Mail, and the story has been repeated in publications across the country, with steadily increasing exaggeration.

As a result we are getting literally hundreds of enquiries from people who want to cover their land with windmills and retire to the South of France. Our job now is to sort out the genuinely promising sites and advise them as best we can. The problem at the moment is to try and keep abreast of changes in the electricity privatisation plans, and to try and determine what will happen to the non fossil fuel fraction now that nuclear power is staying public.

Electricity

We also have power problems of our own. We generate all our own electricity at present, both for the Centre and for the community, largely from wind and water power. There is no way that our power system as it stands could cope with all the planned expansions. Either we completely re-vamp the system, or we plug into the mains, or both. Of course, there is always the possibility of setting up a wind farm of our own and becoming a net exporter of electricity.

All this involves enormous changes for the people who work here, particularly for those who live on site. It is also happening against a background of share prospectuses, cash flow predictions and tourism development grants, not the traditional stamping ground of the professional hippy. It is a worrying prospect and will take a lot of effort (as well as money) to make it work. It will also take tact, imagination, patience and determination. If it does work then it'll be the best thing since wholemeal bread and, who knows, perhaps we will save the world by lunchtime. □

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As we go to press the Hinkley Inquiry has almost reached its conclusion. JANE ROBERTS, a founder member of Stop Hinkley Expansion takes a critical look at the Public Inquiry system, and attempts to make some sense of the bizarre events in Somerset.

Atoms in Wonderland

ANTI-NUCLEAR activists have been described as 'post-materialists', valuing the environment above prosperity. Proponents of nuclear power, however, place more emphasis on the material, arguing that while middle class ex-hippies don't have to worry about the lights going out, an expanding world population needs the abundant energy that nuclear power can provide. Don't dismiss this view as logically untenable. Transpose a 'rational argument' from one value system to another and it becomes a piece of superstition, or immoral rubbish, or incomprehensible, and vice versa.

These differing frames of reference affect perceptions of the Public Inquiry system. Materialists see the process as one which establishes the 'facts', whereas some, but by no means all, objectors to a nuclear proposal may be misled, by their belief in and desire for participatory democracy, to conclude that the Inquiry is a forum where their opinion will be heard and taken into account.

In the past the nuclear industry has claimed objective fact as its territory, relegating objectors' arguments to the realm of opinion. They were wrong to do this for three reasons. Firstly, to rate fact above opinion is itself a subjective judgement, although objectivists are too unaccustomed to thinking in value terms to recognise this. Secondly, the case for nuclear power is value laden. To believe that the benefits of prosperity outweigh the fear of nuclear accidents, radioactive pollution or risk of proliferation is to make a value judgement. Thirdly, the track record of the anti-nuclear movement on the nuclear industry's own ground, that of objective fact, is very respectable.

Shoe string

Cast your mind back to the Windscale Inquiry, 1977. Is it not astonishing that the evidence of the nascent Friends of the Earth, prepared on a shoe string and in haste, was right, and that BNFL with its millions and its experts was wrong? Yet CEGB documents which admitted as much were leaked earlier this year. Is it not amazing that the purveyors of 'objective fact' at that Inquiry deluded themselves on this matter for the next decade before belatedly concluding that Friends of the Earth had taken a moderate view, and that the waste management crisis was worse even than FoE had predicted?

And then there was Sizewell. Layfield was told by the CEGB that Sizewell would be so cheap that it was worth prematurely retiring some coal plant in order to build it in advance of capacity need. Objectors told a different story and got it right. Both Parker and Layfield weighed the evidence - and came down on the side of the nuclear establishment. They had to. Looking down from Mars, who would you believe: the men in suits paid £30,000 and with twenty years experience in their jobs, or the environmental activists funded by jumble sales, who couldn't keep up with Inquiry developments because they didn't have the administration to cope? It would be a brave Inquiry Inspector who discredited the management of a large nationalised industry by saying the brown rice and sandals brigade were right.

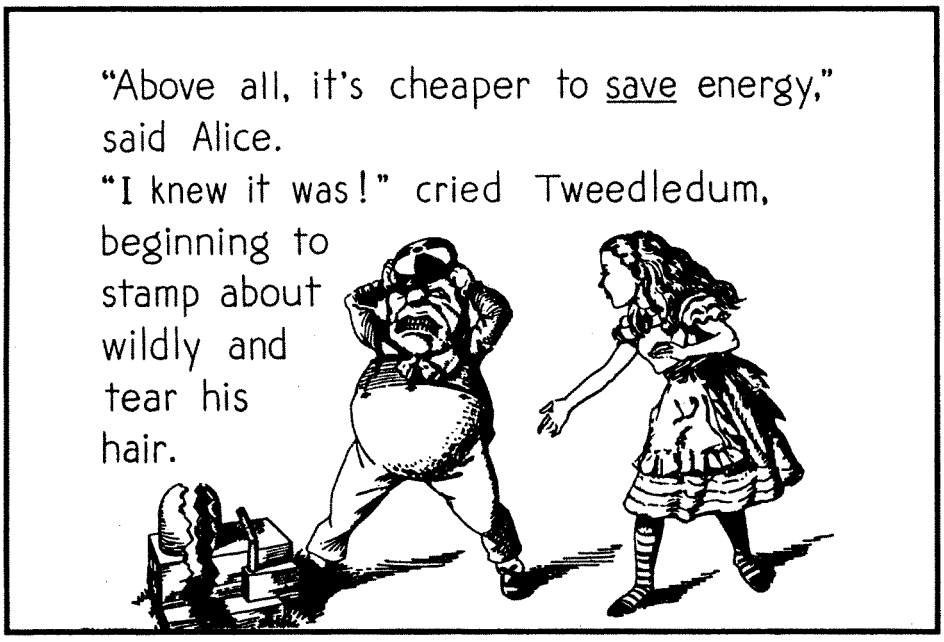
Which brings us to Hinkley. This was different from its predecessors. Reality, in the form of the privatisation of the Electricity Supply Industry (ESI), was catching up with the CEGB. Frames of reference have to change when they can no longer accommodate observed facts. This change can take the form of incremental adjustment or traumatic collapse.

The Hinkley C Inquiry became a victim of the latter because of the Conservative Government's refusal to confront the dilemma at the heart of their proposals to sell nuclear power. It wasn't just the environmentalists who claimed that a strategic commitment to nuclear could not be melded with an ideological decision to privatise. The Financial Times, Times and Independent said so too.

