SAFE ENERGY

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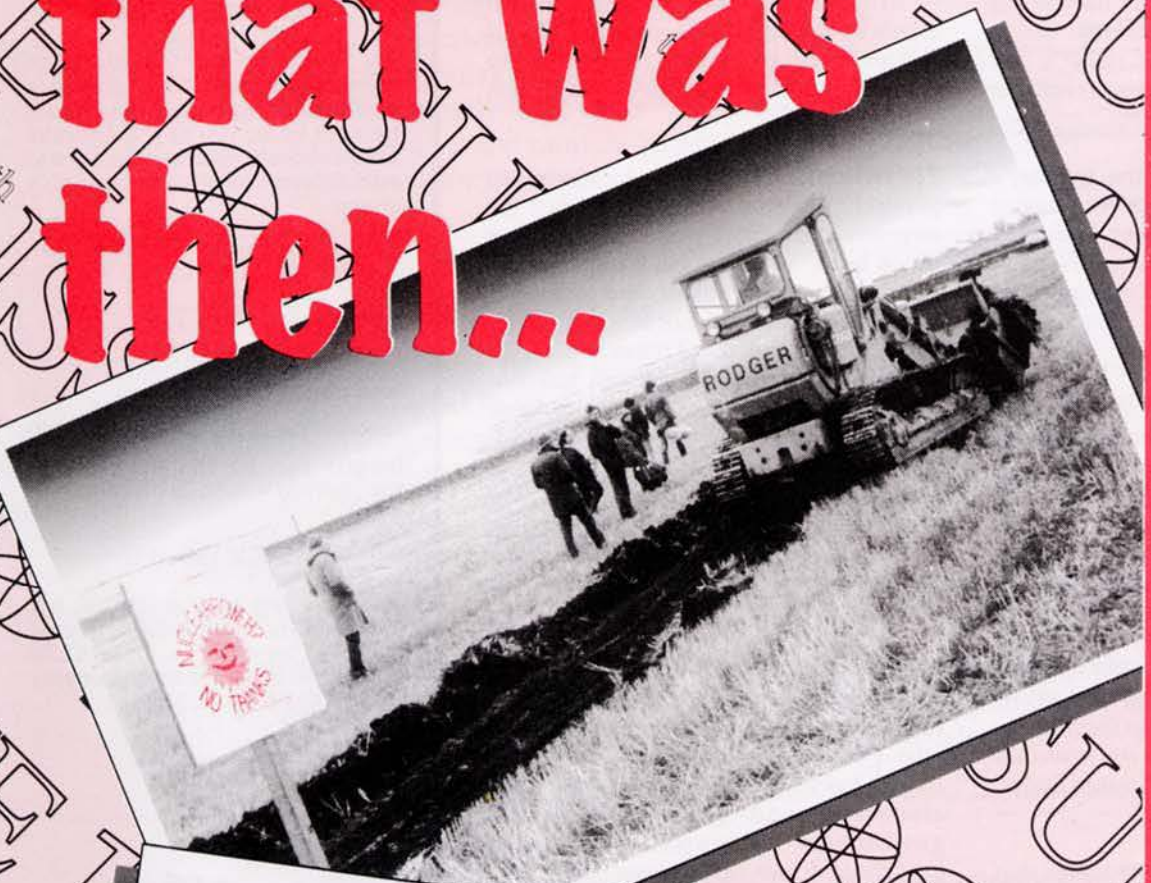
that was then...



this is now!

In this 100th issue

Scram: a look back

Energy efficiency: little progress

Made in Korea

Plus a 4 page supplement on renewable energy

COMMENT

SAFE ENERGY is one hundred issues old and its publisher, Scram, is in its 19th year. A long time for a campaign group to survive on meagre funds. Over the total period of our activity we have probably spent no more than the nuclear industry does on PR each and every month.

Yet the truth of our message shines through. Nuclear power is dangerous and uneconomic. It has created, and is creating, a deadly legacy which our children's children's ..... children will have to look out for.

Forged in the furnace of the military's desire for ever-more destructive weapons the so-called civil nuclear industry remains true to its parentage. Nuclear reactors produce plutonium and growing world stockpiles are becoming increasingly difficult to police.

No matter how many times US President Eisenhower's 'Atoms for Peace' mantra is chanted by the nuclear mandarins, nuclear reality will always echo back 'Atoms for War'. While the Cold war is finally thawing, the world is witnessing the emergence of new nuclear powers. Pakistan, South Africa, India, North Korea and Argentina are amongst those suspected of having, or known to have, nuclear weapons, despite the best efforts of the United Nations to keep the number of weapons states down to the favoured five — Britain, France, the United States, Russia and China.

It is to draw attention to these issues that we publish *Safe Energy*, so that anti-nuclear activists have access to up to date information with which they can counter the nuclear industry's glossy claims of environment friendliness and, at least until recently, economic viability.

This is a vital time in the campaign for a sane energy strategy; the nuclear industry is on the ropes and *Safe Energy* will continue as long as Scram has the resources to publish it!

After this 100th issue, the *Safe Energy* journal will be published quarterly. The decision has been taken because with just two staff, one part-time, and limited finances it is proving impossible to publish on a bi-monthly basis and maintain Scram's other campaigning and information work.

THE UK government has recognised the risk of climate change and accepts that "energy efficiency improvements are the cheapest and quickest way of combating the threat of global warming" (*This common inheritance*, 1990).

A recent study has found that the UK may meet its international commitment — to stabilise carbon emissions at 1990 levels by the end of the century — but if it does it will be by luck rather than by effective policy measures ("Carbon study", p19).

The switch from coal to gas for electricity generation is not being carried out for any environmental reasons, but for a quick buck. VAT has been imposed on domestic fuel and power, and increased duty levied on petrol, not to save mother earth, but to fill the Treasury's piggy bank. Slow industrial growth has not been designed by government to limit emissions.

These factors look like achieving short-term reductions in carbon emissions, but are unlikely to achieve the necessary long-term reduction in energy use.

Meanwhile, a main plank of the government's carbon abatement strategy, the Energy Saving Trust, has become a joke ("Efficiency funding", p19). The money has all but dried up, thanks to the electricity and gas regulators — government appointees working to guidelines drawn up by government.

Yet the UK government insists it knows best and stands alone in refusing to contemplate a European Union carbon/energy tax that other countries argue is essential.

Given this background, the government's decision to block two well-thought-out and widely supported private members bills on energy efficiency ("Efficiency measures axed", p19) was short-sighted and ill-advised.

The government has no coherent policy on energy efficiency, and the Treasury refuses to allow even modest expenditure on "the cheapest and quickest way of combating the threat of global warming". If it relies on chance to get it through the nineties, the necessary framework for future cuts will not be in place and the task will be that much the harder.

The *Safe Energy* journal is produced for the British anti-nuclear and safe energy movements by the Scottish Campaign to Resist the Atomic Menace. Views ex- pressed in articles appearing in this journal are not necessarily those of Scram.

scram, *skram, v.*
to shut-down a nuclear reactor in an emergency.

CONTRIBUTIONS

We welcome contributions of articles, news, letters, graphics and photographs, which should be sent to Scram at the address below. Scram reserves the right to edit letters to fit the available space.

ADVERTISING

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BACK ISSUES

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PRODUCTION

Editors
Mike Townsley
Graham Stein.

FRONT COVER

Photographs show the cutting of the first turf for the construction of Torness nuclear power station in 1978 and a Torness Action Group blockade of the plant in 1994.

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As *Safe Energy* reaches its 100th issue, **Rob Edwards**, a founder member of Scram, award-winning journalist and former environment correspondent for *Scotland on Sunday*, looks back at the early days of the campaign — days of mass demonstrations and rainbow jumpers —and assesses their significance for the present.

14 Energy efficiency: little progress

A recent House of Commons' report on energy efficiency in buildings echoed the findings of another Commons' report published 11 years earlier. Their similarity showed just how little progress had been made in the intervening decade. **Andrew Warren**, director of the Association for the Conservation of Energy, criticises the failure to promote energy efficiency and hopes for a more promising future.

16 Made in Korea

The Korean peninsula has become a region of major international concern, with the risk of a nuclear arms race in east Asia. North Korea's suspected nuclear weapons programme is seriously testing nuclear safeguards and the non-proliferation treaty, reports **Mike Townsley**.

PLUS A FOUR PAGE SUPPLEMENT ON RENEWABLE ENERGY

giving basic facts and information on the range of renewable forms of energy

Torness Action Group campaigners protesting at the presence of Scottish Nuclear and British Nuclear Fuels' exhibition caravans at the Edinburgh International Science Festival on 1 April.

Nuclear review

CONSIDERABLE doubt is now being expressed within Whitehall over the government's chances of privatising the nuclear industry before the next general election.

While the government is technically entitled to privatise the industry without any change to existing legislation, senior government ministers have told *The Independent* newspaper they believe primary legislation will be required. According to one source it would be "politically unacceptable" to go ahead without seeking the approval of parliament.

The terms of reference for the nuclear review which were expected to be announced before the end of last year have so far failed to materialise, and it is now believed that time is running short for any form of privatisation before the next election.

