SCRAM

The Safe Energy Journal

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Before the Flood - Greenhouse Effect

Plutonium Flights of Fancy

Ministry of Truth - Chernobyl Lies

Milk of Human Kindness Exporting Chernobyl

CONTENTS

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COMMENT

In the words of Dr Tom Wheldon, at the Fourth Annual Low Level Radiation and Health Conference held in Stirling, to say that radiation has existed in the environment since the dawn of humankind and is therefore not a problem is just as daft as saying that crocodiles have been around since the beginning with no perceived adverse effects - they will still bite your leg off, given half a chance.

The second report on the incidence of childhood leukaemia near Dounreay from COMARE, of which Dr Wheldon is a member, is a valuable contribution to the debate; but don't forget what happened to the 1976 Flowers Report. For the uninitiated, Flowers recommended, among other things, that no large scale nuclear power ordering programme be embarked on until the nuclear waste problem had been solved. Since then we have had ordered and commissioned Torness, Heysham 2; ordered Sizewell B; proposed Hinkley C, Wylfa B, Sizewell C; and a public inquiry has been held into the Dounreay EDRP. Question to all governments since 1976: "Does this, or does this not, represent a large scale nuclear power ordering programme?"

It could be argued the public were not as educated then as they are now; and we have had TMI and Chernobyl. Also, our children's health is an emotive subject.

The COMARE report states that there is something common at Sellafield and Dounreay which could be contributing to elevated childhood leukaemia incidence. Privately, COMARE members say that it is radioactive discharges which should be addressed.

They call for a further study period to try to confirm this. The Scottish Office Health Minister (and general Pooh-Bah), speaking for the Government, accepted in principle the Committee's recommendations for further work. He said, "It is hoped that this work will advance our knowledge in this area." We agree, but should we not cease discharge operations until after the studies have reported? After all, suspected criminals can be kept on remand for months before they are found innocent at a trial.

The Flowers report also opined on the plutonium economy. On the return of plutonium to foreign customers: "As a matter of policy, such plutonium should be returned only in the form of mixed fuel elements designed to suit an existing power reactor." On civil liberties: surveillance activities on the general public might include "the use of informers, infiltrators, wiretapping, checking on bank accounts and the opening of mail;" these activities are "highly likely, and indeed inevitable" and no doubt "are already applied to certain small groups that are regarded as dangerous." True, but banal: confused?

Flights of Fancy?

Some members of the US Nuclear Regulatory Commission feel their current licensing criteria for plutonium air transport flasks "approach the upper limit" for designing a suitable flask for plutonium shipments from Europe to Japan. STEVE MARTIN reviews the progress of the debate in the US Congress and assesses how it may affect the planned air transports.

John Fliger, Bulletin of the Atomic Scientists

The US State Department have assured Congress that no transports of plutonium oxide powder from Europe to Japan will be allowed to go ahead, under a recently-ratified Nuclear Co-operation Agreement between the US and Japan, unless a proposed flask is certified under the extremely stringent Nuclear Regulatory Commission (NRC) regulations.

The so-called Murkowski amendment, enacted into US law last year, requires a plutonium air shipment flask to be tested under stresses likely to occur in a worst case accident. In fact Congress approved an amendment earlier this year which will allow the NRC to require crashing an aircraft to test the performance of a proposed flask.

Some NRC officials believe impact forces generated in such an accident could exceed by a factor of two to three those previously considered in their 1978 regulations. One source felt the 1978 regulations "approach the upper limit" for a practical design of air transport flask. Using such worst case criteria could effectively preclude air shipments of plutonium from Europe to Japan.

A further complication for flask design licensing has arisen. Following intense lobbying by Canadian and Alaskan authorities the aircraft will no longer be allowed to land at Anchorage airport in Alaska for refuelling; indeed the flights will not be allowed to enter US airspace. However, the US State Department will allow the aircraft to land at a remote military base in the event of an emergency.

FLIGHTS THROUGH A COMBAT ZONE?

Even if these obstacles can be overcome, there are still other problems waiting in the wings. The requirement for non-stop flights to Japan is stretching the capabilities of present aircraft design. The State Department have "determined that, within the near future, there will be aircraft capable of transporting plutonium from Europe to Japan nonstop, using a polar route that would not require overflights of the US, Canada, or any other country." By implication, no such aircraft currently exists.

In a letter from President Reagan to the chairman of the Senate Foreign Relations Committee, dated 29 January 1988, the issue of using a US military base was addressed: "the Department of Defense has determined that there are possible routes utilizing US military facilities in the Aleutians for refueling." This part of the world is practically a combat zone in the US/USSR confrontation, and decidedly trigger-happy. One has only to recall the Korean Air Lines 007 incident.

Civil liberties could also be seriously eroded. The US-Japan Agreement includes an annex of guidelines for the transports. They include the following:

- The shipment will be accompanied by armed escorts to protect the cargo.
- "Determination of trustworthiness" will be made for people involved with the shipment, including "ground personnel".
- Relevant authorities, including police or other armed personnel, will have to protect the aircraft at any airport against theft or sabotage.

LOCAL AUTHORITIES "HORRIFIED"

British Nuclear Fuels admit that "Prestwick is the currently preferred airport for such shipments (from the UK to Japan) on both operational and cost grounds," due to a suitable length of runway for a B747 freighter, and its proximity to Sellafield.

Councillor Brenda Campbell, Convener of Environmental Services of Kyle and Carrick District Council, is "horrified" by the prospect. She says that Kyle and Carrick District remain "implacably opposed" to these shipments. Prestwick Councillor John Bailey of Strathclyde Regional Council is "very concerned that US authorities may at some time become involved with vetting civilian workers at Prestwick airport. If this happened I would raise it with the Region, in its role as a Police Authority."

Strathclyde Region are seeking a meeting with BNFL to discuss the proposed flights, and they will be working closely with Kyle and Carrick District on this issue.

However, if the regulatory log jams in the US are not resolved the flights may not take place at all. But, President Reagan is keeping a card up his sleeve: the Department of Defense "has determined that civilian (sea) shipment, given a military escort, would provide a level of physical security equivalent to that afforded by civilian air transport." This has been done before: in 1984, a 250kg consignment of plutonium oxide sailed from France to Japan with an military escort from France, Japan, US and the UK, and satellite surveillance. At the time the US told the Japanese that future sea shipments would not be approved, because of the great costs involved. But now they may have to reconsider.

PRIVATISATION NOTES

The creation of a 'free market' assumes "equality of opportunity between participants," according to Andrew Holmes, the author of a new report from Financial Times Business Information; yet in the context of a European Electricity Industry no such thing exists.

The report - **Electricity in Europe: Opening the Market** - examines the prospects over the next decade as several countries plan structural and ownership changes, and the EEC plans to include electricity in the "single internal market."

However, conditions in each country are very different. The West Germans, for example, are forced to support an ailing domestic coal industry and bear stringent environmental legislation; whereas the French have been free to develop as much nuclear power as the country can hold and run up a foreign debt of $39 billion in the process. Because this debt is not reflected in the selling price, the German industry is vulnerable to the French 'dumping' their surpluses.

Also the European 'fuel mix' is changing. Nuclear power is no longer on the agenda in most of Europe: German politicians now talk about it as a 'transitional' source bridging the gap between coal and renew-ables; in Spain the overambitious nuclear programme has exacerbated the industry's financial problems and led to its restructuring.

Coal is cheaper than 1970's forecasters ever imagined it could be; natural gas, once considered too precious to burn, is now abundant; and a new fuel known as Orimulsion - a cross between coal and oil - from Venezuela is likely to make an impact.

On UK privatisation, Holmes asserts that the needs of the consumer are already met to a greater extent than in most countries, and the Government have failed to explain how they will be improved by privatisation: judging which of the new utilities will have the necessary entrepreneurial spirit to become successful "will make an interesting task for the nation's investment analysts."

He added: "The notion that competition will make electricity supply more efficient is an interesting hypothesis, but no more than that. No proof of it can be derived from foreign ESIs (Electricity Supply Industries), because nowhere has competition ever been more than a marginal consideration."

Holmes concludes that an entirely open electricity market in Europe is "a figment of the imagination." Many countries will allow new private generators access to their grids, but this can easily be achieved without re-organising the industry.

The UK may, in fact, rescue the West German industry by taking French imports as part of the 'non-fossil fuel' quota. But it must be borne in mind that the French definition of production cost bears no relation to the overall cost of the nuclear programme, as it makes no allowances for EdF's staggering long term debt.

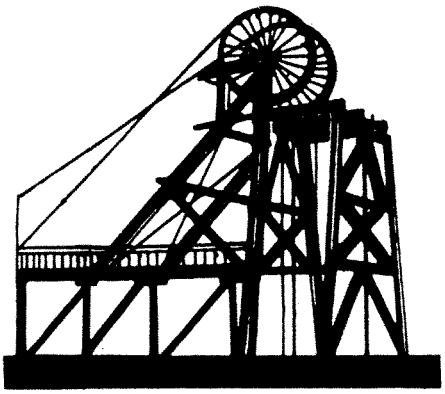
The danger for European electricity, at present, is that the feverish desire for structural change will become contagious without making any differences to the problems which will have to be faced in the 1990s. The irony is that US examples are frequently quoted to show what free enterprise can achieve; yet in most cases it has been the Public Utility Commissions - arms of local government - which have brought new and innovative practices into being.

Table 5.1: NUCLEAR POWER PLANT CAPACITY OF EUROPE (GWe net) AND PROJECTIONS

	1970	1985	1987	1990	1995
Belgium	-	4.5	5.5	5.5	5.5
Finland	-	2.3	2.3	2.3	2.3
France	1.5	33.9	44.5	52.5	60.3
Germany	0.8	16.1	18.9	23.0	23.0
Italy	0.6	1.3	1.3	1.3	3.1
Netherlands	0.1	0.5	0.5	0.5	0.5
Spain	0.2	4.7	5.5	7.5	8.4
Sweden	-	9.5	9.6	9.6	9.6
Switzerland	0.4	2.9	2.9	2.9	2.9
UK	4.2	7.2	10.8	12.6	12.6
Yugoslavia	-	0.6	0.6	0.6	0.6
Total	7.8	83.5	102.4	118.3	128.8

Source: Nukem

Effect on British Coal



The UK coal industry could face a new wave of closures following privatisation of the electricity supply industry, according to the Institute for Fiscal Studies, in a recent report - **Privatising Electricity: Impact on the UK Energy Market.**

The CEGB claim their current policy of burning mostly indigenous coal costs them around £750 million each year. Using imported coal could lead to a lowering of electricity costs. But some of the potential benefit will be lost by requiring the industry to meet part of its fuel requirements from high cost nuclear sources. The Institute also describe nuclear power as "uneconomic on any commercial criteria."

Although there are a great many uncertainties surrounding the impact which privatisation can be expected to have on British Coal, it is clear they can no longer expect to be the sole supplier of coal in the UK.

The average price of British coal to the CEGB is £42/tonne, at which level BC can barely make a profit. Imported coal is available at £25/tonne including transhipment costs. Although the price cannot remain at this level forever, it is unlikely to rise above £33-38/tonne.

British Coal are partly protected by the upward pressure on world prices which would be caused by UK imports, and the cost of transporting coal to inland power stations. But to fight off substantial imports, British Coal will need a favourable exchange rate; higher world prices; continuing uncertainty in South Africa; serious problems with nuclear power; and a substantial fall in production costs. The chances of a large increase in imports is, therefore, high.

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Emergency Planning

The evacuation of cities in the event of a nuclear accident would be virtually impossible - with the possible exception of pregnant women and children - and it is highly unlikely that sufficient quantities of iodine tablets would be available. This is the conclusion of a recently published report on the consequences of a nuclear accident at Trawsfynydd.

Greater Manchester Fire and Civil Defence Authority initiated their study - **Operation Spring Mist** - following the proposed test at Trawsfynydd in February. Cllr Sean Rogers, chair of Greater Manchester's Emergency Planning Committee, claimed if the test had gone wrong Chernobyl would look like "a tea party."

Magnesium oxide fuel cans used in Trawsfynydd are flammable, unlike those in Chernobyl, and could lead to a 13-30% release of the fuel inventory, compared with only 4-7% at Chernobyl.

The Chief Emergency Planning Officer found that there were no specific contingency plans, at a local or national level, because the Government refuses to acknowledge the possibility of a domestic nuclear accident. Nor does the Government see any role for local authorities. Consequently they are the last to be informed, so Greater Manchester might not find out about an accident for 5 or 6 hours.

He concluded that unless there is a properly planned and coordinated response, coupled with an improved warning system from the CEGB, the people of Greater Manchester, despite the best efforts of the emergency services, would be left virtually unprotected.

The report recommends that the Government should recognise the possibility of a domestic nuclear accident and draw up appropriate emergency plans. It also calls for the closure of Trawsfynydd and the abandonment of plans for a PWR in north Wales.

It is indeed fortunate that the Trawsfynydd test was cancelled: reactor 1 was closed down for its biennial maintenance on 12 February 1988; it should have restarted about 8 weeks later. However, some 4 months later, the CEGB are still unable to confirm when it will restart, following the discovery of weld defects. The Board have given scant details of the faults, but it appears a thorough inspection was not undertaken before the test was proposed.

US Accidents Report

More than 26,000 accidents have occurred at US reactors since the Three Mile Island accident nine years ago - 3,000 in 1987 alone.

This is the claim of a new report by US consumer group, Public Citizen. The group say that despite promises to tighten safety standards, "the safety record of the nuclear industry remains abysmal."

At least 1,000 of the accidents were particularly significant according to the Nuclear Regulatory Commission, and they have estimated the chance of a major meltdown within the next 20 years to be as high as 45%.

- During 1987 the Peach Bottom plant in Pennsylvania was closed by the NRC because operators were found to be regularly sleeping on the job. A nuclear industry safety organisation described the management at Peach Bottom as "an embarrassment to . . . the nation."
- Also in 1987, operators at Oyster Creek in New Jersey degraded the plant's ability to control pressure build-up in the event of an accident in violation of NRC regulations.
- At Pilgrim, Massachusetts, 19 workers were contaminated in a series of leaks caused by incomplete maintenance work.

For the ninth year in succession, US commercial nuclear plants operated at less than 60% of their capacity. Nuclear power supplies only 17% of total US electricity, while overcapacity stands at over 30%.