Rigging

The Department of Energy (DoEn), however, came up with the concept of the non-fossil fuel obligation (NFFO), and proceeded to use it to rig the terms of reference of the Inquiry at the outset, and then rig them some more. The CEGB's case was that Hinkley C was needed to meet the NFFO. While the DoEn would not commit itself on what the expected 'gap' in the NFFO by the year 2000 would be, the CEGB, and the main objector, the Consortium of Local Authorities (COLA), assumed at the start of the Inquiry that the target would be 3.1GW.

Once it became apparent that COLA had made a plausible case for meeting this figure, with a combination of renewable energy and nuclear imports, the target was increased. In a particularly nifty move, the renewable quota of 600MW was deemed to be additional to the existing NFFO, removing this much capacity from COLA's figures. By the closing submissions in September the total maximum NFFO was



Cartoons by Terry Mulvihill

4.1GW, a 33% increase on the figure on which COLA had based their evidence.

It is interesting to note that the NFFO is based on a qualitative concept: the perceived need for diversity in sources of fuel for electricity generation. The technical and economic arguments of Windscale and Sizewell were abandoned, and Hinkley C was justified by the concept of diversity which the CEGB initially claimed to be unquantifiable. The event of the nuclear industry resorting to overtly subjective arguments at a Public Inquiry was a clear sign that the end was nigh.

Although Public Inquiries, like the nuclear industry, claim to deal in fact, not opinion, the Inspector, Michael Barnes, had to accept the policy background as described by the DoEn witness. Objectors in their evidence and cross examinations were not allowed to question the merits of Government policy.

Yet the policy was a nonsense. Even at the start of the Inquiry, in October '88, there were enough newspaper articles saying this for their use in cross examination to become an Inquiry joke. The gap between fact and fantasy was bridged at the begining by a recognition from Barnes, though not from the CEGB, that Government policy might not be immutable. Barnes' decision to ask the Board to bring evidence on the economics of coal versus nuclear was a recognition, by him, that with the Electricity Bill under attack before it was even published, the White Paper proposal for a NFFO might not become law.

By summer 1989 this room for manoeuvre had gone. The Electricity Bill was enacted, and the Department of Energy witness, recalled in late July, swore that the NFFO would be set at 3.6GW to 4.1GW. Thus the inquiry proceeded up a blind alley, becoming more removed from reality with every development.

In particular, Inquiry watchers became increasingly intrigued at the discrepancy between the Board's robust presentation of its case within the Inquiry hall and the far less enthusiastic messages that were emanating via press briefings and National Power wastepaper baskets. Sooner or later something had to give.

In late September, within a few days of the scheduled closure of the Inquiry, Brian George, the man in charge of building both Sizewell B and Hinkley C, brought an addendum to his earlier evidence on the capital cost of Sizewell, showing a 10% increase. This forced a month long adjournment.

Such cost escalations had been predicted, notably by the Council for the Protection of Rural England. Accustomed as they were to post-inquiry vindications of their evidence, objectors were suprised to be proved right, by the CEGB, before the Inquiry had ended.

One could speculate endlessly on why the Board deliberately delayed the end of the Inquiry in this way. It is likely that by this stage there was no longer total support for the PWR programme within a factionalised CEGB. National Power managers, acting with increased autonomy since its launch as a separate company, may have intended sabotage; or Hinkley C enthusiasts, expecting a different Cabinet decision from the one that was taken, may have wanted Barnes to be able to take account of this in his Report.

Nuclear pull out

On 9 November the Inquiry was adjourned pending the Cabinet meeting which pulled all the nuclear stations out of the sale and re-defined the NFFO "at a level which will not require the building of any nuclear stations after Sizewell B." Excruciatingly, when resumed on 14 November, the Inquiry was again adjourned, this time for a week.

The CEGB told the Inspector they needed time to form a view on the implications of the Secretary of State's announcement. Stop Hinkley Expansion (SHE) protested that the clarity of Wakeham's statement could leave no one in any doubt that the whole basis of the case for Hinkley C was destroyed. It seems even Government ministers can't make the CEGB face the facts.

Policy clique

The sheer incompetence of the ESI privatisation has been extensively analysed elsewhere. The isolated clique of nuclear policy makers have suffered a collective nervous breakdown as privatisation exposed the real economic costs and uncertainties. No longer able to bend the facts to fit reality, they tried to bend reality instead. The putative champions of objective fact were forced into subjectivism, and eventually outright fantasy, by the scrutiny of the real objectivists - the men from the 'City'.

Hinkley C might have been built if attitudes at the top had been more flexible. If it had been accepted at the outset that reactors were unsaleable the rest of the industry could have been privatised and the discreet silence of the last thirty years over the true costs maintained. Readers might conclude that it is their good fortune that, whereas reality came home to roost at the Hinkley C Inquiry, the cloud cuckoo still thrives in its traditional habitats - the nuclear industry and the Department of Energy. □

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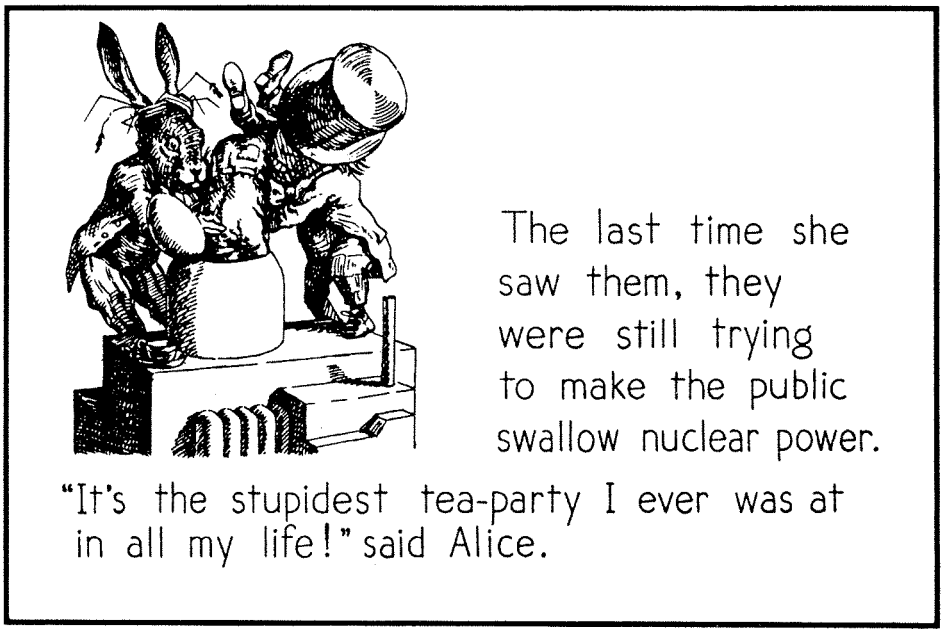


NEA & ET

EMPLOYMENT Training (ET), the Government's replacement for the Community Programme (CP), has "dealt a severe blow" to the network of energy efficiency projects for low-income households, run by Neighbourhood Energy Action (NEA). There are now only 2,800 ET workers on the projects compared with 7,800 CP workers in September 1988, just before ET was introduced.