If primary legislation *is* required then the Department of Trade and Industry (DTI) would need to find space in the parliamentary timetable for introducing new legislation. But the DTI already has a significant parliamentary programme: it has to introduce a bill in the next Queen's Speech to open the gas industry to greater competition and is considering legislation to privatise parts of the Royal Mail — a process which is now 21 months behind schedule. According to the *Independent*'s sources it is unlikely that a third slot can be found in the Autumn for a bill to privatise nuclear power: "After that it will be too late, because it would be too close to the election."

The DTI's plans for a short internal review prior to privatisation have been further complicated by a row within the cabinet over the terms of reference for the review. The Treasury and the Department of the Environment (DoE) have been insisting on a wide-ranging review which would not only look at what it would take to convince the 'City' to buy the industry but a much more detailed investigation of the long-term environmental impact of nuclear waste and a full assessment of the costs of decommissioning. The sources say that the Treasury and DoE are winning the argument.

It is also unlikely that the terms of reference will be forthcoming prior to the completion of the latest consultation into the opening of the Sizewell B PWR ("Thorp ruling", below), as any announcement before Sizewell begins operating would open the way for a legal challenge to the plant's operation.

The DTI is adamant that it still intends to conduct the review: "The accusation that we have been dithering is unfair. We are determined to publish the reviews in our own time and we will not be pushed by outside vested interests saying 'publish now, now, now'." ❑

Thorp ruling

LEGAL action taken by Greenpeace and Lancashire County Council to prevent the opening of the Thermal Oxide Reprocessing Plant (Thorp) may well have failed in its original intention but has firmly established the legal requirement for practises involving radioactivity to be 'justified' in that their net benefits to society must outweigh their impact.

In making his ruling Mr Justice Potts said that the government had acted legally and within its authority when it authorised the start-up of the plant. However, he commented that "it may be thought that a minister sensible to the scale of representations ... and the desirability of allaying public anxiety would have directed an inquiry."

He further commended the appellants for bringing the "unusual and, indeed exceptional case" and in the clearest indication he could give that he believed the case to have been brought in the public interest he refused to award costs against Greenpeace. It is believed that the total cost of the case was over £1 million.

Even before the ink was dry on Justice Potts ruling, its repercussions where being felt all the way up in Suffolk. Nuclear Electric (NE) had expected to be given authorisation for discharges from its nearly complete Sizewell B power station last month; however, much to NE's senior executives' dismay HM Inspectorate of Pollution has ordered a further round of public consultation into the justification and need for the plant. While it is highly unlikely that the process will end in anything other than approval for the station, the new delay will cost NE an estimated £30 million. ❑

Decommissioning doubts

PLANS for the decommissioning of the UK's nuclear plant are morally dubious and shrouded in uncertainty according to a report commissioned and, at least in part, endorsed by the Radioactive Waste Management Committee (Rwmac).

The report, "UK Nuclear Decommissioning Policy: Time for Decision" produced by the Science Policy Research Unit (SPRU), commissioned as part of Rwmac's investigation into decommissioning, argues: "With some of the world's oldest reactors, Britain is the only country planning to postpone the most difficult stage of decommissioning, dismantling the core, for over 100 years. British policy also assumes that money set aside now will accumulate at an annual rate of 2% above inflation during this delay. This means that relatively little money is currently being provided for decommissioning in relation to the eventual bill. Questions clearly arise about the environmental sustainability, ethics, technology and economics underlying this policy."

While the UK nuclear industry believes that the undiscounted cost of decommissioning civil facilities will be about £18 billion, SPRU warns that cost uncertainties surrounding the issues of dismantling the reactors and the packaging and eventual disposal of the waste generated make the industry's estimates highly speculative.

Further, they argue that the policy of postponing full decommissioning for over 100 years is ethically dubious, failing to adhere to either the 'precautionary' or the 'polluter pays' principles.

SPRU warns that the current financial provisions fall far short of what is required. Money collected for decommissioning prior to electricity privatisation has effectively been lost and the money collected by the industry through the non fossil fuel levy "is being used for other things and will hardly contribute at all to decommissioning expenses."

Four main areas of financial uncertainty are identified in the report. It says that provisions may not earn real interest at the required rate; the station may not operate for its full life; site clearance could be required earlier than planned; and a reactor accident could increase decommissioning costs.

Instead, SPRU recommends that a separate decommissioning fund be established and run by a government-appointed independent management committee. Such funds should be invested in low-risk gilts rather than long-term fixed assets like new nuclear power stations.

It also suggests that one magnox station should be fully decommissioned now to prove that the proposed techniques are both technically and economically viable.

Rwmac rejects as unreasonable the assertion that a segregated fund should contain sufficient resources to meet full decommissioning in the 'worst case scenario' — possibly after a reactor accident — as no other industrial activity is subject to the same pressure. However, it calls on the government to accept that only it "could meet the costs of early greenfield clearance of all sites following a decision to abandon nuclear power at short notice."

In what is clearly meant as a warning to the government — as it ponders the terms of reference for the nuclear review — Rwmac concludes: "We pass many benefits and consequential liabilities down to future generations, the balancing of these in a kind of intergovernmental account is, if not impossible, certainly not something to be attempted in isolation on nuclear plant decommissioning." ❑

Fast reactor no more

SO, Britain's fast reactor has closed, no fanfare here, no heralding of a brave new scientific age. The experimental prototype fast breeder reactor (PFR) at Dounreay, with all its explosive potential and after £4 billion and four decades, finally died the death of a thousand cuts at the end of March.

What now? According to Tom Morton, who over eight years as Highland correspondent for *The Scotsman* was "patronised, bullied, ignored and treated with indifference or complete unconcern" by the 'Atomics': "If God were a golfer, He could take a celestial sand wedge and, with one heavenly swing, send into hyper-space that gigantic sinister white sphere, that mutant Dunlop 65, which symbolises a nuclear Dounreay.

"A sizeable divine divot could also excise from the Caithness bogscape the reprocessing plant, HMS Vulcan next door, with its rumoured missiles and redundant Polaris engines, and the supporting pits of radioactive waste which surround the perimeter fence, its armed guards and slavering dogs." Unfortunately, Morton's vision is no more realistic than that of the scientists and officials who first got the ball rolling decades ago with the promise of inexhaustible clean power that would be 'too cheap to meter.' Caithness and the North of Scotland will bear the scars of the nuclear industry for a long time to come.

In the short term, AEA Technology has applied to increase its radioactive discharges to sea and air by massive amounts — nearly 1,000% in some cases — to accommodate reprocessing of the reactor's last fuel charge. The government has instructed Dounreay to reprocess the remaining 30 tonnes of PFR spent fuel over the next three years, for economic reasons. Yet since the reactor opened in 1974 only 17 tonnes of its spent fuel have been reprocessed, and there is considerable doubt that Dounreay could carry out the work in the timescale being demanded.

Burn-up

According to information supplied in 1992 to Highland Regional Council by AEA Technology, the plant has a design throughput of six tonnes of spent fuel a year, assuming a 50% load factor and a 10% burn-up rate in the fuel. However, the PFR has achieved a surprisingly high burn-up of over 20%, greatly increasing the fuel's radioactivity. While the low load factor of the PFR has meant that only an average two tonnes of spent fuel have been available for reprocessing each year, the plant has had a radioactive throughput of 80% of its design specification. Even without considering the burn-up rate it would still take the plant five years to reprocess 30 tonnes of fuel, two years longer than the government is allowing.

The recent High Court ruling, made when Greenpeace challenged the decision to allow the Thorp plant at Sellafield to begin emitting huge quantities of radioactivity, has established that under European Union law and the 1993 Radioactive Substances Act "the various types of activity resulting in exposure to ionising radiation shall have been justified in advance by advantages which they produce." In other words, in order to gain authorisation for radioactive discharges it must first be shown that the cause of the discharge — in this case reprocessing — offers a net benefit to society.

In a world which is awash with plutonium and becoming increasingly concerned about the dangers of weapons proliferation, it will be difficult to justify a process which separates plutonium from spent fuel for no other reason than it is there. HM Industrial Pollution Inspectorate (HMIPI) is now considering Dounreay's application for new discharge

Mike Townsley

authorisations and is believed to be having considerable difficulty figuring out exactly how to decide if the reprocessing represents a net benefit to society.

Meanwhile, in anticipation of a public consultation period following the publication of HMIPI's decision, an unprecedented number of local authorities, individuals and organisations have asked to be consulted. Internationally, the local government organisation KIMO, with members drawn from around the North Sea, has urged all its members to seek information from HMIPI and demand compliance with the Paris Commission — to which the UK is a signatory — which last year adopted a policy requiring widespread international consultation and scrutiny of all new or revised discharge authorisations for reprocessing plants.

In the longer term, there is the dual problem of nuclear waste and decommissioning. Or perhaps this is just one problem.