Public Citizen have called for the rapid phase out of nuclear power: all plants under construction should be halted; any plant currently closed for safety reasons should be retired; those plants considered to be the most dangerous should be retired, except where they are required to meet local energy needs; and all remaining plants should be closed as soon as possible.

Sellafield Malpractice

Cumbrians Opposed to a Radioactive Environment (CORE) and Greenpeace have published a report which reveals a cavalier attitude towards worker health and safety at Sellafield.

The report - **Behind Closed Doors: Malpractice and Incidents at Sellafield** - alleges that worker radiation dose records were deliberately falsified; a number of serious accidents went unreported; radiation monitoring systems and safety procedures were avoided; and there was critical understaffing in some active areas.

The allegations are made even more disturbing because of the alleged weaknesses in worker radiation dose recording procedures and the fact that this attitude is encouraged by supervisors under pressure from management to get the job done.

Information in the report came from three Sellafield workers, and covers a ten year period. A huge number of contaminations and breaches in safety regulations are alleged, which the Nuclear Installations Inspectorate have apparently never been told about.

The identity of the informants has been kept secret for fear that they might be prosecuted under Section 2 of the Official Secrets Act.

A copy of the report has been sent to the NII, together with a request that they set up a procedure whereby workers can approach them in complete confidence to voice their safety fears. This is the only way, say CORE, that they might stand a chance of stamping out bad practices at Sellafield.

Contact: CORE, 98 Church St, Barrow-in-Furness, Cumbria. Tel: 0229 33851.

Dose Limits

US worker dose limits are unlikely to be revised to bring them into line with proposals by the UK National Radiological Protection Board.

The Nuclear Regulatory Commission do not think the expense is justified, especially when most workers receive far less than the 5 rem/year limit. The NRPB has recommended that workers should not exceed an effective dose of 1.5 rem/year.

Independent Monitoring

A proposed Local Authorities Radiation and Radioactivity Monitoring and Collation Centre should be able to provide a national database independent of the Government and the nuclear industry. The Centre has been agreed in principle, with the aim of advising and co-ordinating the activities of the 150+ local authorities carrying out radiation monitoring.

The Convention of Scottish Local Authorities, the Association of Metropolitan Authorities, the Association of County Councils and the Association of District Councils are all involved.

For several months a group of officers has been considering the possible benefits of setting up the Centre. Guidance would be given on the design of monitoring programmes, so that they would be fully compatible, and their quality assured.

The objective is not to operate in competition with the National Response Plan, but to complement it. But this will depend on the Department of Environment informing the Centre immediately in the event of an emergency, and allowing them access to data collected by government agencies.

The Centre would then be able to make a preliminary assessment of the likely impact of the emergency and alert local authorities to monitoring priorities. An independent assessment of counter measures could then be made.

No firm commitment to fund the Centre has yet been agreed, but with running costs for the first year of only £85,000, and the possibility of aid from the European Community, each authority's contribution should be quite small.

A seminar for all Council's involved has been arranged for September, where a more detailed explanation of the Centre's role and a firm indication of costs to each authority will be spelt out.

Referendum Results

Residents of Sacramento, California, voted on 7 June to place the 13 year old Rancho Seco nuclear plant on probation. A proposal to close the plant permanently was narrowly defeated by 50.4% to 49.6%.

The plant has the worst safety and economic record of any US nuclear station, according to its opponents.

The Utility knew they were heading for defeat, so they added a second question, giving voters the option of probation rather than complete closure. The plant will have to operate at a 70% load factor for 18 months - it has only managed a 38% annual average load factor to date - before another vote.

During the referendum campaign the plant's supporters outspent opponents by 5 to 1. Five previous referenda in the US since 1976 have all failed to close nuclear plants by at least a 10% margin.

Nuclear Policy

The Government's Advisory Council on Science and Technology (ACOST) believe there is no justification for future public inquiries to be as long as Sizewell B, "because the main issues have now been adequately examined."

ACOST, which includes several people who previously argued strongly in favour of the AGR, such as ex-SSEB chairman Sir Frank Tombs, also conclude that there is no point in spending money keeping open the AGR option - its future resurrection after a period of inactivity will result in heavy financial penalties.

Even the pro-AGR SSEB require no new capacity before the end of the century, and they are said to be looking at new coal-fired capacity to replace the ageing Hunterston A magnox station.

In their deliberations on the PWR, ACOST conclude that a future programme of 4 or 5 stations should be sufficient to encourage UK firms to invest in the necessary facilities to allow them to compete in international markets. Whilst going for the PWR apparently exposes our manufacturing industry to foreign competition, particularly after 1992, it is noted that 93% of Sizewell's contracts should go to UK companies.

But this expenditure would only be justified if Britain sticks to the same design and uses the same suppliers for each new reactor. However, this could be scuppered by the CEGB. They are considering building only 2 or 3 plants of the Sizewell design before switching to a French design.

According to Unipede (Union of Producers and Distributors of Electrical Energy), privatisation will wipe out any claimed cost advantage which nuclear power in the UK currently enjoys, because private companies are expected to make a higher rate of return than public ones.

The CEGB therefore want to develop a PWR with a single 1,400 MW turbine-generator, which, they claim, would cost no more to build than Sizewell but would produce 20% more power from less fuel, and hence be cheaper to run. Such a change in design could threaten the economic benefits which could be obtained by serial replication of the Sizewell design.

Nirex have indicated for the first time that Caithness is at the top of their list of possible sites for dumping low and intermediate-level nuclear waste.

George Foulkes MP, who represents Carrick, Cumnock and Doon Valley, wrote to Nirex asking whether Ayrshire, wherein his constituency lies, was being considered. Nirex replied that they had received "an invitation from Caithness District Council inviting us to investigate the potential of that area. We are now considering our response in the knowledge that both the United Kingdom Atomic Energy Authority and Lord Thurso, who have substantial land holdings there,would be willing for us to study sites owned by them."

Nirex Waste

● The US Government's $700 million underground repository for demonstrating the safe disposal of plutonium contaminated military waste has sprung a leak.

Situated in the New Mexico desert, once thought by government scientists to be one of the driest places on earth, the repository was due to accept its first waste in October this year. But water is leaking in at a rate of over a gallon a minute, and could be saturated within 25 years.

In response, the Department of Energy will probably simply reduce the amount of waste intended for the repository, but would prefer to go ahead as planned.

Australian Uranium

Australia's ruling Labour Party (ALP) ended their national conference in June having prepared the way for the abandonment of some of their most sacred policies on uranium.

Their 1983 policies to forbid further mines and to ban exports to France until Pacific weapons testing is abandoned have now been eroded.

Roxby Downs mine in South Australia was allowed a development lease in 1983, because uranium extraction was claimed to be merely incidenral to the mining of copper and gold. BP own 49% of this mine.

More recently Conzinc Rio Australia (CRA), an associate company of the UK multinational RTZ, have been exploring in Western Australia. Federal Labour MPs from the State lobbied to change the Party 'no new mines' policy to a 'three mines' policy. This would allow CRA to develop a mine at Rudall River, when Nabarlek in the Northern Territories closes soon. National Conference ordered a review of the uranium mining policy.

The ban on exports to France was lifted in August 1986, when the Hawke Government approved a new contract. Conference reluctantly legitimised this contract, but ordered that no further sales be made until Pacific weapons testing is halted.

To accommodate Australia's wish that their uranium is not used for weapons, a portion of the end-product from the French Tricastin enrichment plant is designated as being for non-military purposes only. But it is now accepted that there is no way of tracing the precise destination of Autralian uranium.

Hinkley

The electricity industry have been exposed for fiddling their accounts, in a report commissioned from their own financial advisers. The document was so embarrassing that it was suppressed until word of its existence leaked out - the Energy Select Committee subsequently demanded its release.

Even then it was only produced after the Electricity Council were threatened with a visit from the Sergeant at Arms.

The report, by Price Waterhouse, shows that the Electricity Council have been underpricing its "flagship" Economy 7 cheap night rate for storage heaters, by 28%.

This is significant for the Hinkley inquiry because a disproportionate amount of night supply is provided by nuclear power, which the CEGB describe as "cheap base load electricity." It is not presently possible in Britain to use nuclear power for "load following" - varying output to meet fluctuating demand - therefore the generating bodies, in a desperate bid to offload their nuclear overcapacity in the small hours of the morning, underprice it.

At Hinkley, the CEGB plan to argue a PWR is a "sound economic choice." Their own financial advisers show as a fiction.

Price Waterhouse also argue that independent electricity producers are being offered a price which is 10% lower than it should be because they base their payments on the average cost of coal - £32.50/tonne - when they should have used the marginal cost - £42/tonne. The marginal cost is the cost of running the least efficient, and most expensive, power stations. These are the ones which are shut down when outside suppliers come in.

There is now no way the CEGB can claim they need more nuclear power because it is 'economic'. A central pillar of their case for Hinkley C has thus been demolished before the inquiry has even begun.

Photo: Paul Glendell

Site of the proposed Hinkley Point C.

Ministry of Truth

Two years after the Chernobyl nuclear accident, the Government's handling of the affair is the subject of an investigation by the House of Commons Agriculture Committee. Predictably, the message presented by the different government departments is that the lessons have been learnt and Chernobyl was not that bad anyway. PATRICK GREEN assesses MAFF's evidence and accuses them of attempting to rewrite history.

The message from the Ministry of Agriculture, Fisheries and Food (MAFF) to the Agriculture Committee is different from that of other departments, and as such is more worrying. Quite simply they claim their response was perfectly satisfactory and they do not accept mistakes were made. By implication they have no lessons to learn.

MAFF's evidence describes a carefully co-ordinated response which fulfilled its primary objective to "protect the food chain from unacceptable radioactive contamination," and "where necessary, to ensure that alternative food supplies are available."

Unfortunately for MAFF their evidence is not supported by their previously published information. Thus, one can only conclude that MAFF deliberately sought to mislead the Committee in their investigations.

In their evidence MAFF make several statements that are either wrong, distortions of events or completely false. The following goes through some of their evidence, and offers an alternative interpretation.

● MAFF maintain they initiated daily testing of milk from the south east of England, as a precaution, when they first heard of the accident on 29 April 1986. In fact the monitoring they carried out was of an extremely limited nature. Between 29 April and 1 May - the day before the cloud arrived - only six samples were tested: five from Surrey and one from Norfolk. Such a small sample size does not amount to precautionary monitoring, as it cannot yield any useful data against which increases can be compared.

● MAFF's evidence claims their monitoring was extended nationwide on 3 May, and that a national incident room was radidly set up. And, by the time the cloud arrived on Friday 2 May 1986, MAFF claimed there was close liaison with the Meteorological Office, who advised on areas to monitor.

However, with the exception of the areas already mentioned, MAFF only monitored five extra samples from Cumbria on 3 May. Monitoring was not extended to other areas until 4/5 May and their incident room was not established until 4 May, two days after the cloud arrived. Futhermore MAFF did not make the necessary arrangements to ensure they received the monitoring results within 24 hours until after the cloud arrived. If MAFF were prepared, as they claim, such arrangements would have been made before the cloud arrived.

The claimed close liaison with the Met Office is contradicted by MAFF's failure to identify heavily contaminated areas like Skipton Moor. MAFF totally ignore the fact that this hot spot was discovered by **Farming News** and Friends of the Earth, and that both the National Radiological Protection Board (NRPB) and the Met Office were aware the area received heavy rainfall over the weekend 2 to 5 May, but no-one told MAFF.

● MAFF claim their programme was designed to show the worst case contamination levels in food. This claim is false. MAFF's press releases from 1986 quoted contamination levels in terms of national average figures which ignored regional contamination. They have subsequently claimed the data were there for anyone who wanted them. This ignores the fact that back in 1986 terms like 'becquerel' were less understood than they are now. Consequently the tables of data accompanying the press releases would have been meaningless to many people.

In fact in early May, when the NRPB published regional data, MAFF were questioned about the

* MAFF tested only six samples of milk from south east England between 29 April and 1 May.

* Five further samples were tested from Cumbria on 3 May, but monitoring was not extended to other areas until 4/5 May.

* A national incident room was not set up until 4 May - two days after the cloud arrived.

* MAFF failed to identify Skipton Moor as a heavily contaminated area even though the Met Office and NRPB knew the arec received high rainfall over the weekend of the cloud's arrival.

* MAFF's quoted food contamination levels were expressed in terms of national average figures - worst case levels were ignored.

* Meat firms were not warned about their products until mid-May when exceedingly high levels of contamination were discovered in five cattle thyroid glands.

* Delays in implementing the lamb bans probably led to contaminated lamb from Cumbria and North Wales going to market.

* The lamb bans were expected to last for only three weeks and are still in force over two years later.

validity of national average figures. They maintained they were acceptable and the NRPB figures probably represented extreme examples. Thus, MAFF's current explanation is exactly the opposite of their 1986 position.

> "... MAFF deliberately sought to mislead the Committee in their investigations."

One reason why MAFF may have chosen to publish national average figures is that their sample size was too small to accurately assess the extent of regional contamination, and the risk to the public. For instance, once MAFF had started monitoring nationwide on 4 and 5 May, they monitored 150 samples from 33 different areas: an average of 4.5 samples per area.

Furthermore, MAFF initially concentrated on Iodine-131 levels in cows' milk. After May they should have been monitoring milk for caesium, but no samples were tested until the autumn. Consequently there are no data on caesium levels in milk during the period when caesium was found to be a problem in upland areas.

The sampling of sheeps' milk was even worse. One sample from Surrey contaminated with over 2000 Bq/l should have led to warnings being issued and alternative supplies used. Instead no warnings were given and only fourteen other samples from the area were tested as a follow-up. Even though these showed lower contamination levels, the sample size is totally insufficient to determine the range in contamination levels and to establish whether or not the initial reading was typical or not.

● MAFF claim the levels of contamination in vegetation and crops were low and only reached a small percentage of the Derived Emergency Reference Level (DERL) although the sample sizes were too small for an accurate assessment. In addition they failed to take action where contamination was found. For example, in Essex a sample of spinach monitored in early May was found to be contaminated with 701 Bq/Kg of Iodine-131 and 306 Bq/Kg of caesium. A sample of parsley, also from Essex, was found to be contaminated with 803 Bq/Kg and 567 Bq/Kg of total caesium.