A new report, "Energy efficiency & Employment Training: One Year On"* highlights the effect of ET on the "energy efficiency services provided by its [NEA's] national network of community insulation projects," and calls for the establishment of "loft insulation, draughtproofing and energy advice ... funded independently of Employment Training."

Since the introduction of ET there has been a 73% cut in the number of lofts insulated, a 32% cut in the number of draughtproofing jobs and a loss of community insulation projects in many counties and major towns.

The problem of fuel poverty remains, says the report, it estimates that there are 6.8 million low-income households in Great Britain "with no, or inadequate, draughtproofing, 1.8 million with no, or inadequate, loft insulation." Even although the projects have insulated over 600,000 homes, during the past 8 years, there is clearly no room for complacency.

NEA are taking part in this year's Government supported 'Keep Well, Keep Warm' programme, they comment that in last year's campaign of the same name 28% of the inquiries were about insulation and draughtproofing and that 32% of the callers no longer have a project in their area.

NEA conclude that 'given the decline in services since the introduction of ET, only a radical solution can ensure that a highly successful, and effective, programme does not collapse, leaving millions of inadequately insulated low-income households to suffer the continued misery of living in cold conditions."

They recommend that planning for a programme funded independently of ET covering "loft insulation, draughtproofing and energy advice ... should begin immediately, with a view to introducing such a programme in 1990/91." Although centrally funded the network could still retain close links with ET, "either through subcontracting or the establishment of employer placements."

The report finishes, "Any new programme should be compatible with the plans being drawn up by the Department of Environment to incorporate grant aid for energy efficiency with other housing improvements. However, it should be noted that, in order to encourage local authorities to provide grants for energy efficiency work, a specific allocation of funds for this purpose will be needed, with clear signposting from Government that this is a priority." □

*** Available on request from NEA, 214 Bigg Street, Newcastle upon Tyne NE1 1UW.**

Promoting efficiency

FRIENDS of the Earth launched their new Energy Efficiency Campaign, in October, by calling on the Government to ban electricity guzzling domestic appliances.

They argue that technologies exist to "reduce UK electricity demand by 70% over the next 15-20 years whilst maintaining (or even improving) the quality of services." This would cut pollution by a similar percentage and reduce consumers' fuel bills, whilst being 5-10 times cheaper than meeting demand by building conventional power stations.

Waiting for people to become "aware" and for manufactures to feel and respond to market pressures would take too long. We "need far reaching action, of the sort introduced in the United States in 1987 in the National Appliance Energy Conservation Act."

US Federal Law has set minimum efficiency standards for new domestic appliances which will mean that 70-90% of equipment available in US shops today "will be in effect outlawed" when the standards come into force in 1990-92.

The average energy efficiency of UK appliances is well below that of the best mass produced models in Europe. FoE take this as proof against those who say "it can't be done." Standards should be constantly under review, so as new levels of efficiency are attained the benefits are passed on to the consumer and the environment.

Energy labelling would play a central role in developing consumer awareness and in encouraging manufactures to improve the efficiency of their goods. Information on the label should include:

- An indication of the energy consumption and efficiency of the appliance in standard units, which enable easy comparison between say, fridges of different sizes.
- A banding system, eg. points out of ten or stars out of five, giving a clear indication of the efficiency of the appliance in relation to others of its kind.
- A general statement that the better the points rating then the less environmental pollution it will produce and the cheaper it will be to run.

FoE have also convinced the Secretary of State for Energy, John Wakeham, to review the draft supply licence for Area Boards under the Electricity Act 1989.

Currently the draft excludes the possibility of the Area Boards using energy efficiency as a way of meeting their obligation to "keep the lights on." The pricing mechanism under which they operate allows them to pass the cost of electricity supply on to the consumer through the price of a unit of electricity. However, if the board wanted to meet the consumers requirement for a 60W bulb by providing a 10W energy efficient bulb and 10W of electricity there is no way the cost of the efficient bulb could be passed on.

By the end of a meeting with the Energy Secretary they had a promise that he would re-examine the draft, to see if it could be changed to allow the Boards the efficiency option. □

*** A 6 page briefing on "Setting Standards for Energy Efficiency", price £1 is available from the FoE Energy Campaign, 26-28 Underwood Street, London N1 7JQ.**

Inefficient investment

DESPITE its key role in fighting global warming, investment in energy conservation measures has dropped by an average of 12% this year.

Andrew Warren, director of the Association for the Conservation of Energy, speaking on behalf of the Building Energy Efficiency Confederation said, "Earlier this year we pointed out that even keeping investment in conservation measures at constant levels will still drive up CO_2 emissions by 20% over the next 15 years. To cut emissions we need to expand the levels of conservation investment considerably."

Amongst the figures released were:

- Draughtproofing Down 15%
- Cavity wall insulation Down 16.6%
- Doubleglazing Down 20%
- Heating controls Down 12%
- Loft insulation Down 7%
- External wall insulation Down 6%

These figures along with a call for the abolition of Value Added Tax upon energy conservation equipment (VAT is not levied upon energy supply like gas or electricity), energy labelling and energy audits on housing, and a strengthening of the promotional role of the government's Energy Efficiency Office, whose budget has been halved this year, have been sent in a letter to the Energy Secretary, John Wakeham. □

Labour policy

IN A FIERCE attack on electricity privatisation, Labour's new energy spokesperson, Frank Dobson, promised that "frugality" and "good housekeeping" would be the hallmark of their energy policy.

He also said that the Area Boards should be obliged to promote less wasteful industrial processes. Environmental impact of a power station should be taken into account under the "merit order system" - the preferential order in which electricity is bought from power stations, which currently operates on the basis of the cheapest - suggests Dobson: "Maybe each generating unit could carry a handicap which reflected its impact on the environment, its energy efficiency and long term costs like decommissioning. That way plants which are cheap and environmentally nasty would lose their high place in the merit order. It could provide a real incentive for the generators to improve both their efficiency and their cleanliness." □

Global warning

IT HAS BEEN an embarrassing couple of months for the Prime Minister, who has made a flood of comments on the international stage about the environment.