One thousand tonnes of liquid sodium coolant lies at the heart of the difficulty in decommissioning the PFR. Sodium is highly reactive and liberates explosive hydrogen gas on contact with water. At the end of March one engineer died and four others were seriously injured when attempts to neutralise the residue of sodium coolant at France's first experimental fast reactor, Rapsodie, caused a massive explosion. Having removed much of the 37 tonnes of sodium coolant by a process known as DESORA — in which the sodium is mixed with sodium hydroxide in an oxygen free environment and the resultant hydrogen gas is tapped off — the explosion is thought to have been caused by hydrogen gas generated by the 100-200kg of sodium left in the cooling circuit.

Hydrogen build-up

AEA Technology is currently building equipment to neutralise the 50 tonnes of sodium-potassium coolant from Dounreay's first fast reactor, which closed in 1977. The plan is to inject the coolant into sodium hydroxide and blow nitrogen through the chamber to prevent hydrogen building up. Dounreay says that like DESORA this process will also leave a residue. Ken Butler, head of decommissioning at the plant, says, to clean up the residue, they plan to spray it with water vapour: "You can tune the amount of water vapour to control the hydrogen production over a number of days." Let's hope the delivery system for the water doesn't follow the design specification of every other pipeline built by the company, and leak.

However, if it does it may not be state-owned AEA which is to blame as the government has set out its plans to privatise the company and tenders for decommissioning the PFR are being sought. So far, two groups are known to be interested: Rolls-Royce and the French company Novatome which has a license to use DESORA.

The privatisation scheme has a simple premise, the profitable sectors of AEA, such as its oil industry work and 'Silver Bullets II' scheme for destroying toxic waste, will be separated from the non-profitable sections and prepared for privatisation in 1995-96. All else including the AEA's liabilities of £3-4 billion will be kept in public ownership under the title of UKAEA Government Division.

Private companies will be permitted to tender for both decommissioning and waste management work.

Whether Dounreay continues in the public or private sector, or that twilight zone in between, the invariable response of the 'Atomics' to questions put by intrepid reporter Morton, of "Go away, sonny, we know best. We're SCIENTISTS!," will not wash. The long and difficult road to making Dounreay safe cannot be travelled without full public consultation. ❑

Nirex speaks volumes

PLANNING permission for a rock characterisation facility (RCF) at Sellafield may now not be sought until after the European Elections, because the government fears that any move before the elections could cost valuable votes at a time when it is already vulnerable.

At a cost of about £200 million, Nirex, the agency charged with finding a final resting place for the UK's intermediate-level nuclear waste, says the laboratory is needed to further study the properties of the Barrowdale Volcanic Group of rocks under Sellafield where it hopes to entomb the waste. Without such a lab, argues Nirex, it would be impossible to make a safety case for its repository at a public inquiry.

However, many opponents of the facility believe that if the RCF is given the go-ahead it will tip the scales so far in favour of deep dumping at Sellafield that the industry would never retract.

According to Nirex, the facility is "designed for investigatory and experimental purposes and, as a matter of law, the planning permission for the RCF could not allow its use for any other purpose."

The local county council, Cumbria, believes that an inquiry covering only the RCF would be inadequate: It "is not just a super borehole but represents a major construction exercise with the sinking of two shafts, the opening of two caverns and a ten-year programme of research."

The council is demanding that a full public inquiry covering all issues surrounding the dumping of nuclear waste should be held first, including a public examination of why Sellafield was selected in the first place.

Meanwhile, Nirex has slashed its calculations of the amount of nuclear waste to be dumped in a deep repository. The forecast amount of low-level waste (LLW) to be dumped has fallen from 1.4 million cubic meters to 100,000 cubic meters and the quantity of intermediate-level waste (ILW) has dropped by 200,000 cubic meters to 300,000 cubic meters.

The revised LLW figure comes from new estimates of the capacity of the industry's current shallow trench at Drigg for LLW, with the remaining 100,000 cubic meters being unsuitable for Drigg. And the new ILW figure reflects a reduction in waste production estimates from the nuclear industry.

Having lower quantities to dump will not significantly cut the cost of the repository. They do, however, mean that the original monetary justification for choosing Dounreay over Sellafield as the dump site has waned significantly. Dounreay was rejected because most of the waste to be dumped was already at Sellafield and the additional cost of transport would have been £1 billion.

This, and Nirex director Michael Folger's assertion on Border TV's live broadcast "The Forum" that "Dounreay is not hugely better or necessarily hugely worse than Sellafield. It is still there as a reserve site," can only further fuel fears in the North of Scotland that it is only a matter of time before Nirex mounts another cross-border raid. ❑

AEA waste sites

A report from the Health and Safety Commission's advisory committee on the safety of nuclear installations (ACSNI) has added to the growing concern about the way the UK's nuclear waste is being stored pending the establishment of a national nuclear waste repository.

The report into the six sites managed by the AEA Technology repeats the warning made last year by the committee following an investigation of waste storage at Sellafield: "A common theme in both reports is the need for decisions to be made on the types of packaging that will be required for the various types of waste. The nuclear site operators have had to delay taking action to condition some of their radioactive waste for long-term storage because of uncertainty about the packaging which will be accepted for placement in the repository.

"Drums used to store some of the waste are starting to corrode and some buildings used for storage are reaching the end of their useful lives. Licensees are naturally reluctant to spend money to package waste before they know whether the type of packaging will be acceptable.

"If waste is repackaged now and subsequently found to be unsuitable for a repository, the double handling that would result could mean higher radiation doses to workers."

While most AEA sites were found to be generally satisfactory by ACSNI, Dounreay was singled out as having a "legacy of inadequate storage."

ACSNI also considered the issue of decommissioning at the AEA sites. In particular it is unhappy about the neglect of the Windscale piles which are part of a small AEA enclave within BNFL's Sellafield complex. "There are still serious problems not cleared up since the [1957] accident," comments ACSNI. About 15 tonnes of damaged fuel remains within the core of atomic pile and a further five tonnes of fuel are trapped in air and water ducts.

Again at Dounreay, considerable decommissioning work remains to be carried out on the Dounreay fast reactor which closed in 1977. Stage one is almost complete with only one jammed fuel element remaining in the core. However, the core still contains 1025 breeder elements, most of which are believed to be stuck. ACSNI comments that special equipment will be needed for the removal of these elements.

"The method of disposal for the breeder fuel has yet to be resolved," observes the committee, but their removal will begin in about five years time, and could be complete in 20 years. However, the time scale may be extended for financial reasons.

Committee chair, Dr David Harrison, has made it clear that the problems of waste management should form a major part of the government's long-overdue Nuclear Review, but warned that the energy minister, Tim Eggar, had failed to clarify whether the review would indeed consider these issues. ❑

Safe rad waste plan

PARTICLE accelerators could be used to speed up the decay of radioactive waste, so that it would become safe in a hundred or so years, and could be at the heart of a new generation of nuclear power stations according to Nobel Laureate Dr Carlo Rubbia.

Dr Rubbia, former director-general of CERN, the European particle physics lab, believes that by bombarding radioactive waste with a stream of neutrons, accelerating its natural rate of decay, the waste would become much less harmful almost immediately and the final remnants of radioactivity would decay to safe levels in scores of years rather than thousands.

Further, applying the technology to power generation — firing neutrons at thorium atoms — would produce a system of nuclear power which generated only small quantities of radioactive waste which would have a decay curve covering just over a century.

"In the past" says Rubbia, "we looked at nuclear power generation through military eyes, our plants were designed in the wake of atomic bomb programmes.

"Today we have different requirements. We have to think about the ecological impact of energy generation. We want to generate power without creating piles of garbage, and make reactors that won't blow their tops if not operated properly."

While the basic principles are not new, Rubbia says that the relative low cost of modern accelerator technology means that it could be used to produce cheap power.

Rubbia plans to test his vision later this year when researchers at CERN will bombard thorium atoms with protons and neutron to see if they can produce temperatures that can generate electricity.

Although the idea rings with a familiar tune, such is Rubbia's track record that governments will take him seriously, and anything that can reduce the longevity of the world's mountain of deadly radioactive waste must be worth further consideration. ❑

Gardner dropped

FURTHER investigations into the controversial link between paternal exposure to radiation and leukaemia in children have been abandoned by the Medical Research Council (MRC) because little corroboration for the hypothesis can be found.

Four years ago the late Professor Martin Gardner generated headlines around the world when he published the results of his investigation into the leukaemia cluster in Seascale, a small village near the Sellafield reprocessing plant. His work suggested that male occupational exposure to ionising radiation could cause sperm mutations which in turn could substantially increase the risk of childhood leukaemia.

Now, however, Dr Hazel Inskip, writing to British Nuclear Fuels (BNFL), from Southampton University where the original work was conducted, said the results of further studies had not supported the hypothesis and that the MRC no longer intended to pursue the work. She is, however, awaiting the results of some large studies which may yet corroborate Gardner's findings.

BNFL has welcomed the announcement saying: "The original Gardner report caused a lot of concern, heartache and anxiety among our workforce and their families, and therefore it is only right that they now receive this reassurance at first hand from Dr Inskip to whom we are grateful."