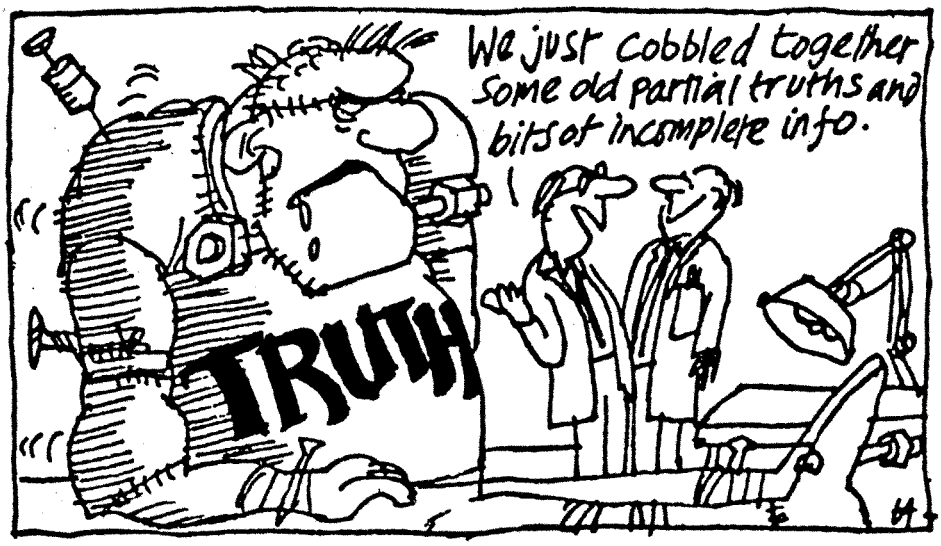
The fact that these readings are only a fraction of the DERL is irrelevant. It would have cost MAFF nothing to advise people that as a precaution vegetables should be washed extremely carefully prior to consumption (which would have the effect of significantly reducing the contamination levels). No such warnings were given. Given MAFF's stated functions this lack of action is unacceptable.

● MAFF also claim they monitored meat and meat products of all types. In mid-May MAFF found exceedingly high Iodine-131 levels - up to several hundred thousand Bq/Kg - in thyroid glands of five cattle from Essex, Hereford, Kent, Surrey and North Yorkshire. They warned meat firms to ensure the thyroid glands do not get into meat supplies, but claimed these five cattle had not been destined for human consumption.
A further 26 cattle were tested, of which 4 came from these areas. Again this is insufficient for a detailed follow-up after the initial high readings.

● MAFF's treatment of the lamb restrictions is equally disturbing. They fail to address the evidence that contaminated lamb reached the food chain because of delays in implementing the restrictions after the first high readings had been found in mid-May. This probably resulted in contaminated lamb from Cumbria and North Wales, and a number of farms which were contaminated but not identified in 1986, going to market. It should be noted that **The Observer** recently published evidence to suggest that sheep in Somerset and Devon were heavily contaminated in 1986.

● MAFF also completely ignore the fact that the restrictions were expected to last for only three weeks and are still in force over two years later. Instead of acknowledging that their predictions were incorrect, they attempt to portray the introduction of the lamb bans as a carefully controlled exercise.

Their discussion of their computer model implies they have always known upland ecologies are more complex. If this is the case one has to question why the Minister categorically stated the bans would only last for three weeks, and why MAFF did not have computer models for upland soils. This will be discussed further in the next issue of SCRAM.



MAFF's unwillingness to acknowledge the mistakes of 1986 clearly indicates they have not learned from Chernobyl. It also suggests they have something to hide. Unless the Agriculture Committee recognise this, MAFF's attempt to rewrite history will succeed.

PATRICK GREEN is Friends of the Earth's radiation consultant.

Privatisation of the electricity supply industry is forcing the Conservative Government into an unpleasant dilemma: should they continue their unswerving support for nuclear power; or should they continue their war on public spending? ANDREW HOLMES addresses this quandary and asks what will happen to Dounreay, Sellafield and the rest of the nuclear industry, particularly the research sectors.

The Irresistible Force meets the Immovable Object

Nuclear power has been strongly supported by the Conservative Party, particularly since the miners' strike of 1974. Yet this support has always been contradictory, and more so than ever since Margaret Thatcher became leader. A party which stands for the reduction of public spending lend their weight to a technology which, more than any other in the civil economy, has squandered financial resources and thrown good money after bad. Now, however, the government are having to face up to that contradiction, because of their plan to privatise the electricity supply industry (ESI).

Energy Secretary Cecil Parkinson has made clear his wish to see the existing nuclear power stations sold to the private sector and new nuclear stations built with private money. The plans for keeping nuclear power alive mainly affect England and Wales. It will be a long time before Scotland needs to build a power station of any kind, but in England and Wales the Sizewell pressurised water reactor is under construction already, with an inquiry about to start for a successor at Hinkley, and at least two others (at Wylfa on Anglesey and possibly Dungeness in Kent) to follow shortly. Here the plans are of immediate relevance.

The plan is as follows. A new company (nicknamed Big G), formed of 70% of the Central Electricity Generating Board's (CEGB) power station stock, will inherit all the nuclear plant and the responsibility for building more. The 12 Area Boards (distribution companies) will have a statutory duty to take a certain amount of their supplies from "non-fossil fuel sources". The quota has not yet been specified but will probably be around 20%. The government will have the right to change the quota year by year.

On the face of it this must look like another soft touch for nuclear power. But it is not that simple. The scheme proposed commits the government to absolutely nothing. The nuclear quota could be 20% - or whatever the theoretical maximum production from nuclear power is - but it could also be much less. The "non-fossil fuel" categorisation includes not just Big G's nuclear output, but also imported electricity from Scotland and France; and the Area Boards can make their own choice about how they fulfil their quotas.

As well as turning the ESI over to the private sector, the Conservatives have pledged to introduce competition into the electricity industry, despite the fact that competition has never been a central principle of electricity supply anywhere, at any time.

Nuclear power and private capital don't mix well these days; nuclear power and competition are more or less mutually exclusive. In the months between the 1987 general election and the unveiling of the White Paper on ESI privatisation, published in March this year, it was clear that something had to give. And all the indications are that nuclear power has ended up the loser.

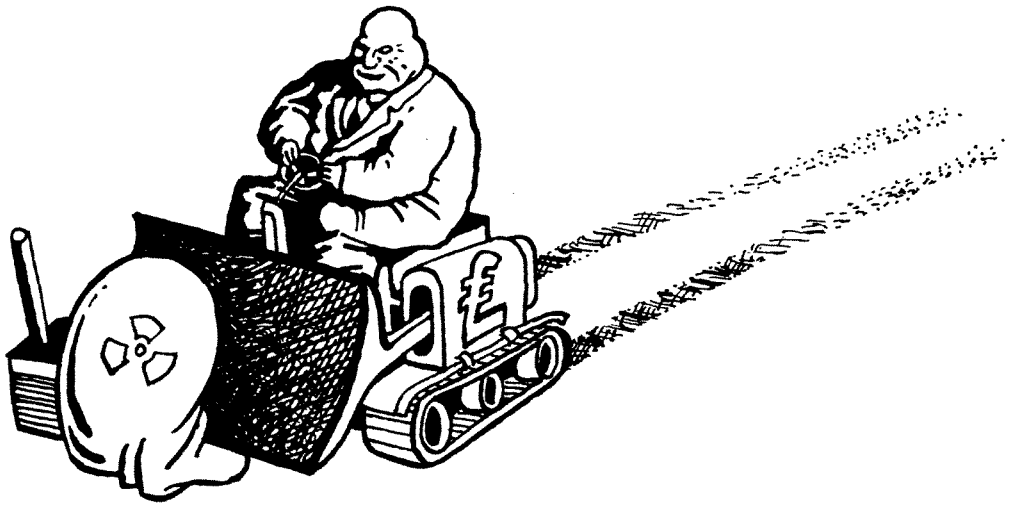
The Parkinson nuclear scheme is a way of building a ring fence around the output of the CEGB's existing nuclear stations. How - or if - it will allow the construction of new nuclear stations remains to be seen. At present, we are about to see the unusual spectacle of a company, the CEGB, applying for a new nuclear station, Hinkley Point C, which will barely have started construction when the company disappears. The White Paper gives no hint that this might be something of a problem.

Indeed, the White Paper considers nuclear power purely and simply as a collection of nuclear power stations, completely ignoring the rest of the nuclear industry, and most notably the UK Atomic Energy Authority (UKAEA) and British Nuclear Fuels plc (BNFL). The only role allocated to these two companies is as "competing generators" within the privatised system, matching their collection of geriatric reactors against imports from the South of Scotland Electricity Board (SSEB) and Electricite de France. Of the rest of the nuclear fuel cycle; of fast breeder research; of reprocessing; of the future of BNFL and the UKAEA; the White Paper has nothing to say.

"something had to give ... nuclear power has ended up the loser."

The CEGB, however, having lost their great battle to remain intact, have been very far from silent. Their chairman Lord Marshall has said that Big G - of which he is to be chairman - will not be able to fund fast breeder research. Bearing in mind that Mr Parkinson, in his first nuclear site visit as energy minister, promised a bright future for the fast breeder project at Dounreay, this puts him in a slightly embarrassing position.

During his Dounreay visit, Mr Parkinson seemed not altogether clear about the present position of fast breeder research world-wide. The facts are these:



the USA have given it up; Japan have postponed it indefinitely; the Soviets are doing something about it, but nobody's very sure what; India are also doing something, a fact which nobody really likes to think about. In Europe France have built a "commercial" breeder, it has broken down, and Electricite de France don't want any more; the Italians have closed theirs, along with everything else to do with nuclear power; the Germans have gone off the idea of plutonium since the Nukem scandal, as have the Belgians, while the Dutch went off it years ago. And in our case, we have Dounreay.

NO HELP FROM THE CITY

The one thing which might be noticed is that privately-owned nuclear electricity industries are conspicuous by their absence. Most privately-owned utilities, anywhere in the world, would turn pale at the idea of trying to build even a conventional reactor. The fast breeder has as much relevance to their lives as H G Wells' time machine. Uranium, for those who want it, can be had cheaply and easily. The need for a power station fuelled by plutonium is so far away as to be invisible to most in the electricity industry - even if fast breeders worked well, which they don't, and were economic, which they aren't and are never likely to be.

None of this mattered much as long as the fast breeder was safely wrapped in the cocoon of the public sector. But the people who will own the industry after privatisation will be harder to convince. One thing which can be said about the money men of the City of London is that they are not sentimental about nuclear power. They will not put their money - and this is real money, not public money - into a venture like the fast breeder, which has no prospect of a return.

So the choice now facing the government is simple; abandon the fast breeder or pick up the tab; all of it, and forever.

If the fast breeder goes, much else goes with it. For example, what conceivable purpose is there in reprocessing nuclear waste if there is no prospect of using plutonium for electricity production? Why should the UKAEA continue to exist if there is no fast breeder research to be done? What is to become of the Dounreay community when and if the breeder is abandoned?

On the other hand, should the government simply decide to pick up the tab, it will have to find some sort of political justification for doing so, beyond keeping Dounreay active as the most expensive job creation scheme in history.

The option of taking the breeder, and all its related works, under the wing of the state, is not as easy as it may seem. The Treasury, like the City, understands only one language, and it is a different one to that spoken in the UKAEA. The prospect of funding fast breeder research, indefinitely, to no very obvious purpose even in the long term, will be hard to sell to those Treasury mandarins whose sole purpose in life is to avoid the expenditure of money.

The reality is that privatisation has forced the issue of nuclear power, and particularly nuclear research, in a much more dramatic way than could have been imagined five or ten years ago. Hard decisions need to be made, and will be made, because ESI privatisation is among the biggest projects of the Third Thatcher Term. Nuclear power has finally met a force bigger than itself. That it should come from the Right rather then the Left is not really surprising; money has always been one of nuclear power's big problems, and nothing, these days, is more important than money.

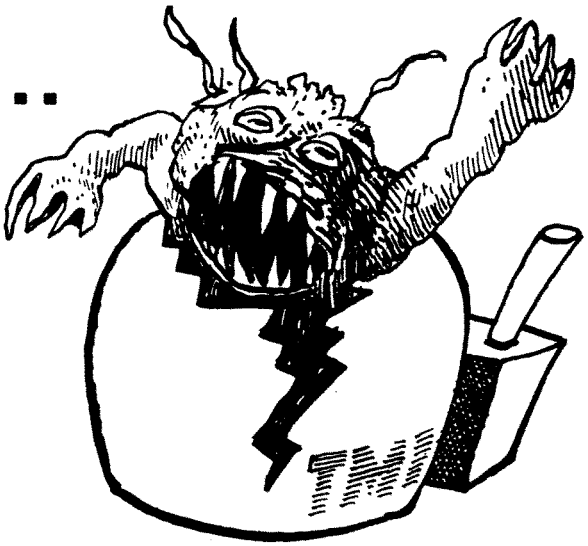
THE PARTY'S OVER

The crunch will come first at Dounreay. The decision on the plant's future has been postponed until a more general review of research spending is carried out in the autumn. It will not, however, be postponed for much longer thereafter, and the likelihood is that the government will be looking for a way to wind down the Dounreay plant in an orderly fashion. Following this, there will need to be a decision on the general management of the nuclear 'cycle'; who will take responsibility for waste disposal, decommissioning and so on. The deadline for these decisions is set by the government's own timetable for privatisation. Unless there is a major change of policy, the government will need to have the loose ends tied up in time for writing the investment prospectus for Big G, sometime in 1991, at the latest.

The nuclear establishment will fight as hard as ever to retain their influence and spending power, but so far they have met with little success, and nothing suggests that they will do so in the next few years. The conclusion is inescapable: suddenly, for the British nuclear establishment, the party is over.

ANDREW HOLMES is editor of 'Power in Europe' - a fortnightly digest covering the European Electricity Industry.

Snug as a Bug ....



Bacteria and other micro-organisms have been discovered in the degraded core of Three Mile Island. Although the engineers working on the dismantling of the burned-out reactor appear to see no more significance in this discovery than a reduced visibility for the workers, the consequences could be catastrophic. DON ARNOTT reports.

The Pressurised Water Reactor (PWR) core at Three Mile Island number two burned out in March 1979. The results of that accident, although of the highest possible relevance to Sizewell B, were not available in time to influence the Inquiry. The sheer hazard of the decommissioning and clean-up operation necessitated delay (which was further increased because nobody could find the money.)

But, in 1987, dismantling began and is expected to be complete by late this year or early next. Full data are not yet available; but the indications are that interesting questions will arise at the Hinkley Point C Inquiry this autumn.

But, in this preliminary note, I am concerned with something quite different to the accident itself. This is the fact that, quite early on in the dismantling procedure, the residual coolant in the burned-out core became infested with micro-organisms.