At the beginning of November Britain along with the US, the Soviet Union and Japan blocked an international treaty on freezing levels of CO_2 by the year 2,000. Between them they account for half of the world's CO_2 emissions. The conference held in the Dutch town of Noordwijk, attended by 72 Nations, proposed a treaty calling for:

- the stabilising of emissions of carbon dioxide in industrialised countries at present levels by the year 2,000 and an investigation into the feasibility of cutting by 20% by the year 2,005.
- increasing the area of the world's forests by 30 million acres a year for at least the next 30 years.
- an examination into the setting up of new funding facilities, such as an international fund, to help Third world countries to minimise their use of fossil fuels and protect their forests.

Britain opposed all three measures. The Government want to delay action until the UN-backed International Panel for Climatic Change (IPCC) report their findings next year. This could result in a delay of "the best part of a decade" said Peter Usher, the top UN official dealing with global warming. Yet, only one month before the Prime Minister said, at the Tory party conference: "Britain has taken the lead internationally and we shall continue to do so."

It is widely believed that the main reason for the desire to wait until IPCC report, is that Britain, the US and the USSR each chair one committee.

In the end the treaty said the freeze would "be set at levels agreed by the International Panel on Climate Change and the Second World Climate Conference of November 1990." Despite this, the Dutch Government announced an 8% cut in CO_2 emissions, on their 1988 level, by 1994.

Even before the ink was dry on the substantially watered down Dutch agreement, Mrs Thatcher was in New York delivering a lecture on the global environment to the UN General Assembly.

Calling for a "good conduct guide for all nations," she challenged the UN to have a protocol on global climate change ready for the World Conference on Environment and Development in 1992: "These protocols must be binding and there must be effective regimes to supervise them and monitor their application ... the challenge for our negotiators is as great as for any disarmament treaty."

Nuclear power has its part to play, according to the Prime Minister, which "despite the attitude of so-called greens, is the most environmentally safe form of energy." Yet, one day later, 9 November, the new UK Energy Secretary, John Wakeham, pulled the nuclear industry from electricity privatisation and called a halt to the construction of new nuclear power stations for at least five years.

We must "resist the simplistic tendency to blame modern multi- national industry for the damage which is being done to the environment...It is industry which will find the means to treat pollutants and make nuclear waste safe."

She boasted of the UK's £2 billion investment programme into reducing acid rain emissions from power stations, and of "our latest legislation [which] requires companies which supply electricity to promote energy efficiency." Yet because of that privatisation programme the UK will not now be able to meet European Community directives on acid emissions, unless it imports massive amounts of low-sulphur coal, and the electricity boards are currently unable to pursue energy efficiency because pricing formulae prohibit passing the cost of energy efficiency devices on to the consumer.

On a more positive note she announced the establishment of a Centre for the Prediction of Climate Change, in the UK, with an annual budget of £5.5 million. Prof Tom, Wigley of East Anglia University's Climatic Research Unit, criticised the level of funding: "There is a terrible imbalance in the Governments research priorities; £5.5 million is chicken feed."

Greenpeace air pollution campaigner, Steve Elsworth, summed up the reaction to the Government's pontifications, saying, "Britain is all talk and no action. It is an internationally coordinated public relations exercise with no solid content." □

'Business as usual'

CARBON dioxide emission, in Britain, will increase by 75% over the next 30 years, in the absence of drastic changes to energy policy, according to confidential Department of Energy (DoEn) figures.

Documents leaked to the Association for the Conservation of Energy (ACE) show how the DoEn expect the British electricity industry to meet demand in 2020, if we follow a "business as usual" approach to electricity supply. They were compiled for the International Panel on Climate Change (IPCC).

Nuclear power is in its twilight years, the figures show nuclear generated electricity falling by 14%; and only a small increase in generation from alternative energy sources.

Andrew Warren, the director of ACE, said, "the forecast shows that we cannot go on with business as usual. It simply cannot be allowed to come true. There are going to have to be drastic changes in the way we use energy."

Energy efficiency is simply the only option for preventing such a disastrous scenario being played out. A point which the Government has finally conceded. Yet, in his autumn statement, the Chancellor announced only a tiny increase in the budget of the Energy Efficiency Office, over the next three years, however, in real terms this amounts to a reduction.

Only by investing substantial amounts in an energy efficiency programme can political rhetoric be turned into reality. □

Greenhouse defficiency

"ENERGY efficiency is above all a matter for decisions and actions by individuals," replied the Government, in response to a Commons Select Committee investigation into global warming, at the end of November.

They also rejected the Select Committee's contention that the free market alone will not produce an adequate response to the greenhouse effect. Although, they did concede that "there are external costs associated with energy consumption that are not fully taken into account by market mechanisms."

In a total abdication of responsibility they ruled out further action to promote energy efficiency. Measures that improve efficiency, they say, "benefit those who implement them. There is no need for proposals which are in the producers' and consumers' own interest."

In the 'brave new world' of 'double think', they claim their road building programme is justified as a means of combating global warming. Building more roads would relieve congestion which "is a major cause of poor energy efficiency." This on a simplistic level may well be true, but a more effective policy would improve public transport systems and therefore greatly reduce the number of vehicles on the road. Transport is one of the fastest growing sources of greenhouse gases.

Meanwhile, the House of Lords Select Committee on Science and Technology have published a report on their findings on global warming.

Lord Carver, the committee chair, warns, "we cannot afford to wait until proof is clear." The report says, that although scientific evidence and computer model forecasts about the rate of warming are inadequate the Government must not use these to dodge "expensive and difficult" decisions.

However, the report which warns of a colder climate in the UK, with more extremes in temperature and a higher incidence of hurricanes and droughts, calls for the preservation of the Dounreay nuclear establishment. It argues, that nuclear power is the only available alternative to fossil fuels, and "the abandonment of research into fast-breeder technology is short sighted."

The Lords also underline the urgent need for a wide ranging, Government backed, programme of energy efficiency. □

Severn setback

ENGLAND AND WALES could meet 7% of their electricity demand from an electricity generating tidal barrage across the Severn.