Her letter follows the publication, at the beginning of March, in *Nature*, of the results of an investigation into the Gardner hypothesis by Sir Richard Doll — who first established the link between smoking and lung cancer — and Sarah Darby of the Imperial Cancer Research Fund and Professor John Evans of the MRC.

Their report argues that Gardner is not consistent with known radiation genetics or the hereditability of childhood leukaemia.

"It is not supported by observations of the relationship between men's exposure to ionising radiation and the risk of leukaemia in their offspring in the survivors of the atomic bomb explosions in Japan, in the neighbourhood of nuclear installations in Ontario, Scotland or Cumbria other than Seascale.

"We conclude that the association between paternal irradiation and leukaemia is largely or wholly a chance finding. Nevertheless, it appears likely that small but real clusters of leukaemia in young people have occurred near Sellafield, and some other explanation for them needs to be sought." ❑

Rimnet

BRITAIN'S £13.2 million radiation early warning system established to detect radioactivity from nuclear accidents is entirely dependent upon rainfall and would probably leave Britain in the dark in the event of a Chernobyl-style disaster, says the government's Radioactive Waste Management Advisory Committee (Rwmac).

At a cost of £1.4 million a year the Radioactive Incident Monitoring Network (Rimnet) would register radiation from a Chernobyl-style plume only in areas where heavy rainfall had carried sufficient quantities of radiation to the ground.

Rwmac is also concerned that the radiation detection equipment installed at Rimnet's 92 sites around the country is not sophisticated enough to provide any information on the composition of any fallout. It therefore fails to meet people's expectations because it is currently incapable of being used is assessing levels of doses from inhalation and ingestion of radioactivity on a regional basis.

Further, it would be particularly useless in the event of accidents close to or within the UK, warns Rwmac.

The committee has made a number of suggestions to the government including the possibility of installing more radionuclide-specific monitors at some or all of the sites "in order to provide an early determination of radionuclide content."

However, the committee notes: "This will be expensive and therefore if this is not considered best value for money then the Department of the Environment (DoE) should positively encourage the supply of essential supplementary data from outside bodies to the Central Database Facility," in London.

The DoE has accepted much of Rwmac's criticism and is planning to test two monitors capable of providing information on radioactivity in deposition. ❑

Chernobyl

EIGHT years after reactor number four at Chernobyl erupted, sending a plume of radioactivity around the world, western experts and Ukrainian officials have finally agreed that the remaining two operating reactors at Chernobyl should close. However, when and how have not yet been worked out.

Following a safety inspection, the International Atomic Energy Agency (IAEA) said the site's two surviving reactors had "serious safety deficiencies". In addition, the Agency warned that many of the Russian technicians who once operated the plant have gone home.

Further, the concrete sarcophagus which was hastily erected around reactor four is beginning to crumble. The IAEA is concerned that if it collapses, releasing large quantities of radioactivity, the operators may not be able to get to the other reactors to keep them under control. The IAEA did, however, concede that Chernobyl cannot be closed until Ukraine secures alternative fuel supplies.

At a meeting in Vienna at the end of April, Ukrainian officials and Western donors failed to agree on the best option for closing the site as soon as possible.

While the Ukrainian delegation argued that the only cost-effective option for closing the site early lies with the completion of five Soviet designed VVER reactors at a cost of $1.2 billion, safety experts are not convinced that the VVER design can be made safe.

The US believes that more nuclear power is the least attractive of a number of options and argue that the answer lies with energy efficiency improvements. The Ukraine currently uses about 5 times as much electricity per unit of economic production as does the average industrialised country.

The Ukrainian deputy prime minister, Valeri Shmarov, told the Vienna meeting that the conservation option would be too slow as it would require "a complete overhaul of the infrastructure, lasting decades." Indeed, he told the meeting that even the completion of the 5 VVERs may not be enough to fulfil Ukraine's energy needs. He believes that more "modern VVERs" are required. ❑

NUCLEAR FREE LOCAL AUTHORITIES (SCOTLAND) congratulates SCRAM on the 100th issue of Safe Energy.

MORE THAN 90% OF SCOTLAND'S POPULATION LIVES WITHIN AN AREA WHERE THE LOCAL AUTHORITY HAS MADE A NUCLEAR FREE DECLARATION

WHY? - because these Councils believe that

- possession of nuclear weapons is potentially disastrous to the global environment;
- the transport of nuclear weapons and spent fuel through Scotland threatens our safety;
-the chance of a disaster at nuclear generating stations and weapons bases is a threat to the Scottish people.

WHAT ARE THEY DOING ABOUT IT?

- supporting groups working towards a future free from the threat of nuclear war;
-encouraging peace education in schools;
-commissioning research on nuclear dangers and alternatives to nuclear power;
-developing strategies for alternative product and employment opportunities for nuclear and defence dependent industries and communities.

FOR FURTHER INFORMATION CONTACT LIAM MEEHAN, NFLA'S (SCOTLAND) SECRETARIAT TEL 041-227-3261.

Strathclyde Regional Council congratulates SCRAM on the 100th issue of Safe Energy and on its continued promotion of energy issues.

The Council is actively working to support the responsible and environmentally acceptable use of energy.

The Council's Charter For The Environment published in 1993 aims to

"Reduce the consumption of energy through greater energy efficiency and support the development of renewable energy sources"

To this end the Council

- *has reduced the emissions of CO_2 from its own buildings by 120,000 tonnes a year*
- *will be preparing a strategic planning framework for renewable energy sources in Strathclyde*
- *will continue to be an active participant in the Nuclear Free Local Authorities Movement*

For further information contact
Adrian Shaw,
Environment Policy Officer
on 041 227 3614

After seventeen years and 100 issues of Scram's energy magazine, Rob Edwards, a founder member and former environment correspondent for *Scotland on Sunday*, looks back on the early days. Back to a time of mass demonstrations, centre partings and 'jumpers with rainbows on'.

Scram: a look back

I can remember the moment as if it were yesterday. A young, red-haired man in a navy sweater with leather arm patches bounded with a sense of self-importance to the front of the room. It was in an old YMCA building in the middle of Edinburgh's new town.

He joined the small panel of speakers and started to tell the hundreds who had crammed into the room why he was late. He had just flown back from a tour of the Dounreay nuclear complex in Caithness. There they had told him that no-one in Britain was worried about nuclear power.

"I come to this hall, to this meeting tonight, and I see all of you and I know that they are wrong," he said, to a loud roar of approval. It was a good moment.

It was, I think, the autumn of 1977. The speaker was the keen new Labour member of Parliament for Edinburgh Central, Robin Cook. The occasion was Scram's launching public meeting, the event from which all else has flowed.

Dynamic group

It brought together the activists who would go on to make Scram into one of the country's most dynamic and successful anti-nuclear protest groups. It gave us all our first flush of enthusiasm for the fight. It gave the few representatives of the nuclear industry present in the audience that night a wee fright.

We went on to organise a rapidly escalating campaign against the South of Scotland Electricity Board's plans to build a nuclear power station at Torness in East Lothian. We lobbied MPs, councillors and local people. We got our names in newspapers. And of course we launched the *Scram Energy Bulletin*, as it was first called.

When it became plain that conventional lobbying was getting us nowhere we began to organise mass demonstrations, first in 1978 and then again in 1979, attracting tens of thousands of people to the cause. We took risks, we broke the law, we created history.

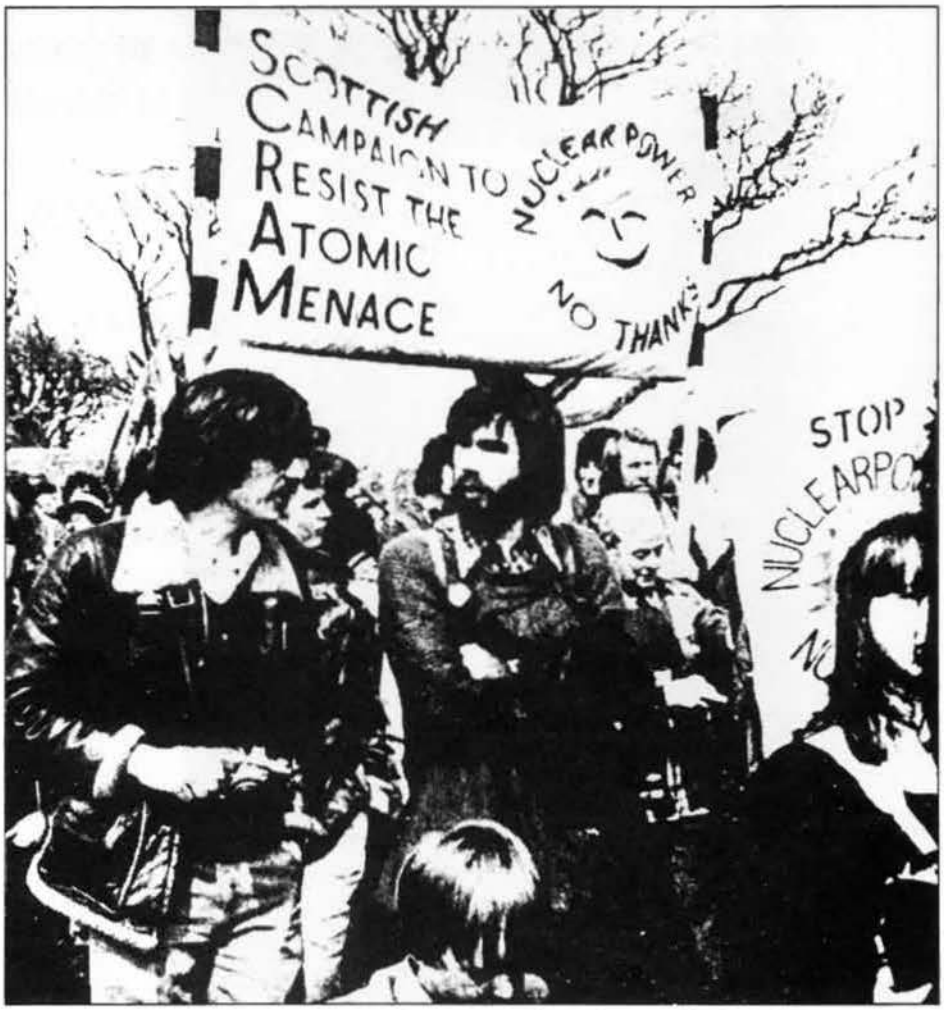
Those were good days. We parted our hair in the middle, we bashed away at antique typewriters and we laboriously printed leaflets on a messy old duplicator. We religiously read our copies of Saul Alinsky's Rules for Radicals. We always went to the pub after meetings.