Some of what was found emerged in two publications: Science (4.12.87) and Nuclear Engineering International (December 1987). The language used is the slap-happy sort reserved by physical scientists for biological problems, so none of the details is to be trusted. But it is clear, from the Science article, that the boys had a really tough nut.

We are told: "... after a few hours work, the water became so cloudy that the men had to operate by feel. The low visibility was caused by fine sediment and by the hardy organisms that thrived in the reactor vessel. 'The reactor was just like a stagnant pond in summertime,' says Gordon Tombs, GPU Nuclear's earnest public relations man. The decaying fuel assemblies keep the water heated to a tepid 80°F and the underwater camera-lights allow for photosynthesis, making the core a suitable habitat for many species of algae, fungi, yeast and bacteria. Particularly impressive are the bacteria that feed on the carbon-rich hydraulic fluid that leaks from the tools during defueling. The bug problem was solved by dumping hydrogen peroxide into the soup."

HOW ON EARTH DID THEY GET IN THERE?

I'll turn aside merely to get rid of one piece of nonsense. Fungi, yeasts and bacteria do not engage in photosynthesis; only the algae will have benefited from the camera lights. The hydrogen peroxide can wait, for the moment.

How on earth did they get in? Are we witnessing the birth of yet another nuclear acronym, DECCE (Degraded Core Coolant Eutrophication)? I think not: one can believe most things of bacteria but not that they were happily installed in the intact core, and ready to take over following the disaster.

No, such a plethora of micro-organisms can only have got themselves installed into such a habitat as the result of abominably careless and indescribably filthy work. There may be undesirable consequences.

For the water in which they so happily multiplied - the average bacterium divides once every 20 minutes - was warmed by decay heat. Accompanying this must have been a relatively enormous radiation dosage arising from fission product decay. The mutation rates must have shot up beyond anything experienced in nature

POTENTIALLY VIRULENT STRAINS EVOLVE

It will happen as a rare event that such a mutation will give rise to an especially virile, and sometimes virulent strain which proceeds to multiply and crowd out the rest. The chance is of the order of 1:100,000. This is why genetic mutation is almost unidentifiable amongst humans: there are only 5000 million of us. But in a micro-organism soup there can be that many individuals in a single cubic centimetre. Under such circumstances rare events become calculable certainties.

Which brings me to hydrogen peroxide. This is a mild antiseptic, principally used as a mouthwash and gargle. It is very reactive chemically and easily destroyed by heat. It is quite impossible to imagine that it can have been effective against a wide range of micro-organisms; added to which many of them have the trick of forming highly resistant and long-lived spores the moment circumstances seem against them.

It seems clear that very little of the core debris is being subject to examination. It is being bundled into drums and shipped off to the DoE's National Engineering Laboratory at Idaho. One hopes that it was thoroughly dried out first; but even if not, such hydrogen peroxide as may have got into the drums will have vanished long before arrival.

The consequences of this discovery are great indeed. Novel strains of bacteria could be evolving in spent fuel stores, nuclear waste stores and decommissioned reactors. They could be transferred to nuclear dumps of the type envisaged by Nirex. Nobody is certain what the environmental and human health consequences of these micro-organisms escaping into ground water, or even being released from waste transport operations, could be. An immediate research programme is necessary.

DON ARNOTT is a former consultant for the International Atomic Energy Agency.

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Milk of Human Kindness ?

Food contaminated above EEC limits has been deliberately exported to developing countries, many of which are in the grip of famine. EEC nuclear and trade departments have tried to pressure them to withdraw their objections, or risk losing vital trade and aid. FELICITY ARBUTHNOTT and TONY WEBB record some of the evidence and accuse the nuclear authorities of double standards: if they believe the recipient countries are not competent to measure levels of radioactivity in food, how can they expect them to run the nuclear power programmes which the nuclear powers want to sell them?

A 6,000 tonne shipment of beef is currently anchored off Rotterdam, awaiting orders. The ship was directed to sail from Venezuela after thousands of people took to the streets of Maracay demanding that the meat be returned to its countries of origin - Eire, Northern Ireland and Denmark - because of its level of radioactive contamination. The Venezuelan health authorities declared the meat unfit for human consumption, and confirmed that the radiation levels were unacceptable. The Irish and UK Governments, however, claim the radiation was "within acceptable EEC limits."

This is not an isolated case. Our research has revealed that some 17 developing countries (see map) have had Chernobyl-contaminated consignments of food dumped on them over the past two years - food that should have been condemned and destroyed. In many cases the radiation levels were unacceptable; in some cases the food was part of international 'aid' programmes; in a few cases the consignments were carefully and deliberately mixed with uncontaminated food to dilute the contamination level to just below the EEC limits.

CONTAMINATION WAY ABOVE INFANTS' LIMIT

In February 1988, Eire admitted that a 37,000 tonne consignment of dairy produce was rejected by Mexican authorities and had been returned. Bord Bainne (The Irish Dairy Board) admitted on an RTE programme that the level of contamination was 3,750 Bq/Kg. The EEC limit is 1,250 Bq/kg for all radionuclides over 10 day half life, and 370 Bq/kg for caesium in milk intended for infants. They had initially stated that the radiation levels were within EEC limits.

They emphasised that taking back the consignment was a "goodwill gesture" in view of the importance of the trading links with Mexico, and that this would not affect a major trade deal that had just been negotiated.

Many questions remain unanswered

How much produce was contaminated by Chernobyl fall-out; and to what degree?

Where is such produce stored; and can these stores be inspected?

If it was destroyed, how; where; and what was done with the residues - were these burned; buried; dumped at sea?

What decontamination measures were used for the containers involved in the transportation?

Were food handlers checked for contamination; are they being monitored?

Powdered milk from Cork's Golden Vale Co-op, worth an estimated IR£100,000, was also rejected by the Phillipines. Bord Bainne claimed this was because the Philippines wouldn't accept EEC radiation level guidelines, and implied that the rejection was instigated by Australia and New Zealand diary producers. Later, their Chief Executive revealed that batches of powdered milk had been mixed with uncontaminated milk powder to reduce the levels.

The Phillipines also received contaminated milk from the Netherlands. Teh Chin Chai, a journalist with the Consumers' Association of Penang claims in a recently published book that in July 1986 loads of dairy produce arrived in the Phillipines covered by safety certificates from the Netherlands. Tests revealed they contained unacceptable levels of radioactive caesium.

In September 1986 the Malaysian Government found high levels in six other brands of milk powder, four from the Netherlands and one each from the UK and Eire. The Malaysian caesium limit is 180 Bq/kg. This caused real fear. One mother wrote to the Consumers' Association: "please help me find which brand (of milk) is safe, our stock is running low and I don't know which brand to choose."

EGYPTIAN PASTA FACTORY CLOSED DOWN

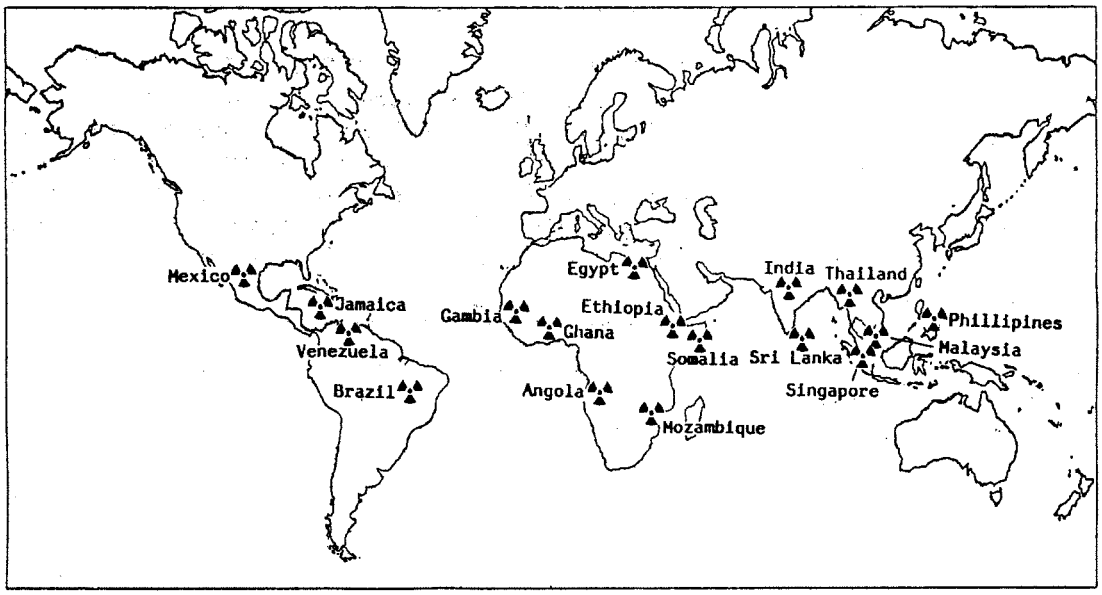
Egypt is known to have rejected five consignments before introducing stringent import regulations. However, according to Mrs M Mizbah, at the Egyptian-British Chamber of Commerce in London, a consignment of flour from Italy, manufactured from Greek wheat, was accepted by a pasta factory on the Red Sea. Subsequently, it was found to be so highly contaminated that the factory was closed down. Decontamination methods are still being sought.

In Bavaria, workers refused to handle 260 goods wagons containing 5,000 tonnes of whey powder with readings as high as 8,000 Bq/kg. After spending some time in a siding the owners, Meggle Dairies, were compensated several million Deutschmarks and ordered to 'destroy' the powder. However, it found its way to a trading company, Lopex, based in Frankfurt. Lopex allegedly attempted to export it to Egypt as cattle food and to famine-stricken Angola for human consumption. The powder was subsequently moved to the security of two army camps for safe keeping.

In October 1987, 750 tons of EEC dairy produce, donated as food aid to Ghana, were found to have radiation levels as high as 5,459 Bq/kg. The finance minister, Mr K Botchey, who has responsibility for

Countries which received produce deemed unfit for human consumption:

Angola
Brazil
Egypt
Ethiopia
Gambia
Ghana
India
Jamaica
Malaysia
Mexico
Mozambique
Phillipines
Singapore
Somalia
Sri Lanka
Thailand
Venezuela



the shipment immediately contacted the media and warned the public. This action led to a serious dispute with the EEC ambassador to Accra, who insisted that the shipment was within EEC limits before it left Hamburg.

EEC PRESSURE ON GHANA, BRAZIL

Despite assurances that all interested parties could be present, Ghana were excluded from the test conducted by the International Atomic Energy Agency in Vienna where the consignment was cleared as safe for consumption. As one official put it: "there is some cause to wonder whether official reports of EEC countries are always accurate. Disposal of unacceptable things in Africa has been going on since time immemorial. There is a lot of pressure from the EEC on us over this and there is a Ghanaian saying - we have our hand in their mouth - what can we do?"

In August 1986, the Brazilian authorities claimed 3,150 tonnes of butter and milk powder contained 1,000 times the Brazilian limit. The bulk of this produce was allegedly from Eire although Denmark, West Germany and the Netherlands were also implicated. A Board Bainne spokesperson denied levels exceeded EEC standards. Eire's Ministry of Agriculture said a certificate was issued for export based on analysis of milk and milk powder from the area where the produce originated. However, it has been suggested that they were unable to identify the specific area.

Brazil came in for some arm twisting. A senior executive of the Nuclear Energy Board visited their Ministry of Agriculture. Irish press reports suggest that the Brazilian authorities were reminded of the importance of EEC trade. On the official's return it was stated that a second test by Brazilian Government chemists found the consignment to be within acceptable limits. Despite this retraction, the Head of the Brazilian Agricultural Society, who made the original claim, maintained the levels were too high. He was accused by a committee of senior Brazilian Government scientists of having vested interests. The consignment was accepted in September 1986.

Media reports suggest that EEC famine aid to Angola, Ethiopia, Mozambique and Somalia, has been contaminated; Sri Lanka and Thailand were reportedly pressured to relax their permitted levels; Singapore rejected 240 consignments by October 1986.

It is a matter of record that a number of countries have been very concerned over the level of radiation found in produce shipped from Europe since Chernobyl, and the initial claims of unacceptable levels in these countries have frequently been followed by visits from officials of the originating country. In some cases these visits resulted in a subsequent statement casting doubt on the original measurements.

DOSE SPREAD OVER A LARGER POPULATION

There is also a suspicion that in some cases shipments of food contaminated at unacceptable levels have been diluted with other produce to bring them below the permitted levels. If this is the case then most of the contaminated food could eventually be disposed of in this way. Such a practice is to be deplored as presenting an unnecessary risk to the people who consume it. There is no 'safe' level - diluting the foodstuff merely results in a greater volume of material containing the same radioactivity, so the dose represented by that contamination is spread over a larger population.

The argument promulgated by the EEC nuclear powers that these countries are incompetent at the simple task of measuring radiation levels in food correctly simply doesn't wash. If it is the case then it makes nonsense of IAEA assertions that these countries are fit to administer and control nuclear energy programmes, food irradiation plants and similar technologies. They can't have it both ways - either they are competent for all nuclear applications, or they are not competent for any of them.

This latest outrageous example of 'dilute and disperse' policy for radioactive waste disposal must be exposed.

FELICITY ARBUTHNOT is a freelance journalist and TONY WEBB works with the London Food Commission.

Norwegians Would - UK Wouldn't !

As reported in previous issues of SCRAM the Norwegians have replaced the UK as world leaders in wave power technology. DAVID ROSS up-dates the progress of Norway's overseas trade. He also reveals, with reference to evidence presented to a House of Lords Committee, some of the scheming which went on to discredit the UK research and development work in the late '70s. With the Hinkley Point inquiry due to begin this autumn, it is possible that the 'dirty tricks' manual may be taken down from the shelf and dusted off again.

The UK Government, worried that they have placed themselves in an increasingly untenable position over wave energy, have launched a snooping expedition to discover what the Norwegians are doing.

I can reveal that they have despatched Dr C P Burdess, the Commercial Attache at the British Embassy in Oslo, to gather information about the teams of engineers and scientists and business men who replaced UK as the leaders in wave power technology when the Government decided that wave power was not "commercial."