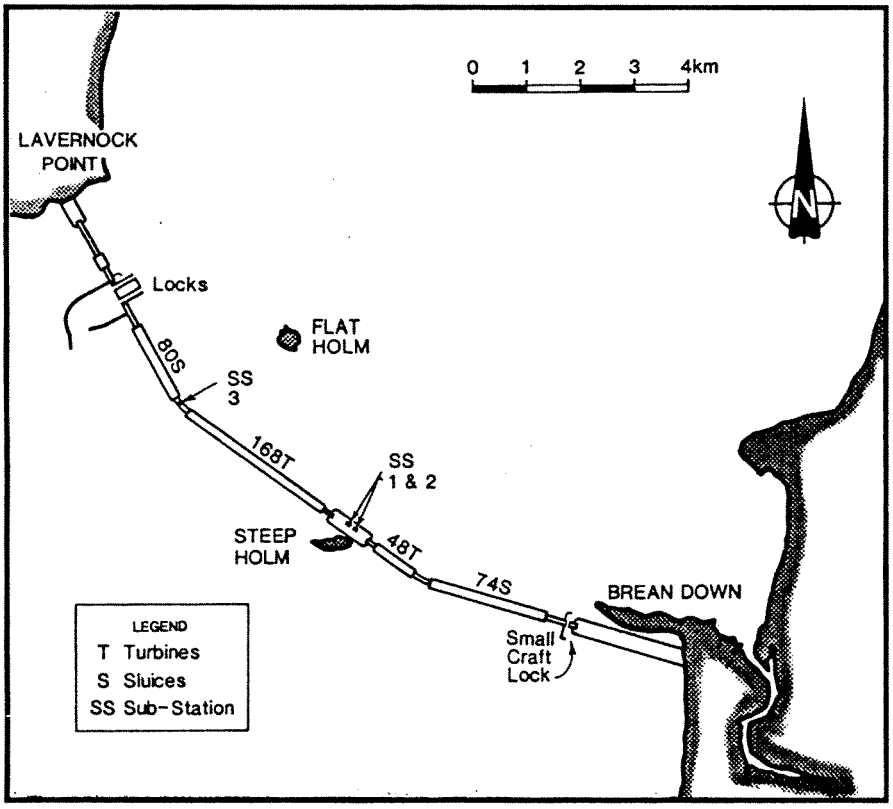
However, the results of the £4.2 million, three year, study into the Severn Barrage (SCRAM 73), published* at the end of October, show that it could not be built without an injection of public funds. This led Sir Frank Gibb, Chair of Taylor Woodrow, one of biggest memebers of the Severn Tidal Power Group and long time supporter and funder of the Tory Party, to say that there would be "a better chance" of public funding under a Labour Government. Tony Blair, then shadow energy spokesperson, said his party would need more detailed estimates of the economics and environmental impact before deciding whether to support the scheme.

The Severn Barrage Project set out to "examine further the design and construction of a Cardiff to Weston-super-Mare barrage so as to reduce uncertainties on its costs and performance, to examine its regional and environmental effects, to reassess its economic viability and to define what further work would be needed before a decision could be taken to proceed to construction."

An annual output of 17TWh could be obtained at a cost of 3.4p/kwh, using a 5% discount rate. However a commercial discount rate of around 10% would push the unit price of electricity up to 7.2p/kWh; about 2p less than the nuclear industry. The barrage would not generate any radioactive waste nor threaten to release huge amounts of radioactive gas into the atmosphere.

Current accounting methods do not take into account the longevity of a tidal barrage. The report argues: "With high discount rates, little present value is placed on electricity generated after about the first 30 years of operation, which is a paradox bearing in mind the 120 year design life taken for the structure and proven longevity of hydro power schemes." With careful maintenance they believe that the life span could be well in excess of a 120 years.

Carbon dioxide emissions of 17.6 million tonnes a year would be displaced, according to the report, which concedes that the barrage "would have environmental effects of its own." It is these environmental effects which have been the cause of considerable concern amongst environmentalists - the Severn estuary plays host to internationally important populations of wildfowl and waders. They are worried that the destruction of intertidal mudflats, where many wintering waders feed on the high concentration of invertebrates, will mean the birds will be displaced and die. However the report states: "Studies to date indicate that the overall numbers of wading birds and wildfowl supported by the estuary are as likely to increase as decrease, while the diversity of species regularly found there is almost certain to increase."



Benefits

Construction of a barrage would afford some protection against high storm surge levels "and rising sea level should this become a significant national problem next century."

Considerable socio-economic benefits could also be gained from the scheme. They would come from: Construction and operation of the barrage; tourism and recreation; industrial and commercial property development; road transport; ports and shipping and; housing and infrastructure. 1,000 permanent jobs to operate the barrage and 2,000 jobs in tourism would be created, as well has 200,000 to 500,000 person years of work over the period 2001 and 2021 would be created.

No detailed consideration has been made of the organisation and financing of the barrage because of privatisation. This will be the major task of the next phase of study. Whatever the outcome, the question of a tidal barrage across the Severn will continue to divide environmentalists. Some supporters of renewable energies argue that this is the only way forward. However, it would be more logical to invest the #9 billion cost of this project in energy efficiency, which promises all of the benefits claimed for the barrage without threatening to destroy a valuable ecosystem.

The barrage option is not a limited offer, and if we do need it in the future there is nothing to prevent it being taken up. □

*** The Severn Barrage Project: General Report, Energy Paper No. 57. HMSO; 100pp, £13.95.**

Hungarian dam damned

HUNGARIAN Prime Minister, Miklos Nemeth, has been given the go-ahead by parliament to scrap plans for the massive Nagymaros dam.

The dam has been the subject of considerable controversy over the past five years in Hungary (SCRAM 73) and has spawned one of Europe's biggest single issue protest groups since the 1956 uprising - the Danube Circle, who won the Right Livelihood Award an "alternative Nobel prize".

Work on the dam was stopped in March so that the scheme could be studied in detail. Proponents of the dam had been given until 31 October to justify continuing with the project, which environmentalists say would cause unacceptable damage. Nemeth asked parliament, on 31 October, for permission to change the 1977 agreement with Czechoslovakia. He said: "The Nagymaros part of the complex must not be built."

The Nagymaros dam was to be twinned with a similar project in Czechoslovakia, at Gabcikovo, to create a massive hydroelectric generating capacity. Czechoslovakia is understood to be opposed to changing the agreement and may take the matter to international courts. The result could be an award of compensation to the Czechs, which the Hungarian economy can scarcely afford.

However, as we go to press, the entire Czechoslovak Government has resigned throwing the whole situation back up into the air. If, as is hoped, the new government are more environmentally aware the Hungarian stand may just pay off. □

Rising damp

PLANS to convert some of Europe's worst houses into showcases for energy efficient design may now be cancelled because of Glasgow District Councils refusal to match a grant, which is the first of its kind, allocated by the European Community (EC).

Currently, it costs up to £600 a quarter to heat one of the houses, and keep damp at bay. The tenants are also advised to keep kettle boiling to a minimum, not to dry clothes inside, and to keep windows open during sex. The scheme would reduce the average fuel bill to just £3 a week and eliminate damp.