They were different days. We had never heard of Chernobyl, global warming or catalytic converters. The Soviet Union was regarded as a threat to the world, there was a wall dividing Berlin and CND was thought to be in terminal decline. There was no such thing as the green consumer. John Lennon was alive and well.

It is hard now, after 15 long years under the Tory yoke, to remember how we used to hate the Labour government. They were our enemy. It was Labour ministers who started building Torness. One of our posters unflatteringly featured the Secretary of State for Energy, Tony Benn, as a well known character from *The Beano* with the message "Benn is the Menace".

Thinking back, other highlights come readily to mind. Like the occasion when the SSEB boss, Roy Berridge, called us a "bunch of professional agitators." We were flattered. Or the time we sat up all night planning precisely how to occupy the Scott monument to hang an anti-Torness banner from it.

I particularly remember the long hours we sat in a gloomy basement in



Rob Edwards (centre) at an anti-nuclear rally in 1978

Half Moon Cottage being bulldozed into the sea

Ainslie Place struggling to agree the text of the Torness Declaration, a commitment made by the 4,000 who attended the march and occupation in May 1978. In my book it still reads rather well.

"As an affiliation of groups and individuals we declare our total and uncompromising opposition to the construction of a nuclear power station at Torness. Nuclear power threatens all living creatures and their natural environment. It concentrates power in the hands of a few, necessitates a military-style secrecy and undermines the principles of human liberty. A nuclear power station at Torness would be another irrevocable step towards a future of which we want no part.

"We therefore demand:

- an immediate and permanent halt to the construction of any further nuclear power stations
- an urgent and vigorous energy conservation programme
- a cleaner, safer and more efficient use of our fossil fuels
- the radical rechanneling of resources into wave, wind and solar power and other forms of renewable energy
- the provision of socially useful work for all in energy and other fields.

"Our stand is in defence of the health and safety of ourselves, our future generations and of all living things on this planet.

"We announce that we are prepared to take all non-violent steps necessary to prevent the construction of a nuclear power station at Torness."

The Torness declaration gave birth to the Torness Alliance, a chaotic nationwide network of activists whose first action was to occupy and start renovating Half Moon Cottage on the Torness site in September 1978. After six weeks, the cottage had become an important and vibrant symbol of opposition. It was a nice place to be.

Burning injustice

On November 14, the day after contractors started work on access roads the SSEB ruthlessly ordered them to bulldoze Half Moon Cottage into the sea. Protesters' belongings were burnt. Inside, I can still feel today the anger that I felt then, the burning sense of injustice that was shared throughout the nation.

A few days later more than 400 people converged on the site to try and prevent work taking place. During a long and dangerous morning of confrontation with bulldozers and diggers, 38 people were arrested. Friends were pictured all over the newspapers perched high on mechanical shovels.

The Torness Alliance then devoted its efforts to organising the Torness Gathering in May 1979, perhaps the most extraordinary protest in the history of the campaign. Over ten thousand people camped in a field close to Torness for a weekend of talks, music and discussion. Via an anarchic and sometimes frustrating series of "affinity groups" they decided to occupy the construction site, which by then had been protected by a six foot barbed wire fence.

Very early on the Monday morning, captured for millions by television news cameras, we filed over the fence using bales of hay as steps. It was one of the largest acts of civil disobedience ever seen in the UK, the precursor to the Greenham Peace camps. It felt glorious. It felt as if we had really changed the world. But had we?

In one unavoidable sense of course, we had not. We did not stop Torness from being built. Squat, grey and ugly, it now dominates what was once a fine coastline, generating nuclear electricity. Every time I catch the train down south or drive down the A1, there it is: a monument to our failure.

It was opened, amidst mightily botched ceremonies, by the Prime Minister, Mrs Thatcher, in 1989. She wallowed in it. She posed for

photographs, arms held aloft on the pile cap. She lovingly fingered uranium fuel rods. For her, it was a monument to her government's success.

In reality, Torness is neither a monument to failure or success, but muddle — the enormous welter of contradictions and cock-ups into which successive governments have driven the country's energy policy. It was characterised perfectly by a front page story in the Glasgow Herald when Torness was nearly completed disclosing the Scottish Office's belated discovery that it had been a "£2.5 billion mistake".

If ever there was a case of losing the battle but winning the argument surely this was it . Torness did precisely what we always said it would — cause a massive oversupply of electricity in Scotland and destroy the nation's coal industry. The only thing we failed to predict was that the problem would be so severe that the electricity board would be forced to close down one of its nuclear power stations early (Hunterston A).

Dennis Martin

Margaret Thatcher opens Torness, as portrayed on the cover of *Scram 71*

I sometimes think that, despite all the direct action, all the law breaking, all the arrests, we were not tough enough. We were just a matter of a few years, maybe only a few months, ahead of public opinion. If we had found the strength and energy to persist with serious direct action after the 1979 gathering, if we had found more ways of preventing work on the site, could we have forced a longer delay, long enough to lead to cancellation?

Green revolution

What we did achieve, was real. I think we sowed the seeds for the enormous rebirth of the anti-nuclear movement in the early 1980s, which in turn made a vital contribution to the ending of the Cold war and the subsequent decrease in nuclear weapons. I think we were the beginning of the revolution in green consciousness which has taken place since the late 1970s.

In the UK — and indeed in most of the other developed countries — the hugely ambitious nuclear programmes of the 1970s have ground to a complete halt. There is currently a short-term moratorium on any more British nuclear stations pending a major government review.

Our contention that nuclear power was far more expensive than the SSEB or other power utilities claimed has been amply borne out by the fiasco of electricity privatisation. The costs of waste disposal and decommissioning defunct reactors proved so high that private companies refused to touch them, forcing the government to withdraw nuclear power from its privatisation programme at the eleventh hour.

Our anxiety about nuclear waste has helped force the government to abandon its plans for the dumping of radioactive waste several times. Scram was directly involved in the successful campaign against dumping high-level nuclear waste in the Mullwharchar hills in Galloway. Our arguments about nuclear safety were more than justified when Chernobyl exploded in 1986.

And then there is Dounreay, the fast reactor complex in Caithness. In the 1970s and 1980s we argued against its nuclear waste dump and we shouted loud and long about its radioactive leaks. And what happened? We won, game, set and match. The place is being closed down. The fast reactor dream is dead.

In retrospect, these represent massive victories, far greater than we ever expected. It is almost as if, like children challenging the authority of our teachers, we have grown up to find that the school has been shut down in our honour. There has been a true sea-change in public opinion, a radical transformation in the whole tenor of public debate, so that nowadays to be anti-nuclear is normal. To support nuclear power is eccentric.

That does not mean, of course, that the problems are over. Far from it. The Thorp plant at Sellafield has been given the go-ahead (prompting another fine flurry of anti-nuclear action at Torness and elsewhere). The nuclear industry is fiercely lobbying the government to lift the current moratorium on new power stations within a year. The confusion between nuclear power and nuclear weapons is causing a dangerous confrontation on the Korean peninsula.

The fight we began all those years ago with the help of Robin Cook and his new jumper in the YMCA must go on. All of us in our different ways know what that means. Overcoming the cynicism and weariness of age, the old arguments won. The nuclear juggernaut, which we have forced to a halt, must not be allowed to start rolling again. ❑

ANDREW WARREN, director of the Association for the Conservation of Energy, looks back at a 1982 Commons' Select Committee Inquiry into energy conservation in buildings and compares it to another Commons' report on the same theme 11 years later. The findings of the two reports are almost identical because the intervening decade has seen so little real progress on energy efficiency.