NORWAY CORNERS WORLD WAVE MARKET

Now, two commercial companies in Norway are demonstrating how wrong this is. One of them, Kvaerner, is among the world's best known companies - they have recently taken over the shipyard at Govan on the Clyde. They are now in the concluding stages of selling Oscillating Water Column power stations to Tonga, Western Samoa and Vanuatu (formerly new Hebrides). They claim the cost of a unit of wave electricity is now between 6 and 15 US cents, which at current exchange rates is 3p-8p.

The range in price reveals the reality: much depends on the cost of local labour and materials in different countries, the discount rate and the interest paid on loans and so the nominal cost is not a good indication; as with hydro-electrcity in Scotland, which is now the cheapest power in the UK, at around 1p a unit, the cost seemed forbidding when construction was contemplated. But with the 'fuel' coming free, it does not take long for the investment to pay for itself, over and over again.

The second Norwegian company is Norwave which made history by concluding the world's first commercial contract for a wave power station with Bali in the spring (SCRAM 65). Their director, Dr Even Mehlum, has just returned from there and he reports that the prospects are "very good" for a deal to construct several hundred wave power station in the Indonesian islands within the next 10-12 years.

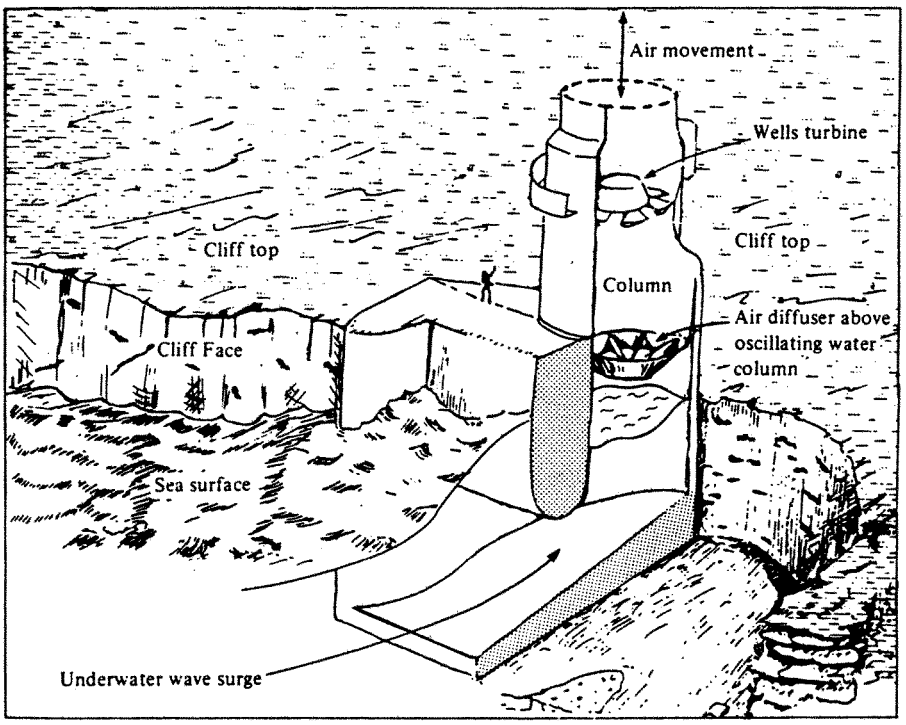
This is big business; which the UK could now be doing.

UK WAVE AXE REVERSED - RELUCTANTLY

But our programme was shut down in 1982 by Nigel Lawson when he was Energy Secretary. His dislike of spending money, plus the pressure of the nuclear lobby (which had always recognised that wave energy was its most dangerous challenger) in UK conditions, proved fatal. But when Norway carried on developing wave energy, the UK Government were forced reluctantly to concede a little, and they have allocated £300,000 to the construction of a wave power unit on the Island of Islay in the Inner Hebrides.

Approval has so far been given only for a test bed, to measure the wave climate on site, and the Department of Energy will have to decide whether to authorise a further allocation of money for a turbine and generator so that the unit can produce electricity.

A decision is likely later this summer. From the point of view of Queen's University, Belfast, who are in charge of the Islay experiment, and for those who still hope for a Government-supported wave power programme, this matters.



Sketch of a Kvaerner Multi-resonant Oscillating Water Column wave power plant near Toftestallen in Norway.

But whatever the Government decide, the future of wave power as a successful alternative is now established, in other parts of the world, and nothing can prevent its development.

The Government are plainly hoping that, at the Hinkley Point C inquiry, they will be able to give gestures of support for tidal and wind power and hope that there will be enough objections from some environmentalists to enable them to say that these alternatives are not acceptable.

DIRTY TRICKS - PAST, PRESENT & FUTURE

But **large-scale offshore** wave power was described as having "no major deleterious environmental effects" in the Energy Department's review paper on wave energy (Energy Paper 42) published in 1979; and the environmental impact of **small-scale shoreline** devices seems to be restricted to "particularly visual intrusiveness and noise" according to the Department's renewable energy strategy (Energy Paper 55) published in June 1988. That is one reason why the Government have tried so hard to decry it.

Accusations that the nuclear lobby shut down the wave power programme at just the time when its problems were being solved, have been made by Professor Stephen Salter, one of the UK's leading researchers in the field working at Edinburgh University.

He recently told the House of Lords Committee on the European Communities that at such a point "it would have been apparent to anyone who wished to delay the progress of renewable energy that a change of direction was necessary. Many of the chief scientists at the Department of Energy have come from and later returned to Harwell" (which is the headquarters site, on UK Atomic Energy Authority property, of the Energy Technology Support Unit - ETSU - who are in charge of the renewables programme).

"There is clear documentary evidence that this nuclear control has adversely affected reporting on renewable energy and that attempts to expose the the distortions have been blocked by officials ... ETSU officials have told me privately that they are being forced to make facts suit policy. I have been told by one of the assessment consultants that the conclusions of his report were reversed."

The Government's final report on wave power said that there was "only a low probability of any design achieving an energy cost below 8p in May 1982 prices." This figure has already been over taken, even in the present pioneering stage when costs are naturally higher than they will be in serial production.

The author of that conclusion was Peter Davies. Having wound up his own department's effort, he went on to another job: in charge of the presentation of the UKAEA case at the Dounreay inquiry.

It is little wonder that the Government are worried about how to defend themselves at the Hinkley inquiry this autumn.

DAVID ROSS is a freelance writer on energy matters, and author of 'Energy from the Waves'.

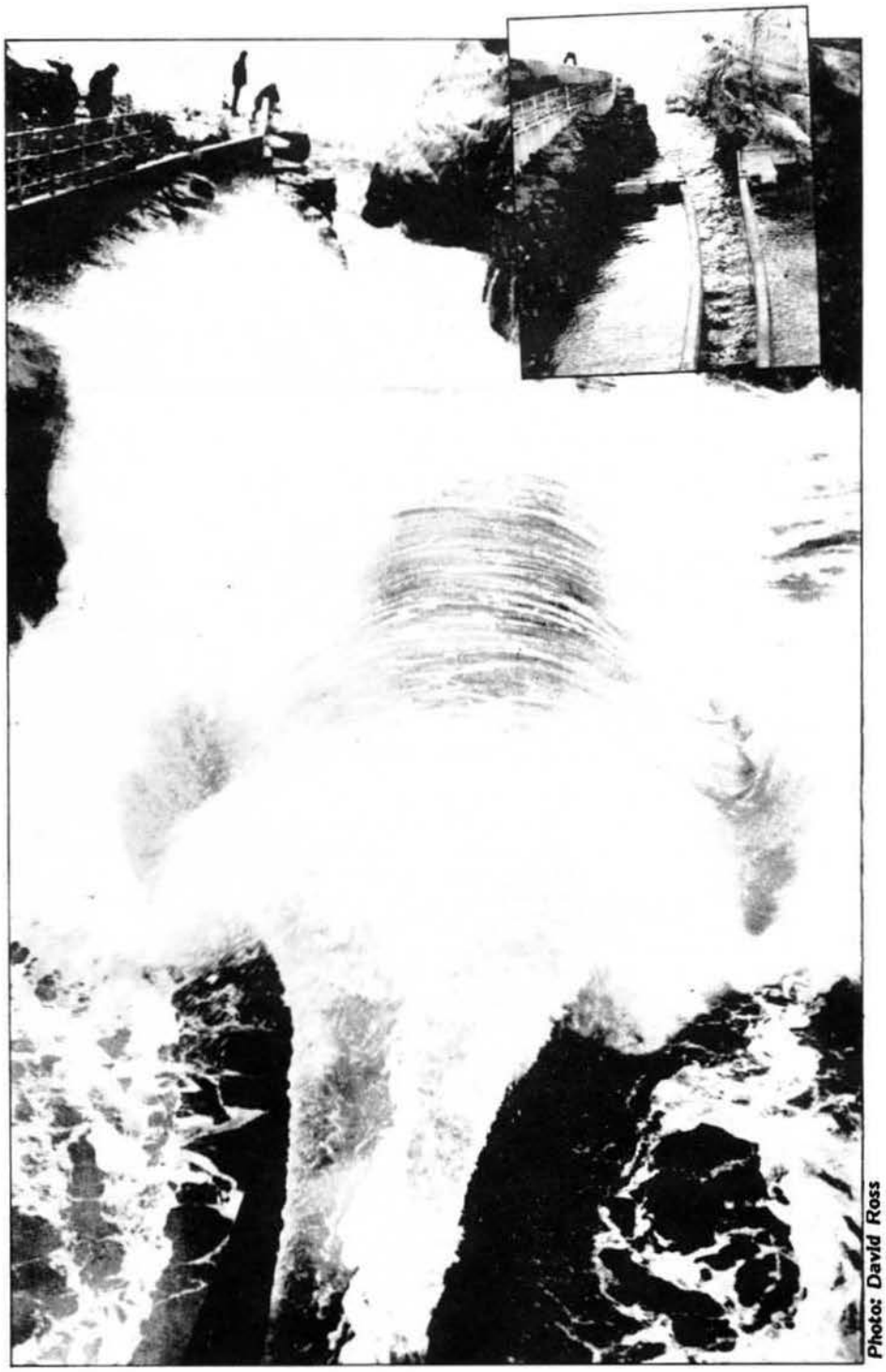


Photo: David Ross

Power from the sea: waves drive up the tapered channel of Norwave's Tapchan power station on an island near Bergen - waves reach five times their natural height. (Inset shows the effect of a poor sea, still faster in the channel than the water outside.)

Before the Flood

Every year the CEGB pumps about 200 million tonnes of CO_2 into the atmosphere, approximately 1% of the world total. This is a significant contributor to the increasingly credible greenhouse theory. In this article MIKE TOWNSLEY explores the theory and describes what might happen if the world continues to rely upon fossil fuel combustion as a major power source.

Global climatic changes resulting from the greenhouse effect will be "considerably larger than has been known in human history," according to Dr Jill Jaeger of the Beijer Institute, in a report published in June.

The report highlights the threat to water supplies as a possible effect of increased evaporation due to global warming. Rainfall patterns could be drastically altered, turning established farming belts into deserts and causing existing arid regions to bloom.

The greenhouse effect, is a natural process: gases in the earth's atmosphere allows short wave length radiation from the sun to pass through but absorb the long wave infrared radiation reflected back. The main 'greenhouse gases' are carbon dioxide (CO_2), methane, nitrogen oxides, tropospheric ozone (in the lowest layer of the atmosphere), and chloroflourocarbons (CFCs). Atmospheric concentrations of these gases are increasing which will cause the earth to heat up - 'global warming'.

THEORY GAINING CREDIBILITY

When the greenhouse theory was first proposed most governments rejected it out of hand; but world opinion is now changing fast. The consensus of international scientific opinion accepts that the repercussions of the greenhouse effect will touch all our lives in the next century.

The precise effect on world climatic patterns is a source of intense international debate: "The only thing we are sure of - there is almost total agreement - is that some increase in world sea levels will occur," observes Dr Phil Jones of the Climatic Research Unit at The University of East Anglia. Jones points out that the rise in sea level will effect some parts of the world more than others: "In Britain, the south east of England will be the most effected, because the land is already falling into the sea. Scotland however will be less effected because it is rising slightly."

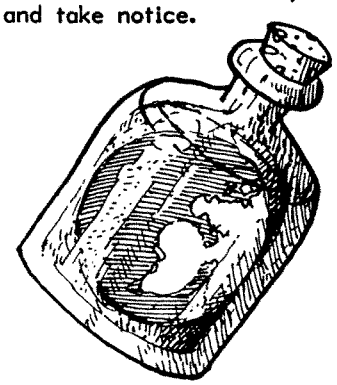
According to scientists at the Institute of Terrestrial Ecology, Britain will need to spend £5-8 billion on improving sea defences. Options include: raising existing sea walls, building new walls further inland, building storm surge and estuary barriers, even abandoning whole sections of coast.

If present trends continue the combined increase of greenhouse gases in the atmosphere will be equivalent to doubling the pre-industrial levels of atmospheric CO_2, possibly by 2030. Applying current prediction methods it is thought this will increase global mean temperature by between 1.5°C and 4.5°C. This will cause the seas to expand and could also melt significant volumes of the polar ice caps, causing a further increase in world sea levels; between 20cm and 140cm. This could have catastrophic consequences as roughly half the world's population lives close to the sea. The US alone will have to spend over $100 billion to protect its eastern seaboard.

Even if present trends don't continue the environment is already committed to significant change. Increases in greenhouse gases over the past 100 years will cause a 0.5°C rise in global mean temperature, and cause sea levels to rise by between 10cm and 12cm as the environment catches up.

CEGB TAKES NOTICE - AT LAST

The international scientific consensus has created such concern that many nations have now initiated research programmes to look into the possible effects of global warming. Even the Central Electricity Generating Board (CEGB) - founder members of the flat earth society - are beginning to sit up and take notice.



Environmental fifth columnist, Peter Chester, head of the CEGB's environmental programme - it was was he who convinced the Board to take some responsibility for the acid rain damage in Scandinavian countries - now has a new project to worry about; they are sponsoring four research fellowships, costing about £1.25 million over the next five years. They aim to improve predictions of future climatic change. The scientific community, however, are rather more coy and prefer 'scenario' to 'prediction'. They are "formulating what could happen, not what will happen," argues Dr Jones.

The research fellowships are to study:

- The absorption of carbon dioxide (CO_2) from the atmosphere by the oceans;
- The way heat is transferred from the warm surface of the ocean down into deeper waters;
- Heat and water vapour transfer from the land to the atmosphere;
- Cloud characteristics and their effects on the climate.