A £400,000 grant was awarded to Easthall Residents Association (ERA), part of Glasgow's run down Easterhouse estate, for a 32 house demonstration project. The conversion involves making the most of passive solar energy by covering large parts of the building with conservatories. It also includes installing double-glazing, gas central heating and improved insulation. Sterling Howieson, an architect with the Technical Services Agency (TSA), who have assisted ERA, described the intelligent ventilation system at the heart of the scheme to SCRAM: "Fans in the kitchen and bathroom, controlled by a humidistat, in response to the air humidity, extract damp wet air from the rooms. This is put through a heat exchanger in the roof, where dry air is pre-warmed and circulated. There are also small air ducts in each room which open and close according to humidity."

When the grant application was made to the EC for the project, which has involved experts from the TSA, the Scottish Solar Energy Society and the West of Scotland Energy Working Group, it was with the support of the Council, who fully understood that any award would be dependant upon a similar grant from them.

Howieson believes, "The council didn't expect to have to put the cash up to back the application. I think they saw it as a joke. Now they claim that they haven't got the money and the the tenants feel they have been kicked in the teeth."

ERA wrote to the Scottish Office (SO) in the hope they would persuade the council to reverse their decision on the £650,000 grant. The Association leader, David Humble, received a reply from the SO pointing out that they had just awarded the council £700,000. It expressed the hope that the council would give some of this to ERA.

It is now widely believed that the SO will pressurise the council into funding the project in order to avoid the embarrassment of Scotland losing the first such EC grant. The council have until the beginning of next year to decide, after which time the EC money will no longer be available. □

Wonderfuel

NORWEB, the North West Electricity Board, have signed the first long-term electricity supply contract in preparation for the privatisation of the electricity supply industry (ESI).

Lakeland power will supply 7% of the areas needs over a 15 year period. The power will be generated at Rosecote power station, near Barrow- in-Furness, where they will convert disused coal plant into a 220MW natural gas power station. The generators will come from Switzerland and West Germany.

The gas, from British Gas' (BG) Morceambe Bay field, will be burnt in high efficiency combined cycle gas turbines - the exhaust heat is used to drive a steam turbine.

Natural gas is central to many of the private power plans waiting on the sidelines of the ESI. Natural gas gives rise to much less sulphur and nitrogen oxides, when burnt, than coal, which means operators of gas power stations can meet EC guidelines on emissions without investing in costly clean-up technologies. It also produces only 60% of the CO_2 that a similar coal sation would.

Companies wishing to sell gas direct to consumers are entitled to have access to BG's network of pipelines. BG published detailed costs of third party access to their network in October, after their regulatory body, Ofgas, criticised them for a lack of price transparency. However, the prices do not seem to have pleased many of the companies planning to enter the gas market.

Many North Sea oil companies, considering diversifying into the gas market, are understood to be considering the possibility of establishing their own pipeline network.

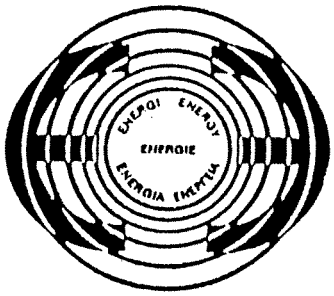
Gas Transmission UK, set up by US pipeline expert Gale Galloway, have begun preliminary work on the UK's first independent gas transmission pipeline. They plan to build a pipeline from the gas terminal at Breacon, in Norfolk, to the Thames estuary. Galloway said substantial additional gas capacity will be needed in the estuary from the late 1990s, and forecast a huge increase in the number of gas-fired power stations following privatisation. □

THERMIE

EEC Energy Ministers have launched the latest five year aid programme for new energy technologies.

The programme to be called "THERMIE" is expected to have a budget of £441 million, this is a slight increase on the current annual budget of £78 million.

During, their meeting in Luxembourg, they also discussed proposals to bring free trade to the energy sector, by 1992. Although the UK, it is said, were reluctant to discuss anything which might interfere with the privatisation of the electricity industry. □



Windpark developments

WHAT was to be the UK's first windpark has been set back by one year, following the withdrawal of Howdens from Scottish Windpark Developments.

The private consortium involving the Scottish Development Agency and the National Engineering Laboratories (SCRAM 66) now hope to begin construction in 1991. It is believed that a new consortium member is hovering in the wings, and are thought to be the same company who are negotiating to take over Howdens wind energy interests. Although no names have been mentioned they are rumoured to be relatively unknown in the UK.

The original plan was to begin construction work on a 3 to 10MW windpark on Eaglesham Moor, near NEL's National Wind Turbine Testing Centre. It was to be a "shop window" for the Scottish wind industry.

Fears over NEL's continued participation have subsided since a recent parliamentary announcement made it clear that plans to privatise the Laboratories had been put on the back burner until at least after the next election.

■ Langdon Common, in the North Pennines, may have been reprieved from being host to one of the CEGB's three windparks, announced last year.

The Board is considering another site in the North Pennines, Redburn Common, in tandem with Langdon Common. They say, "Since its announcement in April last year that it was to look at the suitability of Langdon Common, the Board has held discussions with local authorities and other organisations, and following these has decided to add the second site to its investigations."

The original choice fuelled the opinion that their wind programme was a spoiling operation: it is a site of special scientific interest, the Countryside Commission, when asked to comment on the CEGB's original list of prospective sites, replied that Langdon Common was the most environmentally sensitive of all.

Perhaps the Board has had a change of heart and are now genuinely interested in wind power. □

REVIEWS

Blueprint for a Green Economy by David Pearce, Anil Markandya, Edward B Barbier. Earthscan Publications; 1989, 192pp, £6.95.

Economics is the study of the allocation of scarce resources between competing ends. Price is, in a perfect market, a measure of the balance between scarcity and demand.

The market does not work perfectly. Most political and economic argument revolves around whether it is better to attempt to remove imperfections and to operate a free market, or to control the economy by overriding market forces in the allocation of scarce resources.

Whichever political approach has been followed up to now, the protection of the environment has not been embodied into economic theory.

Why have economists ignored the environment? Firstly, the market only considers traded resources, goods and services; those that are not traded (eg fresh air) are considered to be free. Secondly, there is no economic concept of non-renewable resources. Thirdly, the future consequences of present actions are not fully taken into account. Fourthly, there is an assumption that all participating in the market have complete knowledge.

The Pearce Report tries to address these inadequacies of economics and goes some way to evolving a framework in which the environment can be incorporated into economic decisions.