Energy efficiency: little progress

THE Association for the Conservation of Energy is not as old as SCRAM (who is?). But we are on our way to celebrating our thirteenth birthday this autumn. Hitting the teenage years is normally a sure sign that one has left behind the days of childhood, and that one is heading for maturity with the lessons of one's formative years well learnt. Or something like that. Anyway, sometimes it even prompts some reflection upon the past.

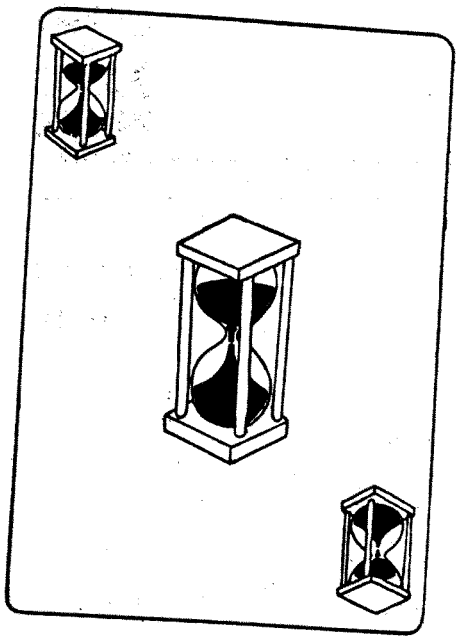
So, I duly reflected upon the first Big Event with which the infant association became involved. It was, believe it or not, a House of Commons Select Committee Inquiry into Energy Conservation in Buildings. Precisely the same title as that of the House of Commons Select Committee Inquiry which reported a couple of months ago.

So what were the differences which the two inquiries found in the way energy conservation policy was handled? How similar were the issues they looked at? How much change was there in the recommendations they made?

Well, apart from the obvious difference that 1982's Report was published by the Energy Committee, and the latest Report was from the Environment Committee, the answer to the three questions were, in order: Few; very; and practically none.

For the benefit of those *Safe Energy* readers whose voluminous filing system does not stretch back to HMSO documents of 1982; or alternatively for those who were not (for reasons of youth or lack of interest) following such issues at the time, I reprint the twelve main conclusions of the 1982 Energy Select Committee Inquiry into Energy Conservation. They were:

- Consumers of all types require a much higher rate of return than might be defined as cost-effective by government (i.e. 5% in real terms);
- A measure might be cost-effective to the nation but not to the individual (who may move house, or be renting) or firm (which may well be leaseholders only) which might undertake it;
- Consumers are unable to undertake cost-effective measures because of shortage of capital;
- Consumers are unaware of the potential economic benefits;
- Standard accountancy practice may militate against energy conservation, by disregarding both the longevity of its effectiveness *and* its increased value as real fuel prices rise;
- Financial institutions have not encouraged investments e.g. conservation measures are not required as a condition of a mortgage;



- The conservation industry has historically been fragmented and weak at marketing;
- Government capital should be placed in investments with the highest rate of return. Investment in conservation is often more cost-effective than investment in energy supply, as the Department of Energy agrees. Investment decisions for conservation and supply should be based on similar rates of return;
- The 'infant industry' of energy conservation equipment manufacture requires assistance in establishing markets;
- Public expenditure could be saved by reducing the £300 million per annum spent on fuel subsidies by concentrating conservation investment (now £149 million pa) in the relevant homes and by reducing running costs of public sector building stock by conservation investment. Subsidies to the coal industry (£550m pa) and nuclear research and development (£218m pa) are far higher.
- Revising the statutory obligations of the gas, electricity and coal industries to require them both to use the fuels in the most economic and efficient manner and to ensure that they use every available means to encourage their customers to do the same;
- The introduction of either a Department of State for Energy Conservation or an Energy Commission or Agency or a strengthened Conservation Division within the Energy Department.

The first eleven of these could not only have appeared with legitimacy over a decade later: in slightly different words, each of them did. Each of the recommendations made by the 11 members of that original Select Committee — every one of whom is no longer in the Commons — found an echo in last year's report.

As not one of the authors of the new report was an MP back in 1982 either, we have two completely separate generations of Members of Parliament — men (all 22 were men!) of very different ages and cultural experiences — coming to virtually identical conclusions.

It is not even as if in the interim nobody in Parliament had considered the matter further. When this Association came to prepare its 1993 evidence, we totted up just how many other Parliamentary inquiries had been called in the interim, to which we have given evidence, both oral and written. The answer was salutary. It was eight. On no less than eight occasions in between these two magnum inquiries had various committees of inquiry in either the Commons or the Lords carried out studies covering this topic. And looking at their conclusions, they have a strange ring of consistency. Each echoed one or other, usually

most, of the conclusions that the 1982 Committee reached.

Of course, there *was* one conclusion that they did not repeat. This was the final one for 1982, the one which called for either a Department of State for Energy Conservation *or* an Energy Agency *or* a strengthened Conservation Division within the Energy Department.

It was not repeated because, the following year, much credit was given by government to the Select Committee, to the effect that it had been *its* recommendation that had been the genesis of the Energy Efficiency Office. (Depending upon the audience addressed, the government's efficiency expert, Lord Rayner, also got the credit, as his Scrutiny reached a similar conclusion. But never mind).

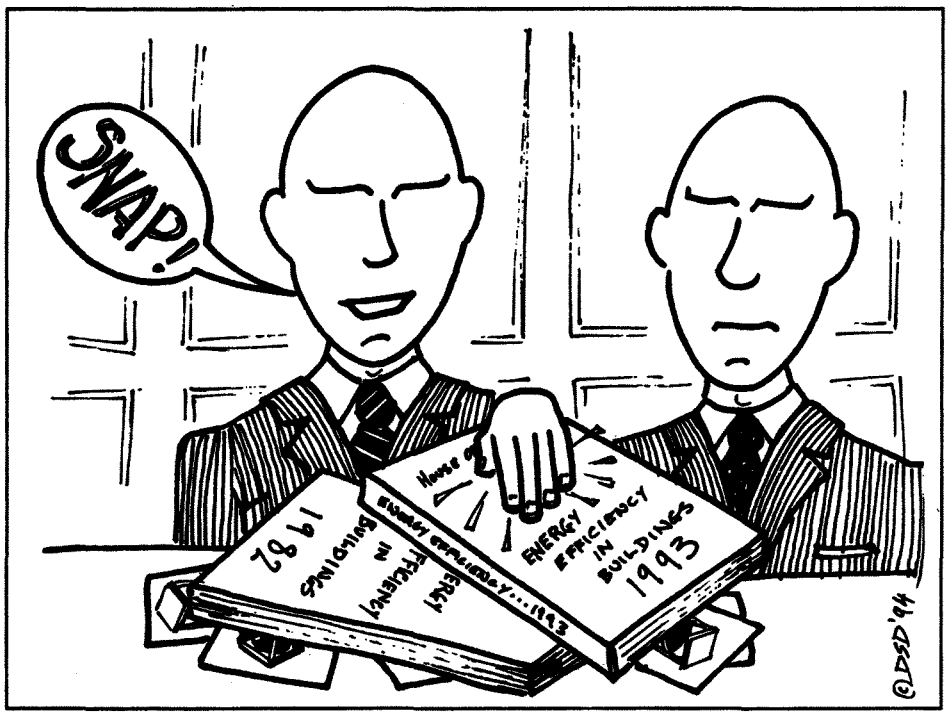
This has not subsequently been a policy area much commented on by Select Committees. That is strange. Because of all the areas in which energy conservation policy has changed, this has been the most obvious.

Energy barons

Of course, nobody has ever set up a Department of State for Energy Conservation. But they *have* responded to the main reason why the 1982 Committee was so anxious to see this option explored. It was the continuing fear of agency capture, of seeing the Department of Energy being run by the big energy supply barons, with the demand side tagged on as an also-ran. This was the concern which was finally addressed by ensuring that the Energy Efficiency Office was switched to the Department of the Environment in 1992. Where not so many conflicts of 'sponsoring interests' could be found.

Nobody suggested this in 1982, for one simple reason: the Department of the Environment had not yet become what its name implied. It was still mainly an amalgam of the old Ministry of Public Works, and of Housing, and of Local Government. Environment as an issue, and indeed energy efficiency's part in it, was not to emerge on the scene for several years yet.

And the second of the institutional framework proposals, an Energy Agency? Some might argue that this is also happening, in the shape of the Energy Saving Trust. Certainly as of now it is but a bit-part player. But as it grows into its role, of a provider of some £400 million pump-priming money each year, it will surely become precisely the executive agency the 1982 Committee was seeking. Couple that with the growing remoteness of the



David Shaw

Building Research Establishment and the Energy Technology Support Unit from Whitehall, and you do in my submission have a prima facie case for saying that this part of the 1982 agenda has been responded to.

But what is most galling of all is to see again the newspaper stories written about the press conference which launched the 1982 report.

How many of these could have been uttered word for word 12 years later? I would submit practically all.

From the Conservative chairman, Ian Lloyd: "Energy Conservation requires increased resources, and increased status . . . the climate of opinion must be changed".