However, very little work is being done to find methods to combat the greenhouse effect. Although it is possible to remove CO_2 from the effluent gases of fossil fuelled power stations, the cost would be enormous. According to one speaker at a symposium to discuss the greenhouse effect, staged in April by the Watt Committee on Energy and the Institute of Energy, it could add between 70% and 150% to the capital costs of coal burning plant, with a knock on effect for electricity prices of

56% to 100%.

Even if financial barriers could be surmounted, we would still have a major secondary pollution problem - what to do with the vast quantity of carbon wastes from the filter plant. It has been estimated that CO_2 filter plant fitted to every fossil fuelled power station would eat up more than 15% of the industry's output.

ACID RAIN LINK

Methane is the dark horse of the greenhouse gases, and little is said about possible clean-up technology. It traps infrared radiation more efficiently than CO_2, and its atmospheric concentration is rising 6 times faster.

Nitrogen oxides (NOx) are also leading players in the greenhouse gas troupe. They are perhaps better known for their role in the acid rain tragedy. This brings us to tropospheric ozone which occurs naturally, but not in the troposphere. It is thought that ozone is produced via a complex chemical chain involving NOx and hydrocarbons and sunlight. Whilst it is true that the major source of NOx is motor vehicles, fossil fuelled power stations also produce a significant amount. It is indeed ironic that the ozone hole above Antarctica is expanding, whilst we are creating the gas lower down in the troposphere as fast as it is disapearing above from the stratosphere.

Although the greenhouse effect is now being taken seriously, most government research programmes are being conducted into predicting the possible effects. This should result in everyone knowing exactly how the climate will change - who will be flooded and whether or not the US grain belt will emigrate to Canada - but nobody will know what to do about it.

The electricity industry is not solely responsible for the greenhouse effect, but it does make a significant contribution to the problem. Both CO_2 and methane are emitted from fossil-fuelled power stations, which account for 90% and 30% of their presence in the atmosphere respectively. The CEGB alone are responsible for 1% of the CO_2 discharged worldwide.

PREVENTION IS BETTER THAN CURE

Steps to prevent further global warming must be taken now. Resources should be redirected from conventional, globally polluting energy sources towards increased energy efficiency and benign renewable energy sources. The extent to which fossil fuels are burnt in the future depends upon many variables: economic growth; population growth; trends in energy markets and planning.

Developing countries have a significant role to play in reducing the future impact of the greenhouse effect: they can either travel the path of a fossil and fissile energy regime being levelled at them by Western Governments or take the soft energy option. Many of them have yet to install large electricity grids and would be better served, economically and environmentally, by stand alone systems based on renewables.

The argument that the greenhouse effect is just another reason for expanding the nuclear industry doesn't even bear thinking about.

The Regeneration of water power

The UK is 'blessed' with relatively high rainfall; the spin-off is a great potential for hydro-electric power. GEORGE CHAPMAN gives a background briefing on water power, what equipment is available and how you can install your own system. In the next issue he will address the institutional and regulatory problems facing small-scale hydro power producers.

Photo: George Chapman

Since before Domesday, when there were around 5,000 water mills, sites with heads (heights of water fall) of no more then 5m were generally used. There may be now as many as 20,000 water power sites in the UK once used for water wheels and, although relatively few are still in use, abandoned sites are being increasingly resuscitated. All these used open waterwheels.

The introduction of enclosed turbines in the mid-1800s has increased water power potential since much higher heads can be used, and more recently there have been attempts to more effectively and economically use heads down to 1m.

Turbines range from the pure impulse type where a jet of water from a nozzle drives 'buckets' rapidly round. The Pelton turbine is the main example. Having given up its energy, the water then falls gently clear by gravity. This is the most efficient of turbines, over the full range of machine size and over a wide range of flow.

At the other end of the scale is the Kaplan or propellor turbine where a stream of water flowing in a close-fitting pipe drives blades round. The pressure due to the head is absorbed by the blades. This is the purest pressure turbine. It is essential that this type of turbine has a flared draft tube downstream, discharging underwater into the tail race, to slow down the water, and to restore the pressure from sub-atmospheric to near-atmospheric.

In between is a number of designs which combine impulse and pressure effects. Generally their peak efficiency is at near full flow and power and falls off markedly below that. In most cases smaller machines are less efficient than larger ones, and this is particularly so with propellor turbines where I suspect insufficient care is given to the draft tube design.

In a class of their own are the gravity operated overshot and breastshot wheels. The work is done by water descending in buckets. Well designed waterwheels can achieve quite high efficiencies, certainly comparable with many turbines, and their efficiency increases as the flow reduces.

Undershot wheels are really turbines and are mixed impulse-pressure machines. Some very large wheels have been built - 16m diameter at Laxey on the Isle of Man, and there are many 10m diameter wheels - but in most cases a modern turbine for the same head and flow would come cheaper.

The diagram relates flow (volume per unit time) and head (height of water fall) to the diagonal lines showing power available. The approximate areas of applicability of various types of machine are indicated. Actual power output will be less due to inefficiencies in turbines and generators.

CONSIDERABLE SCOPE FOR UK WATER POWER

It is helpful at this stage to visualise the magnitude of flow. A typical leat (the channel bringing the water to the wheel) of 1.25m wide by 0.75m deep with water moving at a strolling pace of 0.45m/s carries 0.6m^3/s. If this falls through the diameter of a typical mill wheel of 3.7m a total power of around 15kW will be available. This will drive two or three stones and the odd hoist; or if used to generate electricity with an overall efficiency below 50%, around 5 or 6kW will be available. The same volume of water running down a pipe with a fall of 61m has a potential of 254kW, and an expected 180kW electrical output from appropriate plant.

There is considerable scope in the UK for the construction of hydro-electric stations of between 100 and 1000kW output, provided the leat, pipeline and

powerhouses do not upset environmentalists or anglers. And the technology is well established.

In recent years there has been more interest shown in low head devices, since there are many weirs on the gently flowing rivers of England in particular with a small drop but a large flow. One aim is to use modern materials and novel designs to simplify construction and keep costs down.

NEW DEVELOPMENTS

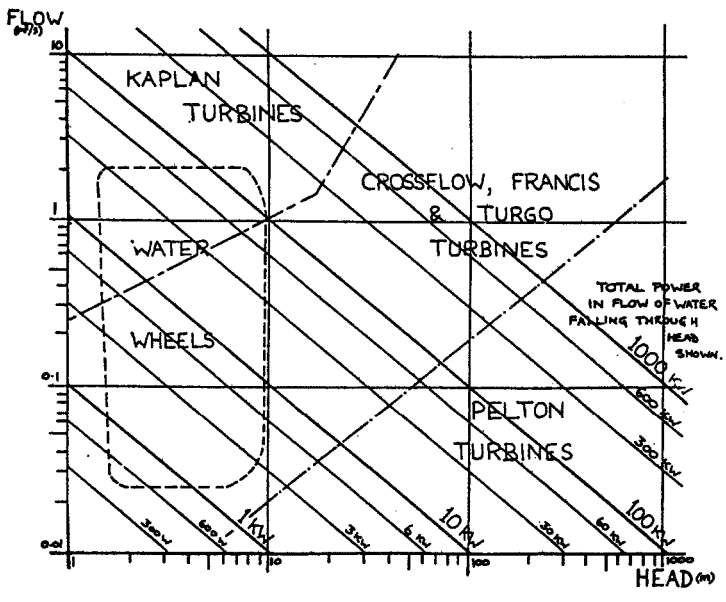
Salford University are experimenting with two ideas. In one, a flap sealed at the edges is pushed to and fro in an open box as water is admitted and exhausted, giving a reciprocating output. In another, water raises a float which falls when water drains away.

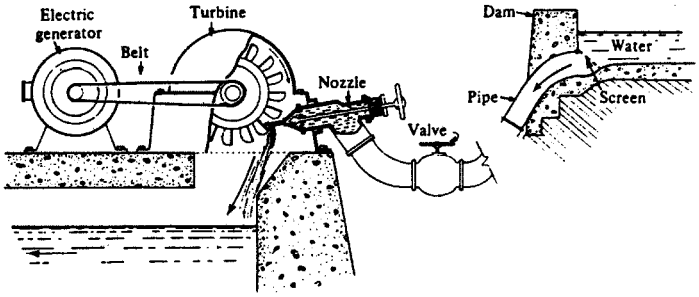
Lanchester (Coventry) Polytechnic, in association with Hydro Energy Associates, are experimenting with a machine in which successive 'slugs' of water pass through an arrangement of flexible bags, pumping air in a closed circuit past a Wells air turbine. It turns at a high enough speed to be directly coupled to a generator. The first 150kW machine, using a head of 2.8m, will begin full-scale trials this summer.

This is not to say that older designs do not work at low heads. I know of at least one vertical shaft Francis turbine working on a head of 1m producing 3kW, which is enough for an average household's lighting and water heating, with some spare for space heating. It remains to be seen whether the new designs can compete on cost at the higher power ratings.

The primary aim of the system designer is to keep down initial costs, but subsequent maintenance costs and inconveniences must also be borne in mind. Also, sizing the plant to make best use of available water flow is important. On rivers like the Test in Hampshire the flow rate is virtually constant, whereas in areas of hard rock hillsides flows can vary dramatically.

Another consideration is debris. Turbines require effective debris screening to remove leaves and so on





Layout of a micro hydroelectric system using a Pelton wheel.

which could clog the jets or blades, whereas overshot wheels present little trouble as they pass almost anything. Against that, slowly rotating waterwheels require considerable gearing or belts to increase the speed to the 150rpm used by generators. This involves initial and running costs, and a small energy loss.

DEMONSTRATION PROJECT

Although each site is generally unique one manufacturer, Osman Goring of Water Power Engineering in Gloucestershire, is building a range of machines in kit form. A prefabricated glass-reinforced plastic penstock (sluice), incorporating a debris screen, and a similarly built powerhouse with a Schiele turbine, can be erected at most sites provided with simple concrete pads at each end of a connecting feed pipe. Goring hopes to install 8 to 10 of these by a weir on the Thames, each producing 20kW for the grid. Funding will come partly from the EEC as a 'demonstration project', and partly from Thames Water Authority.

The electrical side presents the least problems. There are plenty of generators available which can be run either for single phase stand-alone use, or above 15kW for 3 phase, with appropriate synchronising and safety equipment, in parallel with the mains to supply the grid.

Small stand-alone plant can be cheaply controlled by electronic load controllers which dump 'spare' power into a useful task such as water heating. These devices can be simple (but produce radio interference on nearby long and medium wave) or more complicated but requiring resistive load to dissipate the dumped energy. Change-over-switches can be used to control power supply to the grid.

How much will it all cost? Costs will vary considerably, depending on site and what civil works are already present. If you are fortunate it could cost as little as £1000/installed kW, but it is more likely to cost several times that. A useful test is: if I invested £x in the City, would the income pay my electricity bill for ykWh/year FOR EVER?

There are also institutional and regulatory problems to overcome. I will tackle these in an article in the next issue of SCRAM. For more information on water power, its uses and how to set up your own system contact the address below.

Cdr GEORGE CHAPMAN is the Honorary Secretary of The National Association of Water Power Users, The Rock, South Brent, South Devon TQ10 9JL. (Tel 036 47 2185).

APPROPRIATE TECHNOLOGY

Acid Rain

European Community environment ministers have finally agreed on a draft directive to govern emissions of gases involved in the acid rain cocktail.

"A jolly place," said he, "in times of old! But something ails it now: the spot is curst."—WORDSWORTH.

At a meeting in Luxembourg, the five year struggle ended with the UK abandoning the claim that they were being victimised by the other member states. Previously they had complained that the UK were being asked to spend more than any other nation; and that they were already spending £1 billion on their current clean up programme.

At an earlier meeting, UK environment minister, Lord Caithness said they were being asked to implement measures which are scientifically unattainable and not of proven environmental benefit.

The suggested draft directive, under the German presidency, requires the UK to reduce sulphur dioxide emissions (SO_2) by: 25% by 1993, 40% by 1998, and 60% by 2003. It also calls for a two stage reduction in nitrogen oxide emissions: 15% by 1993 and 30% by 1998. These reductions are based on 1980 emission levels.

It is believed the main reason for the UK's change of heart was a threatened court action. If they did not double their reduction of SO_2. The legal action would have been brought against the Government, by EEC Environment Commissioner, Stanley Clinton-Davies, under a little known directive which instructs member states to incorporate the best known pollution control techniques - where not prohibitively expensive.

Curiously, the directive sets different targets for each state, for example Ireland would be allowed to **increase** their SO_2 emissions by 25%.

The UK target could be met in several ways. The two most likely methods are: increasing the amount of imported low sulphur coal, or fitting expensive flue gas desulphurisation plant to three more large coal fired power stations at an estimated cost of a further £1 billion. Energy Secretary, Cecil Parkinson, tried to convince the Department of the Environment, before the meeting, not to make any concessions. He is concerned that an electricity industry with tough environmental controls will be less attractive to the investor.

The draft directive is expected to be signed under the Greek presidency, early next year.

● Results of a research programme conducted at Southampton University show a very strong correlation between aluminium in drinking water and increased incidence of Alzheimers disease - a common form of senile dementia.

Early manifestations of the disease are reduced short term memory, bad time orientation and speech defects, according to a Norwegian report published last year. Death usually follows within ten years. According to the report more people in the most acidified areas of southern Norway are suffering from senile dementia than in other parts of the country.

Whilst assuring people that the "water is still safe to drink", the 10 UK Water Authorities' chiefs have commissioned their own study into ways of removing aluminium from the public water supply. The results of which will be made public in the autumn.

Embarrassingly, Water Authorities actually add aluminium to water supplies, to remove discolouration from peaty water. It also removes acids which would otherwise react with the chlorine in the water to create chemicals which are suspected carcinogens.

Aluminium also penetrates the water supply as a result of acid rain: when acid rain falls on soil it reacts with the soil chemistry to release heavy metals (including aluminium), which can then leach into rivers, and reservoirs.

Over 3.5 million people in this country are connected to water supplies contaminated with aluminium concentrations above the permitted level.

Renewables Policy

The Government expect industry to fund renewable energy research and development to the tune of over £20 million, early in the 1990s, according to Energy Paper *55*, the latest Department of Energy (DEn) report on renewable energy.

According to Michael Spicer, minister with responsibility for renewable energy, industry's present input of £4 million/year will need to grow to $20million, in conjunction with a rise "to match" from the Government, if all promising technologies are to continue to be developed.