The use of GNP as the sole measure of economic success has long been criticised as it ignores many things that contribute to the quality of life. In the future the measurement of economic success must include both the environment quality and the sustainability of the economic system. Some countries already have started but there is a long way to go before there is an internationally accepted system of measurement.

A change in the treatment of the environment will only be achieved if the environmental impact of a project is incorporated into project appraisal methods. In addition programmes of investment must be made subject to a sustainability test to the effect that the environmental capital in aggregate must not be diminished as a result proceeding with the programme.

Pollution tax

The principle that the polluter pays has gained a wide acceptance but the means of implementing the principle is still in the early stages. There are two ways to get the polluter to pay. One is to set limits on pollution and if these are exceeded punitive fines are imposed. The second is to introduce pollution charges and taxes.

There are two advantages to the second approach. The first is that there is an incentive for the polluter to reduce pollution as much as possible rather than to reduce it only to an 'arbitrary acceptable' level. The second is that it can be applied to all pollution creating substances; for example a carbon tax would be effective in changing the fuels used and would also encourage energy conservation, whereas it would be impracticable to fine everyone who emitted more than a prescribed amount of carbon dioxide each year.

The same principle in reverse can be used to encourage the consumption of 'greener' consumer goods (ie less tax on unleaded petrol).

An environmental tax system would increase the price of goods by more than would be the case under pollution limits but would also generate revenue which, given the political will, can be redistributed to the poor who would otherwise suffer most by increased prices.

The market can also be a powerful means of encouraging environmentally friendly production, provided that knowledge about the environmental impact of products is disseminated to consumers. The removal of CFCs from aerosols was rapid once the public were made aware of their effects. It is therefore important that accurate information about the environmental effects of all consumer goods and services is presented to consumers.

This book is a very good beginning for building a framework of practically applicable environmental economic theory. It does not claim to be a panacea and much further work has to be done if its ideas are to be implemented. It is however an important step forward and the book should be compulsory reading for all politicians and industrialists.

DAVID CATT

Alternative Energy In Europe by Jo Robinson. NATTA; 1989, 85pp, £5.

Trying to collect information on alternative energies from the many countries in Europe could not have been an easy task, Jo Robinson concedes that, in the end, what is presented is a sketch rather than a clear picture. Nevertheless it does serve as a useful document for those interested in alternatives in a European context.

By breaking the study down into countries, it becomes increasingly apparent that the adoption of alternative energies is not a technical problem but largely a political one.

What is called a 'new technology' in the UK is quite often tried and tested in one or more country in Europe. Finland, for instance, is pursuing combined heat and power, although they have a population of only 5 million (1985) they hope to have over 360MW from co-generation.

Denmark, having renounced the use of nuclear power, is reducing its reliance on imported oil by using a combination of energy conservation and indigenous renewables. In the longer term they plan to have 1,000MW of installed wind capacity by 2005, dwarfing the UK's 600MW set aside for all renewables.

When European Community trade barriers are brought down in 1992, it seems likely that there will be a flood of alternative technology into the UK. A very useful inclusion in this document is an introduction to the vagaries of the Community legislative structure. In general the community Energy Committee is sympathetic towards the use of renewables, but notes: that although public opinion is in its favour, this amounts to nought without the political will; and the need for research and development to enable breakthroughs. They said in 1988: "The development of new and renewable energy sources is dependent to a very large extent upon political will - rather than technical or economic circumstances or natural factors - which has considerably restricted what has been achieved in terms of energy share and potential energy share. If efforts were stepped up to a level fully reflecting the seriousness of the position of new and renewable energy sources could meet 25% of the community's energy requirements by the year 2020."

Available from NATTA, c/o Energy and Environment Research Unit, Faculty of Technology, The Open University. Walton Hall, Milton Keynes. Bucks.

MIKE TOWNSLEY

How Green is Your Power Station: Special report commissioned by the Coalfield Communities Campaign; 1989, 12pp, £7.50.

Here we go again: yet another report on the Greenhouse effect. This time its from people for coal power and most definitely against nuclear power.

Although the Coalfield Communities Campaign (CCC) did not exert any editorial control over this document they were safe in the knowledge that its well trodden path would not lead to a nuclear future. The report does include in its summary the statement: "In the short to medium term, there is no economic alternative to coal-fired generation."

Recent events in the electricity industry have stolen the fire from this and many similar reports that have been published recently. But the strength of these reports lies not in their criticism of the nuclear solution to the greenhouse effect but in their proposals. Energy efficiency once again comes top of the list for effectiveness in combating the greenhouse effect.

Energy policy is a phrase that is gaining increasing currency in the energy world. Now that the global warming is an accepted problem, the Government will be forced, by the weight of public opinion, to formulate an energy policy which reflects the gravity of an environmental crisis which many believe to be the most serious threat facing the world today. It is the lack of policy that has precipitated the crisis.

By dividing the problem into two halfs, CO_2 gases and non-CO_2 gases the authors seek to put fossil fuels contribution into perspective. It is in these two categories that they suggest steps for ameliorating the problem of global warming. For non-CO_2 gases they recommend:

a) the creation of a better public transport system;
b) the evolution of a 'low-input' form of agriculture;
c) pressing ahead with technical change that destroys CFCs.

They also admit that "non-CO_2 gases can be reduced by curtailing the use of fossil fuels."

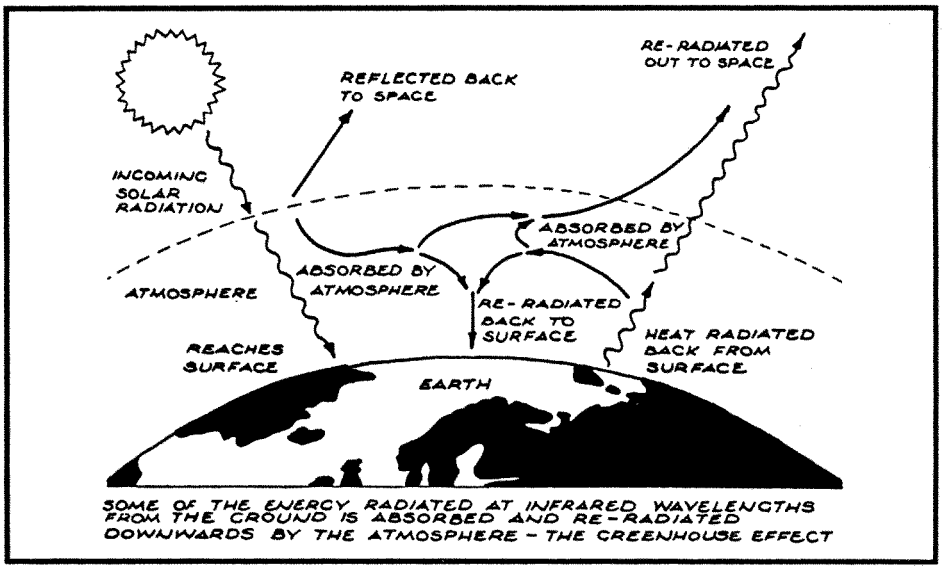
Although they concede that coal plays a major part in global warming they believe: "Government policy appears to derive not from any analysis of energy or environmental problems but rather of fear of miners and the mining community."