And Arthur Palmer, (Labour): "We need much stronger mandatory legislation. The Secretary of State requires over-riding powers".

Peter Rost, (Conservative): "Conservation can make a great contribution to the national economy, improve productivity, reduce public expenditure by diverting money away from supporting wasteful areas to the potentially successful".

David, now Lord, Stoddart, (Labour): "Those who believe in energy conservation are not getting a hearing at cabinet level. The case must be put in cabinet".

Ted Leadbitter, (Labour): "In terms of jobs and the environment, conservation is vital to the economy."

And perhaps most prophetic of all, Sir Robert McCrindle (Conservative). "It is much more difficult for the Government to provide a negative response to all three of our options for institutional changes."

Of course there have been changes in the interim. Attitudes have altered. Proponents of energy conservation are not quite so readily patronised as 'airy-fairy'. Nobody now considers energy supply policy in a vacuum, without at any rate paying lip service to the demand side.

But it is galling to see that so many of the major barriers to progress, identified way back in 1982, still remain. There is still a gross imbalance between supply and demand investment. New grants and tax allowances for energy conservation are still needed. There should be earmarked public sector investment funds for energy conservation. Low income households still waste more fuel than most. We still have few incentives for landlords to improve tenants' buildings. We don't regularly review efficiency standards and codes of practice. We *could* still save 30% (or more) of our heating bills.

And we still have not revised the statutory obligations of the gas, electricity and coal industries to require them both to use the fuels in the most economic and efficient manner *and* to ensure that they use every available means to encourage their customers to do the same.

Let us hope that come the 150th issue of *Safe Energy*, nobody will be able to reprint this article, pretending it has any relevancy. The best thing that could happen in the interim is for the 1982 report to become, quite literally, history. ❑

Over the past few months, confusion surrounding North Korea's suspected nuclear weapons programme has come perilously close to flashpoint. The crisis has highlighted a number of serious deficiencies in nuclear diplomacy — MIKE TOWNSLEY reports.

Made in Korea

TENSION across the demilitarised zone (DMZ), which has kept North and South Koreans apart for over 40 years, has increased to perhaps its greatest level since the end of the Korean war. Fear is mounting that North Korea now possesses nuclear weapons, a suspicion which if it is confirmed could spark a nuclear arms race in east Asia.

Despite being a signatory to the Non-Proliferation Treaty (NPT), the Democratic People's Republic of Korea (DPRK) — North Korea — has so far denied international safeguards inspectors full access to its nuclear sites, precipitating an international crisis and confusion over what action should be taken to make it toe the nuclear line.

The North Korean nuclear programme is in its infancy with two nuclear power units under construction, of 50MWe and 200MWe, at Yongbyon and Taechon, which are expected to go critical around 1995-96. Both are of a design akin to that of the UK's magnox reactors which were developed because of their high plutonium yield. The DPRK also hopes to buy three 635MW pressurised water reactors from the Russian Federation. Yongbyon also houses a 5MW research reactor, which some observers believe has produced more plutonium than the DPRK claims.

The North signed the NPT in 1985 and accepted a comprehensive safeguards agreement in 1992. The following March it submitted a detailed report on its nuclear programme to the International Atomic Energy Agency (IAEA), which polices the NPT on behalf of the United Nations.

The report confirmed suspicions that the 'radiochemical laboratory' had been used to separate plutonium, but claimed that an insignificant amount for weapons usage had been obtained. However, after several IAEA visits information on the DPRK's total inventory of radioactive material remains incomplete.

Further, the DPRK signed a "Joint declaration for the Denuclearisation of the Korean Peninsula" with South Korea in 1991, under which it agreed not to build nuclear weapons installations or plutonium separation facilities and to allow bilateral inspections. But, the DPRK has a reprocessing plant under construction at Yongbyon. While it insists on calling it a 'radiochemical laboratory', Hans Blix, the IAEA Director General, told the US House Committee on Foreign Affairs that the IAEA "would have no hesitation" in calling it "a reprocessing plant in the terminology of the industrialised world". According to the IAEA, construction of the plant is about 80% complete with around 40% of the required equipment already in place. It could be operational within five years and have an annual throughput of several hundred tonnes of spent fuel.

In March of last year North Korea gave the IAEA the statutory three months' notice in announcing the suspension of its NPT membership. Had the threat been carried out, North Korea would have been the first country to leave the Treaty in its 24 year history. The decision to suspend its membership of the Treaty is believed to have been caused by the South's request to exercise its rights under the Joint Declaration to inspect the North's nuclear facilities. Pressure had also begun to mount from the IAEA for access to two facilities at Yongbyon which are believed to hold nuclear waste. The DPRK government declined to open the two sites, arguing that they were military sites and would yield valuable intelligence.

Hollow threats

Following year-long negotiations — and a number of hollow threats — IAEA inspectors were once more allowed into North Korea, in early March this year. It was a far from successful trip. "Important measures agreed in writing before the team went were refused," said the IAEA. The team was unable to take a number of measurements and said that there were "problems" with seals placed on monitoring equipment. In particular access to the 'radiochemical lab' was denied. The team was also again refused access to the two undeclared sites at Yongbyon, believed to be nuclear waste stores: "As a result the agency was not in a position to verify that there had been no diversion of nuclear material at the facility."

Following the incomplete safeguards inspection the IAEA is now worried that the DPRK has installed ducts or pipes to the 'safeguarded' line within the Yongbyon complex. This, say the inspectors, would allow plutonium-laden material in solution to be siphoned off without detection. The overall impression, it says, is that the facility has not been "dormant" since their last inspection in 1993: "In general a lot of money had been spent, a lot of construction had been going on, and a lot of very fancy equipment had been installed."

Further fuelling suspicions, the DPRK prevented the inspection team from removing and replacing safeguards' seals at key points in the plant and smear tests on glove boxes and hot cells were also disallowed. These vital tests would have given conclusive evidence about whether any recent reprocessing activity had occurred. At a nearby building the IAEA team was prevented from carrying out 'gamma mapping' — a technique which would also have highlighted any recent activity.

Non-compliance

On 21 March the IAEA Board of Governors finally cited the DPRK for non-compliance with its safeguards obligations under INFCIRC, its agreement with the IAEA.

The ball is now firmly in the UN's court. The most obvious move would be the imposition of harsh sanctions on the economically vulnerable Stalinist state. This is where the fun and games begin.

North Korea is led by 81 year old Kim Il Sung, the last survivor of a time when Mao Tse Tung and Stalin held the reins of power in the communist bloc. It is he who has led the DPRK since 1948, following Stalin's sanctioning of his premiership of the Soviet backed country in 1946.

Based upon the philosophy of 'juche' — self reliance — his rule has been absolute. Publicly this philosophy was supposed to give the North economic independence, in reality, however, it was based upon substantial handouts from the Soviet Union and China. During his four decades of absolute power 'juche' has become synonymous

with the personality cult of the 'Suryong' or great leader, a title adopted by Kim Il Sung following the death of Stalin in 1953.

It was Kim Il Sung who invaded South Korea in 1950 with the backing of the Soviet Union. A bloody war which ended in a stalemate brought about when China sent troops to support the North in response to US backing for the South.

As *The Independent* pointed out in a profile of Kim Il Sung: "There is something almost noble in the effort required to sustain four decades of unremitting adulation of the Great Leader. But there is also something poisonous in North Korea's psychotic version of reality, a tendency to lash out which was shown in the killing of half the South Korean cabinet by a bomb in Rangoon in 1983, and the bombing of a civilian Korean Airline jet in 1987. And now, if the world's suspicions about the secretive state are correct, Kim Il Sung has finally laid his hands upon nuclear bombs, [the] most dangerous means yet of altering reality.

"Could the final moment of truth of the lie of Kim Il Sung be nuclear devastation of the Korean Peninsula?"

Today, the DPRK has few remaining friends in the world. The collapse of communism and reforms in the former Soviet Union and China has meant that it can no longer expect any state aid. Reports are now circulating about food riots in the DPRK and also of a desperate fuel shortage since China and Russia began demanding hard currency for oil.

Diplomatic relations

A further indication of the North's growing isolation came last year when China announced that it was normalising diplomatic relations with the South.

The UN, partly due to the insistence of China and reluctance of Japan and Russia, is keen to avoid the use of sanctions and is calling upon the DPRK to allow the IAEA inspectors to complete their work "within a reasonable amount of time". So far, the Security Council has declined to set any deadlines. However, if the current attempt to induce the DPRK to allow full inspections fails then a deadline will be set followed by sanctions.

Despite its reluctance Japan has said that if sanctions are imposed it will make strenuous efforts to stem the flow of hard currency to the North. Koreans living in Japan are believed to be transferring between 60 and 100 billion yen annually. Japan is also conscious of its poor relations with the state after its occupation of Korea early this century. The Japanese government must also feel compromised because of its own nuclear policies which will lead to massive stockpiling of plutonium. A fact recanted by the DPRK whenever the idea of denuclearisation of the Peninsula is mentioned.