The document, which is intended to sum up research, development and potential for alternatives to fossil and fissile fuels, also highlights institutional barriers "to the exploitation of renewables." It stipulates that these will have to removed, and that an "institutional framework which will ensure that renewables can compete in the market on equal terms with other energy sources," will be established. This should have been the result of the 1983 Energy Act.

As with most DEn material regarding renewable energy, reading between the lines gives a much clearer picture of the Department's view of renewables: "Alternative or renewable sources of energy **might offer some** potential to increase diversity of supply", and "...the renewable energies **might offer some** insurance value for the future in the event of an unforeseen disturbance in conventional supplies." (emphasis added).

What this document does show is that despite the Government's placatory commitment to renewable energy and the environment, the UK's safe energy industry is poised to become a major force in the electricity industry post-privatisation.

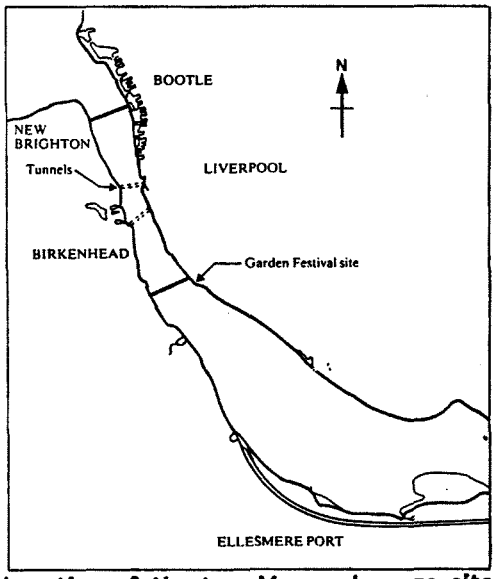
Mersey Barrage

The Government will meet half of the £1.3 million costs of the next round of feasibility studies into constructing a barrage across the Mersey.

The Mersey Barrage Consortium (MBC), which will match the Government money, plan to build the 500MW barrage at an estimated cost of £450-500 million.

According to Peter Wood, of MBC, they have almost completed the initial feasibility studies, to discover whether or not "there are any overriding impediments to the barrage." He adds: "The conclusion of our consultants is that there is not."

Apparently MBC have learnt from the mistakes of the Severn Tidal Power Group, and taken the concerns of environmentalists seriously. They have set up a consultation group which includes both the British Trust for Ornithology and the Royal Society for the Protection of Birds. "In many ways we have had a lot of cooperation from them," says Wood, "especially in the field of environmental monitoring."



Location of the two Mersey barrage sites

The second round of studies will examine the economic and engineering aspects of the barrage, and should take two years. Assuming the results are favourable, construction work would be unlikely to start before the middle of the next decade.

Although the technical considerations are considerable they pale into insignificance when compared with the institutional hurdles that will need to be crossed.

MBC see their proposal, in light of the White Paper on privatisation, as being in direct competition with the nuclear industry to provide the 20% of non-fossil fuelled generating capacity.

Current accounting methods put their proposal at a disadvantage, and may make raising capital for the project, in the City, difficult.

Nuclear stations have an expected life span of 30 years, and the cost of decommissioning the plant, which could be at least equal to the cost of construction, is discounted out. A barrage has no such luxury. They have very high capital costs, and an expected life span of 120 years. Over that 120 years expenditure would be minimal, as barrages require very little maintenance and have no fuel costs. However conventional accounting techniques would only take into consideration the first 30 years of operation.

The Consortium informed the Government of their fears, and have been given assurances, by Michael Spicer, the Minister responsible for both nuclear and renewable energy, that it is their intention after privatisation that no such disparity should exist. However details of the solution have yet to be announced.

Gas Power

The first concrete proposal for a private power station has been launched by Thames Power, who plan to build a 1,000MW gas fired power station, near Barking on the Thames.

The £500 million plant will be the first large scale power station built in the UK specifically to burn gas.

Thames Power - a consortium involving Taylor Woodrow, BICC, and Schroders the merchant bank - are thought to have Energy Secretary, Cecil Parkinson's approval for the scheme.

Burning gas in large power stations is prohibited under a European Community (EC) directive, which was designed in the 1970s to stop dwindling gas supplies from being depleted too rapidly.

However, according to Philip Jones, chairperson of the UK's Electricity Council, the Community are contemplating abandoning the directive, in light of a series of major new gas discoveries.

● The CEGB are also counting on the directive being abandoned. At the recent annual conference of the Union of Democratic Mineworkers, Lord Marshall warned that home-produced coal faces "a new challenge from natural gas for producing electricity."

He added, "Despite all the uncertainties which competition inevitably brings, I believe that all of us in the electricity industry have a strong predilection to ensure that the coal we burn is British. There is a ready and continuing market if the coal industry can deliver to the right quality, with unerring reliability and of course at the right price.

Private Power

Independent electricity producers have been promised a fair deal in privatisation by Energy Secretary, Cecil Parkinson.

In response to a Parliamentary Question, Parkinson said, "The electricity supply industry (ESI) has its rateable value determined by a statutory formula while the independent generator is currently assessed by conventional valuation methods. The Government accordingly has agreed, in principle, that private generators, exporting electricity to the grid, should be rated on a comparable basis to the rest of the ESI."

However the Government's revaluation programme will not yield any changes until 1990, by which time many independents will have been forced out of business, "by the burden of excessive rates," warns the Association of Independent Electricity Producers (AIEP).

They estimate that the CEGB's rateable value is £1/kW of installed capacity, where independents are charged £50/kW.

The new rates will only effect independents exporting to the grid. Therefore anyone wishing to produce electricity for their own use will still face excessive rates. However the Scottish Office claim private generators not exporting to the grid, could be subject "to something similar to agricultural devaluation."

Environmental Impact

A European Community directive, designed to force greater consideration of the environmental impact of development projects, has not been incorporated into UK planing law by the required date of 3 July.

The directive, arguably the first to affect planning law in this country, calls for prospective developers to conduct an environmental impact assessment (EIA), conforming to rigid guidelines, at their own expense, for any project likely to have a significant environmental effect. The guidelines widen the scope of environmental studies, and instruct that a wide range of topics be discussed: alternatives to the development, trans-medium pollution, and sociological impact.

The onus of deciding whether or not an EIA is required will fall upon local authorities. The developer will have the right to challenge the local authorities' judgement, and in such cases the Secretary of State will be called in to arbitrate. The results of an EIA are to made available to the public, for full consultation.

The directive was agreed in Luxembourg (June 1985) after over 50 drafts and five years of negotiations; and member states were given three years to marry the directive with their own planning law.

The UK are trying to implement the directive whilst at the same time "the aim has been to minimise the extra demands on developers and public authorities." They claim "the basic test of the need for environmental assessment, in a particular case, is the likely significant effects, and not the amount of opposition or controversy to which a project gives rise."

Each government department will produce a white paper based on their interpretation of the directive. The Department of Energy have yet to do this, but, expect to produce one shortly.

Meanwhile they have tried to adopt the directive into their planning procedures, the Hinkley Inquiry being the first example of this. As a result they will have to consider alternative sources of energy, and other possible construction sites.

The Department of the Environment told SCRAM that they expect to comply with the directive later this year.

Energy Conservation

Energy conservation has been placed firmly on the European agenda. Both the European Commission and the International Energy Agency (IEA) are examining ways in which it can be used to reduce the need for expensive new supply.

The IEA are organising a three day conference, at their headquarters in Paris, to examine ways in which the electricity supply industry can build energy conservation into their long term forecasting models.

The UK will be represented by two conflicting schools of thought: the CEGB and the Association for the Conservation of Energy (ACE). The conference is by invitation only, and although the SSEB were invited they have not responded.

The CEGB's paper reiterates the Department of Energy's argument at the Sizewell B inquiry:

US Energy

Two energy efficiency companion bills have been introduced into the US Congress, which could save consumers $10 billion by the turn of the century.

The bills call for strict efficiency standards governing fluorescent lamp ballasts. If accepted, they would negate the need for about 7,000MW of supply - equivalent to about eight new nuclear reactors. This will bring the rest of the country into line with California, but would prevent states from enacting even tougher legislation.

O The potental of small scale independent electricity production has been highlighted by Virginia Power, in the US.

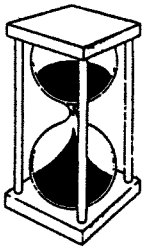
When they recently requested private bids for 1,700MW of electricity they received offers for over 20,000MW. Their current total capacity is only 12,000MW, so they could afford to close their two nuclear stations.

William Berry, the Chairman of Virginia Power's parent company, Dominion Resources Inc, believes "there is plenty of supply ... I would expect other states and other utilities to say this is the way to go."

Texas, California and Massachusetts have already put some of their generating requirements out to tender.

investment in conservation programmes and conventional power stations - which apparently includes nuclear - "cannot be compared in ways useful to planning."

ACE are conducting a study - initiated by Europe as part of their drive to reduce the Community's fuel wastage between 1983 and 1995 - to show how "investment in energy conservation can replace the need for conventional power stations." The study will investigate "US electricity and gas experiences of subsidising energy saving programmes in their customers' factories and buildings as substitutes for conventional supply sources, and will identify the potential for replication within the twelve member countries of the EEC."



They believe the UK - where a substantial power plant construction programme is scheduled - offers one of the highest potential savings of any country.

The study's initial results will be presented at IEA's conference.

European Energy

European Commission estimates of the potential contribution renewables could make to Europe's energy supply have come under heavy assault from the European Parliament.

West German Green MP, Undine Bloch von Blottnitz, with the support of other Euro MPs, has issued a report showing that renewables could contribute 10% of European Energy requirements by the end of the century, and 25% by 2020: considerably more than the "timid" 5-6%, by 2000, forecast by the Commission.

The report also calls for an 'energy risk tax' which is intended to cover two points: the economic risk associated with over-dependence on one energy source, and the safety risks associated with nuclear power.

The revenue from the tax, argue the MPs, should go towards research and development programmes into renewable energy sources.

Unfortunately, the European Parliament only has advisory status, and the Commission has a right of veto.

Scottish Wind Farm

Scotland looks set to host the UK's first windpark, despite the recent spate of Department of Energy (DEn) announcements that three demonstration windparks will be built in England and Wales, by the CEGB.

Scottish Windpark Developments, a group brought together by the Scottish Development Agency - including James Howden & Co of Glasgow, The National Engineering Laboratories (NEL) in East Kilbride, and EMSTAR Ltd (a subsidiary of the oil giant Shell) - plan to conduct feasibility studies into constructing a windpark near Eaglesham, 15 miles south of Glasgow. Preliminary work on the £250,000 study, of which the DEn have promised to pay £60,000, is already being carried out by NEL.

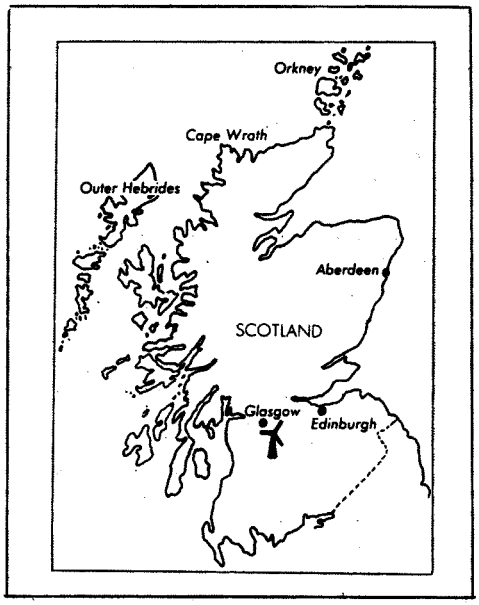
Richard Morris, head of the SDA's special industrial projects section, stresses the project is still in its embryonic stage: "Whether the windpark is built depends upon the outcome of the feasibility study." He is, however, quietly confident and prophesied "there will be no problem in gaining permission for the project."

Howden will provide the machines, each rated between 300-500kW. A 3-10MW windpark is envisaged; which would provide enough power for up to 6,600 households.

The prospective site, a bleak moorland currently used for grazing sheep (which could continue after a short construction period), is also the location of NEL's National Wind Turbine Testing Centre: George Elliot the Centre's manager describes the area as "an ideal site for a windpark."

Although the site is close to Eaglesham it is not visible from the village, and neither is it within hearing range - so the group do not anticipate any strong, local opposition.

If all goes according to plan the windpark could be producing economic electricity for the consumer in 1990; 2-3 years ahead of its counterparts south of the Border, giving the Scottish wind industry an advantage when the European markets are opened up in 1992.



● The CEGB have announced the possible site for their third wind park: Langdon Common in the northern Pennines.

The two previously announced sites (SCRAM 65) are: Cold Northcott in Cornwall, and Capel Cynon in Dyfed.

Energy Park

Feasibility studies are being conducted into creating a renewable energy park on the coast of Kent.

The project appears to be the brain-child of Peter Rawstrone, chair of the two companies at the forefront of the proposal: Kastle Development Ltd (KDL), and Kent 2000.

Rawstrone promotes the complex which will cover "some 1,200 acres of land, half of it reclaimed," as "the first project of its kind in the world to be designed from the begining around renewable energy sources." It is their intention to use only proven technologies and hardware.

The complex will include a 10MW wind park, 2km off the Kentish coast. This will be the special function of KDL, who are already involved in the 0.75MW Howden prototype the CEGB will place 5km off the Norfolk coast next year.

The Kent machines, Howden 1MW turbines, will be assembled on-shore, and then floated out on a small barge. They will be fixed to the seabed, at a depth of about 50m, using relatively small steel piles. Rawstrone believes "KDL's simple design meets the challenge of making an offshore installation competitive with one on-shore."

If all goes according to plan the project could be "operational by 1993."

Biomass

The controversial plan to use millions of tonnes of US domestic waste to generate methane gas from landfill in Cornwall (SCRAM 65), has been changed, as a result of massive local opposition.

The company involved, Power Waste and Water, now propose to build a plant to convert the waste directly to methane and refuse derived pellets. Landfill will now only be necessary for the first 3 years, whilst a 40MW power station is being built.

The first sites being examined are in Cornwall, where valleys made virtually sterile by the tin industry could be used for landfill. PWW have reached an agreement with the landowners, mining company Carnon Consolidated Ltd.

As yet PWW have not requested planning permission from the local authority. But it is understood that informal talks with Cornwall County Council and Carrick District Council have yeilded a favourable response.