Coal fired power stations produce only 36% of the UK's CO_2 emissions: they account for "between 16 and 18% of total 'greenhouse' gas emissions from the UK." This is not exactly true. Nitrogen Oxides also come from coal stations. It does not help the anti-nuclear case to present the figures in this way; the real numbers speak for themselves.

Clean coal technologies are available, which reduce nitrogen oxide emissions and sulphur dioxide emissions drastically, by over 90%. These are touched upon only briefly in the report. It would have made more sense for the CCC to commission a report examining the pros and cons of different advanced coal burning technologies, than to have spent their money on producing a report reiterating the findings of every other study into global warming.

Yes, nuclear power is not the answer. Yes, coal will be needed to bridge the gap between now and the establishment of an energy efficient future based on alternative energy sources. But, which coal technologies will be the most effective and least environmentally damaging.

MIKE TOWNSLEY



No Earthly Reason? Poetry on Green Issues. Crocus Books; 1989 88pp, £3.50.

Seeing flowers sprout up on waste land, "nourishing the eyes", one of these poets asks "can words do the same?" The evidence of this book is that they can.

No Earthly Reason? is a rich mixture of poetry from throughout the North West England, and it covers a whole range of green issues, from hamburgers to motorways, salmonella to dolphins.

These are a celebration of the earth (of "a tree / To last beyond me"), and hopes and fears for its survival. There are satires on the hypocrisy of sudden "green conversions": on farmers hoping for drought so they can claim compensation; world leaders meeting to "thrash out, over champagne, the problems of third world debt" and; "the editors of the church magazine who were putting blank sheets at the end of each copy".

Several poems comment on the "North West England Theme Park", where "reclamation, gentrification" have lead to a "genteel graffiti-free photographic past."

There's a lot of anger in these poems, but it's transformed from pure polemic into poetry, as in the poem where someone "puts on zebra shoes / to dance the night away", but finds that "they felt wet inside - as if something / oozed / between my toes", and in the short, simple poem 'Seasons' which is worth quoting in full: "Seasons 'yeah I remember them' / they used to bring life / Regularly on a quarterly basis / Then one day / Man stopped paying the bills / And we were / Cut off".

No Earthly Reason? should prove a thought provoking introduction to green issues (it would be good to see it being used in schools, for example) and, for those who are already aware of the issues it gives a new, accessible, slant on them.

ELIZABETH BURNS

LITTLE BLACK RABBIT

John Collier, the chairman of the yet-to-be-named nuclear company for England and Wales, will receive a salary of £125,000 per year. LBR calculates that Collier will be earning as much every week as the SCRAM workers earn in a whole year.

LBR wants to know why people who have been proven wrong are rewarded, when those who have been proven right get zilch?

Yorkshire TV's famous film, 'Windscale: the nuclear laundry', propelled childhood leukaemia in Cumbria into the headlines (SCRAM 55). Now the TV company are hiring out their production teams to make promotional films. And, yes you've guessed it, BNFL is one of their first clients. They are going to make a film about Sellafield's excellent health record.

The Government would do well to heed Brian George's advice to the Hinkley Inquiry, before they turn the Suffolk coast into 'a disaster we must not repeat'. The Director of the CEGB's PWR programme said, "if we were not going to build a family of PWRs, then, I think, the investment in Sizewell B would become extremely doubtful, in terms of commercial value". (Day 13, 77D).

In order to avoid too much embarrassment abroad, when the PWR programme became a extremely small family of one, the day after Mrs Thatcher promoted nuclear power as "the most environmentally safe form of energy" at the UN General Assembly in New York, the Foreign Office sent a briefing to our embassies. It advised embassy staff to adopt a "business as usual" approach in answer to questions from local media. The Government "remains committed to a strong nuclear component", said the briefing. The decision "does not mean that nuclear power is to be phased out in the UK". Governments all over the world will obviously be eager to find out why the UK nuclear industry could not stand up to the scrutiny of the 'City', and what, if any, are the differences between their nuclear industry and ours.

M W Thring (presumably Mega Watt Thring) may be an elderly, retired, engineer, but sees no reason why he should sacrifice himself to protect the future of the nuclear industry. He recently received a request to volunteer his services to deal with the consequences of the next nuclear power disaster. (LBR was under the impression that disasters were impossible this side of the English Channel). Thring says that "public opinion will certainly stop [nuclear power] after the disaster", so they might as well stop before it happens.

On the day when everyone expected the CEGB to withdraw its application for Hinkley, their QC, Lord Silsoe, became the victim of one of their most persistent problems - a leak. LBR was visiting the inquiry in the hope of a celebration, and was just about to start singing 'raindrops keep falling on my head' (the roof was leaking), when someone observed "Just like his nuclear power stations", "just like the Department of Energy," someone else quipped.

That day's newspapers had an advert for a Senior Accountant to work for National Power, to "develop accounting techniques for handling long-term liabilities and cost forecasts." Pity they didn't have someone to do that earlier. One person who might apply for the job is Douglas Adams, author of 'The Hitch Hikers Guide to the Galaxy' and 'Restaurant at the End of the Universe'. He conceived the idea of paying for a meal at the Restaurant at the End of the Universe by depositing 1p in a bank account, then travelling forward in time to withdraw the deposit plus interest to pay for the "fabulous cost of the meal". It's almost like decommissioning, isn't it?

Three ways to fight the nuclear industry

Three ways to help SCRAM: fill in the appropriate section(s) together with your name and address and return the form to the address below.

1. I would like to subscribe to the **SCRAM Safe Energy Journal**, and I enclose an annual subscription fee of:

- ☐ £12.50 (ordinary)
- ☐ £15 (overseas)
- ☐ £30 (institutional)
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2. I would like to make a donation to SCRAM and enclose a cheque for:

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To the Manager: _____

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Please pay on _____ (date) the sum of

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Signed _____ Date _____