Now that land agreement has been reached, a series of public meetings will be held, where PWW will explain their plan to the local community. The first meeting, held in May, produced an angry response from local people who fear lorries carrying waste will pass through their villages 10 hours a day for 3 years.

The National Farmers Union have requested that the Ministry of Agriculture should use its veto, under the Animal and Poultry Products Order 1980, to stop the importation of the 1.2 million tonnes of US waste, via Falmouth harbour. They believe that rats and other vermin brought over with the waste could spread diseases such as rabies and foot and mouth. However, PWW claim that vermin would suffocate in the sealed containers, during shipping, or be crushed when the waste is compacted.

There is one postive spin-off from the proposal. It is forcing the issue of poor waste disposal legislation in this country to be examined; and could result in a rise in the cost of UK landfill which would not only prohibit other proposals like PWW's, but make using domestic waste as a power source in this country more attractive.

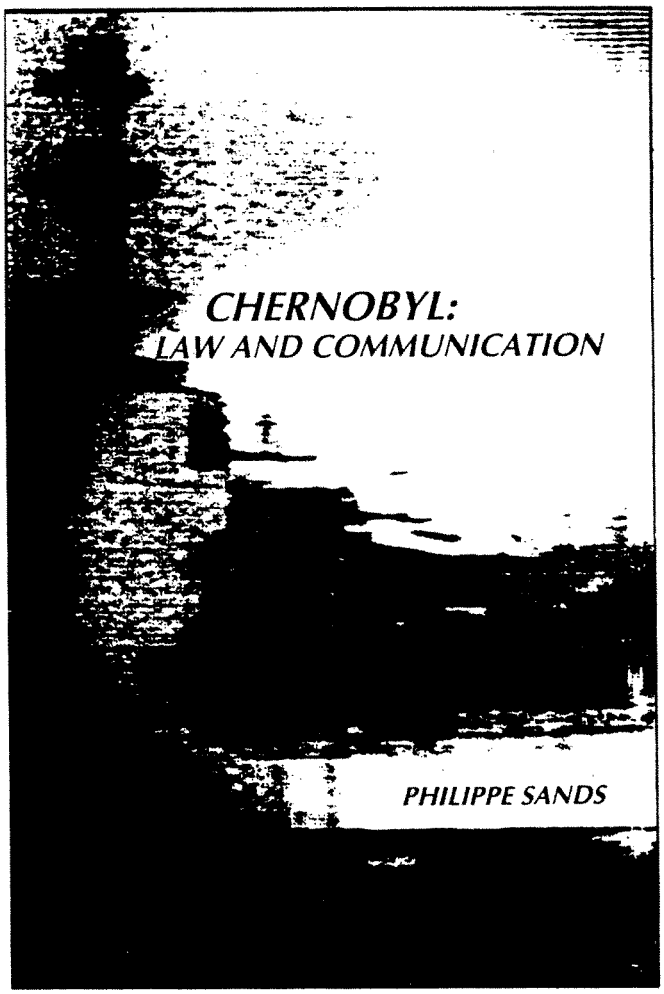
The Chernobyl Disaster by Viktor Haynes and Marko Bojcun. Hogarth, 1988, 233pp, £7.95.

Something in the Wind: Politics after Chernobyl by Louis Mackay and Mark Thompson (eds). Pluto, 1988, 240pp, £19.95 (pbk £7.95).

Chernobyl: The Real Story by Richard F Mould. Pergamon, 1988, 255pp, £25 (pbk: £9.95).

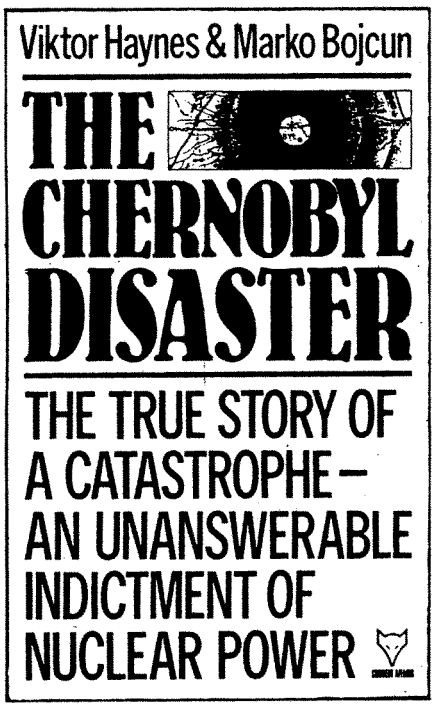
Chernobyl: The Final Warning by Dr Robert P Gale and Thomas Hauser. Hamish Hamilton, 1988, 213pp, £12.95.

Chernobyl: Law and Communication by Philippe Sands. Grotius, 1988, 312pp, £38.



On its second birthday, the Chernobyl industry predictably swung once more into action, with a clutch of books published. These range from technical lists of use only to researchers and academics, to pulp recollections cynically rehashed and trotted out for the most frightened and susceptible part of the market.

First off the shelf is **The Chernobyl Disaster**. Of the five books examined here, it is undoubtedly the clearest and most accessible document on Chernobyl. It pieces the disaster together, with a strong accent on local Ukrainian news reports and interviews, from the beginning of the ill fated reactor experiment, through the fire fight, fall-out, costs to human health, to the clean up operation.



By concentrating on those most involved with the disaster Haynes and Bojcun have created a valuable social history, which will be as comprehensible to the nuclear novice as it is useful to the historian. They both studied at the Institute of East European Studies at Glasgow University, and Bojcun's expertise in contemporary soviet politics here complements Haynes' background in the power industry. However, the second part of this book (which earns its subtitle: 'An Unanswerable Indictment of Nuclear Power'), could be more analytical without detracting from its clarity.

For a full analysis of Chernobyl's political fall-out turn to **Something in the Wind**, its subtitle of 'Politics After Chernobyl' for once accurately reflecting what the book achieves, not what it aims to do.

As one might expect from the editors of the END Journal, no punches are pulled in criticising East or West; refreshing after the more partisan offerings from the nuclear lobby. Worth picking out from this collection of essays are the two chapters by the editors. They examine the state of the environmental and peace movements following the disaster, and, more pertinently, its catalytic effect on them.

Also worth keeping for reference is the fascinating chapter by Zhores Medvedev on the political history of the Soviet nuclear power programme. Quite what will replace nuclear power is not adequately addressed, which will disappoint some people, but that is surely well documented elsewhere.

Sadly, the two books which should be the best, by virtue of their authors' involvement in the disaster, turn out to be the worst. Mould was present at the 1986 IAEA Chernobyl post-accident review meeting in Vienna. His book merely presents the disaster in pictures.

And Dr Gale's offering is no more than a reminiscence of his visit to Moscow - how he met Gorbachev, went jogging, what he had for breakfast - when it should have been a fascinating insight from someone who was actually involved in the disaster.

Lastly comes **Chernobyl: Law and Communication.** This is simply a collection of the full texts of the 23 international treaties covering nuclear accidents with transboundary effects. It is unlikely to be in your local library, but is available from Grotius Sales, PO Box 115, Cambridge CB3 9BP.

THOM DIBDIN

Energy Efficiency in Buildings: Progress and Promise. F M O'Hara Jr (Ed).

Energy Efficiency: Perspectives on Individual Behavior. Willet Kempton and Max Neiman (Eds).

(Both books published by American Council for an Energy-Efficient Economy. Both $19.50 + $7 postage or $10 for the two).

Although these two books are about the situation in the US, much of the background is familiar - fuel costs rising faster than inflation; fuel poverty; rapidly rising costs of nuclear power, and concern about acid rain.

Progress in the States has been much more rapid than in this country, so as a pointer for the UK the first book is invaluable. Energy plans are proliferating and the scale of possible savings astounding. Electric utilities can drastically reduce their operating costs & investment requirements and help the economy in the process.

The cost effectiveness of passive and active solar energy, retrofitting existing homes and superinsulation is examined. Large savings may be available in the Southern States, but little work has been done on the energy saving potential of space cooling.

Efficient appliances can make a valuable contribution - the extra investment required has a rate of return of between 12% and 45%.

Future potential savings are still enormous despite the rapid strides made over the last 10 years. Indeed the country is faced with "insurmountable opportunities."

Energy Efficiency: Perspectives on Individual Behavior must be the first of its kind. It shows that previous efforts to improve the public's conservation behaviour may have been based on false assumptions. Improving people's attitude to conservation doesn't necessarily make conservation behaviour more likely. Similarly, assuming that consumers act in the same way as an economically rational investor can produce hopelessly inaccurate results.

Basically there is no simple blueprint for encouraging energy-efficient behaviour. Most people have goals other than saving money, and unless an efficiency measure meets some of these goals it is unlikely to be adopted. They may be willing to spend thousands on a solar collector which will never pay for itself, but unwilling to get their house draughtproofed - its just not glamorous enough.

The book recommends utilities to identify potential conservers by looking for people who purchase other high technology equipment, then offer to arrange for devices to be installed, and rely on word-of-mouth networks to pass on the message.

I hope that others will read these books so that we can lobby for and implement an energy efficiency strategy rapidly, and perhaps catch up with some of the more enlightened countries. In Thatcher's Britain, for such huge gaps in the market to exist for much longer can only be described as a criminal waste of opportunity.

PETE ROCHE

Tide Lines: A Celebration of Druridge. Druridge Bay Campaign, 1988, 47pp, £1.95.

Emotion is often forgotten in these days of professional international protest groups. Endless reams of quasi-governmental reports levelled at unsuspecting authorities tend to dehumanise the movement, alienating it from the grassroots.

Tide Lines - an anthology of poetry and pictures commissioned, by the Druridge Bay Campaign, from artists of local and national repute, "in the cause of preserving our Northumbrian heritage, and by implication the heritage of the entire British Isles" (or indeed the World!) - breathes emotion back into the heart of protest.

Sadly many of the poems and pictures are prophetic premonitions which could be spoken in lament of our natural heritage, rather than sung in celebration. This is not an optimistic Swan Song for the nuclear industry, but an aria heralding the four policemen of the apocalypse.

It may be too late for many areas of lost beauty, but Druridge Bay need not be sacrificed on the nuclear altar. It is time the Government listened to the voice of the people - spoken in these pages - and called a halt to the madness which threatens not only Druridge, but also the very fabric of humanity which creates communities that care.

MIKE TOWNSLEY

Acid Rain: Rhetoric and Reality by Chris C Park. Methuen, 1987, 272pp, £14.95.

"This most excellent canopy, the air, look you, this brave o'erhanging firmament, this majestical roof fretted with golden fire, why, it appeareth nothing to me but a foul and pestilent congregation of vapours." Hamlet, II ,ii ,299.

This is not only the most comprehensive volume on acid rain I have read, but also the most pleasurable. Park appears to have enjoyed the writing of this book, and punctuates its chapters with quotations like the example above.

For once, the sleeve notes say it all: "As a broad and balanced treatment of a heated subject, **Acid Rain** is a valuable text book for students of geography, environmental studies, conservation and energy policy. It will appeal to anyone who wants a better understanding of the acid rain debate."

MIKE TOWNSLEY

LITTLE BLACK RABBIT

Now the Hinkley Inquiry is about to start, Little Black Rabbit thought it might be interesting to find out what Baron Marshall of Goring thinks of public inquiries.

During the Sizewell Inquiry he told the American business magazine **Forbes**: "I expect to get approval in about a year's time. By that time the British Public will be bored to tears by nuclear power. That of course is the purpose of having a Public Inquiry."

Lord Marshall should watch his tongue or he may suffer the same fate as his 17th Century namesake, the Royalist General Goring. In 1645 Goring besieged Taunton, which was defended by the townsfolk and Parliamentarians. He was defeated, and the Parliamentarians then went on to capture Bridgewater, within a couple of weeks, and thus brought the whole of Somerset under democratic control. LBR believes history will repeat itself at the Hinkley Inquiry.

LBR, being an avid reader of pro-nuclear literature, has noticed something rather odd about the latest propaganda emanating from the Nuclear Ministry of Truth: Sudbury House.

"The original aim of the British nuclear power programme" claims the CEGB's latest work, "was not to make electricity cheaper but to supplement fossil fuel reserves."

Now that Michael Barnes QC has allowed Hinkley C objectors to compare nuclear and coal costs, the CEGB realise they will inevitably lose the argument. In a vain attempt to extract themselves from this embarrassing position, they claim that even if nuclear power was less than economic "it would still be worth installing some nuclear plant to diversify the sources of primary energy."

Considering that 50% of electricity in Scotland will be coming from nuclear sources if Torness ever works, this is a use of the word diverse with which LBR was not hitherto acquainted.

Sir John Sinclair could be turning in his grave at what his descendent Robin Sinclair, aka Lord Thurso, is up to.

The wise and enlightened Sir John, lived in 18th century Caithness and was the first man to graze Cheviot sheep in the County. He urged caution and consideration, and the absorption of the native people into the new economy: sheep. Unfortunately he was ignored, and all around him immersed themselves in one of the most barbaric acts of English colonialism - the Highland Clearances.

As honorary president of the Caithness Tourist Board, Lord Thurso, a former Liberal spokespeer, should reconsider his responsibility to the community, and tell Nirex where to put their waste. Present day highlanders may not be as amenable to forced emigration as their predecessors.

The campaign against Nirex has grown wings. LBR's friends on Tiree were given free tickets to fly to Glasgow by Loganair, so they could attend a meeting, with Nirex, in Inverness, organised by the Centre for Economic and Environmental Development. Thanks to Loganair, Nirex now know what the islanders think of their proposals.

Satori in the Scottish Office: "Today there is an increasing awareness throughout society of the importance of the environment. Environmental issues such as acid rain, damage to the ozone layer and the greenhouse effect all make headline news - and rightly so. These are major Global issues which, to be tackled effectively, require cooperative Governmental efforts on a global scale." So says Lord James Douglas-Hamilton MP, minister for the Environment at the Scottish Office.

LBR has decided not to comment, but to let our readers judge whether the Government is really helping to tackle these issues.

Is the fast breeder ever going to provide a significant amount of electricity? If you believe John Collier, the UKAEA chair, its future economic success appears to be becoming exponentially less likely.

In an interview with an independent television team in October last year, Mr Collier admitted the nuclear version of the philosophers' stone was unlikely to be needed until 2020-2030.

This June the same team interviewed him again. This time he claimed the ETA for success was not likely to be until 2030-2040.

A slip of 10 years in 8 months. On this progression, by 2020, the first e[illegible] have s[illegible] fast breeder!

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