Japan has said that the reprocessing plant at Yongbyon must be dismantled because it has no faith in the effectiveness of the NPT safeguards regime. Yet, it and the US deny that the construction of a massive reprocessing plant at Rokkasho-mura in Japan is a proliferation danger because it will operate under safeguards.

The US has been at the forefront in calling for sanctions against the DPRK if it does not abandon its reprocessing plant and open its nuclear sites for full inspection. It too has little faith in the IAEA's ability to police the NPT. As the original supplier of Japan's nuclear fuel it could veto massive reprocessing contracts that Japan has with both France and the UK, but chooses not to.

Act of war

Paradoxically, earlier this year the US tried to block a deal between Dounreay in the North of Scotland and a Belgian research reactor operator by offering to pay some $600,000 to cover the costs of the Belgians breaking the contract. If they had given approval for the deal the Department of Defense said: "... the US would be declaring that the proliferation risks posed by reprocessing and separated plutonium under international safeguards are acceptably low. In the Defense Department's view they are not."

Pyongyang has said that it will treat the imposition of sanctions as an act of war.

Steeled by a walk onto the bridge of no return — so called because at the end of the Korean war 100,000 prisoners where allowed to choose whether to cross, never to return — US President Bill Clinton said "... it is pointless for them to develop nuclear weapons because if they ever use them it would be the end of their country." He was in South Korea to bolster the morale of the 36,000 strong US garrison stationed there to help protect the South from the North. The US has also dispatched two warships armed with patriot missiles to South Korea in preparation for any hostilities.

War talk reached fever pitch at the end of March when North Korea's chief negotiator stormed out of a meeting with his South Korean counterparts vowing to turn the South's capital Seoul into a "sea of fire". Seoul is a mere 27km from the border between the two sates and the South Korean government is understandably anxious to avoid any military confrontation. The North has the fifth biggest army in the world and while there is little doubt that it would lose a war, it would destroy Seoul in the process. Seoul is at the heart of an economic boom being experienced by the South.

The South Korean attitude is typified in this statement by Professor Yang Sung Chal, who believes that the House of Kim will be brought down by the weight of economic decay: "I don't think North Korea will surrender without doing anything, so let's wait. Eastern Europe imploded without using American missiles and tanks. North Korea will too if you give it sufficient time and enjoy the wisdom of waiting. Let it implode rather than explode."

Waiting game

Like many analysts he believes the best hope for a bloodless solution necessitates a waiting game. He believes that when the 82 year old Kim Il Sung dies that his heir apparent and son — the 'dear leader' — will have insufficient support to maintain his father's vice-like grip on power.

The question remains what are the possible consequences of giving North Korea more time — time to implode? US intelligence suggests that the regime may already posses two nuclear warheads and enough separated plutonium for more and that: "Given their history of exporting missiles, if North Korea develops nuclear weapons, we face the danger that other hostile regimes around the world will soon have them also."

Clearly a world which uses nuclear power will always be prone to the threat of nuclear weapons, as the two technologies are one and the same. North Korea has a very small nuclear programme, indeed at the heart of the current crisis is one incomplete reprocessing facility and a 5MW reactor.

If the international community — through the auspices of the UN — is going to have any chance in negotiating the North Koreans into giving up their nuclear weapons aspirations, its own house must first be put in order. It is simply not good enough for the US and Japan (amongst others) to be condemning the DPRK for having a reprocessing programme when they themselves are responsible for much of the world's massive stockpiles of weapons-grade material. Such hypocrisy could well send east Asia down the Cold war path leading to the eventual nuclear obliteration of the entire area. ❑

Renewables obligations

IT has been announced by the Scottish Office that 190 renewable energy projects are bidding for a place in the first tranche of the Scottish Renewables Obligation. As the scheme is for just 30-40MW declared net capacity (DNC), this level of interest confirms that it will be heavily oversubscribed, as revealed in *Safe Energy 99*.

Most projects which made initial applications for quotations on grid connection charges have now submitted technical/planning questionnaires to Offer (Scotland) for assessment of their viability. There are several more stages in the tender process, and the announcement of successful projects will not be until October. The Scottish Secretary has stated that no single project will be over 15MW gross generating capacity.

Meanwhile, energy minister Tim Eggar has announced that over 650 renewable energy projects have been submitted to the latest round of the Non Fossil Fuel Obligation in England and Wales (NFFO3).

230 of the projects are for wind farms, but Eggar has said he would expect no more than 20 to be included in the 300-400MW total.

In Northern Ireland 20 schemes totalling 15.6MW DNC were selected from 45 bids. The largest share went to wind power, with six wind developments totalling 12.7MW. Contracts have also been awarded to nine hydro schemes totalling 2.4MW and five biogas projects adding just over 0.5MW.

■ The continued exclusion of combined heat and power (CHP) from the NFFO has been criticised by David Green, director of the CHP Association.

Because only the electricity generation element of projects qualifies for subsidy under the scheme, CHP, which offers additional environmental benefits, is losing out in the energy-from-waste market.

To back up its case, the Association has produced a new report* which claims that non-CHP energy-from-waste generating plant has a thermal efficiency of 22%, reducing carbon emissions by 29% whereas CHP has a thermal efficiency of 75% giving a carbon saving of 78%.

CHPA argues that the criteria used for including technologies in the NFFO should be consistent with the programme's stated aim of carbon abatement.

In response, the Department of Trade and Industry (DTI) has said that CHP may be included in the 1995/96 NFFO round

■ Further environmental failings in the NFFO emerged at a recent government seminar on landfill gas, *writes Max Wallis*.

The seminar, "Energy from landfill gas — making it work", held in Solihull on 17 March, was organised by the Energy Technology Support Unit (ETSU). It was reported by ETSU staff that many landfill gas projects currently operating under the NFFO were under-sized resulting in significant quantities of methane being wastefully flared off; 10% of the projects are considered to be seriously under-performing.

It also emerged that the criteria for a new technical assessment of projects bidding for the NFFO will not include the minimisation of methane emissions. Given the potency of methane as a greenhouse gas, this shows a serious environmental failing.

The neglect of emissions reduction can be explained by the DTI's domination over the Department of the Environment.

The government's waste policy, unlike those in Germany and The Netherlands, is to continue mixed landfilling of putrescible and dry waste, adding to methane emissions. This, despite recognition that landfill sites are responsible for three times the level of methane emissions indicated in the 1990 environment white paper, and around 40% of the UK's 5 million tonne annual total.

Present electricity generation from landfill gas is 0.6TWh per year and targets of 3.6TWh in 2005 and 4.9TWh in 2025 have been set. However, as increased production of methane is still outstripping its utilisation, the government expects a modest cut of just 10% in methane emissions by the year 2000. ❑

* "Putting waste to work? CHP and the Non Fossil Fuel Obligation", CHPA, 071-828 4077.

Edinburgh CHP

PLANS to bring combined heat and power and district heating (CHP&DH) to the centre of Edinburgh are progressing on schedule and the scheme is expected to be providing heat and electricity by the end of 1995 ("Edinburgh plans CHP", *Safe Energy 94*)

The £8 million development, jointly sponsored by Lothian Region and Edinburgh District Councils is being carried out by Citigen — a joint venture between British Gas and Utilicom of France. Lothian Health and Edinburgh University are also involved in the scheme which will supply 13MW of electricity and 13MW of heat to council, hospital, university and other large buildings from a boilerhouse at the Royal Infirmary. A demonstration housing project is planned to be incorporated into phase one of the scheme, and it is hoped that in the longer term CHP can be expanded throughout the city. ❑

Plant power plant

BIOMASS "may be on the threshold of a new breakthrough" as a fuel for electricity generation, according to a new study* from the Royal Institute of International Affairs.

The report, written by Walt Patterson, urges governments and international agencies to provide greater support for the technology. Projects are already under way in the United States, Brazil, Scandinavia and parts of the European Union. The US Department of Energy has said that biomass will be the most important renewable energy option for the next 25 years.

Patterson believes that the greatest potential will come with the cultivation of energy crops dedicated to advanced-technology power stations.

Different crops will be appropriate to different climates, with poplar, willow and conifer trees, and miscanthus — elephant grass — considered promising for northern Europe.

In the long run, biomass is expected to have the greatest impact in tropical and sub-tropical countries where crops grow quicker and where electricity demand is increasing most rapidly.

■ An agricultural co-operative in the North-East of England, Farmway has set up a project to produce biodiesel from oilseed rape, the first such scheme in the UK.

A refinery on Teesside will produce 25,000 litres of the fuel which will be used in several vehicles for a trial period of several months.

As farmers in the European Union are faced with taking land out of food production, several countries are looking at the potential of biodiesel. The European Commission has proposed a lower rate of duty for the fuel, but the UK government has pointed to the lack of trial data. ❑

* "Power from plants" by Walt Patterson, RIIA Energy and Environment Programme, 071 957 5711.

Efficiency funding

THE government's strategy to reduce carbon emissions has been thrown into disarray by Clare Spottiswoode, the Director General of gas industry regulator Ofgas. She has refused to allow British Gas (BG) to fund the Energy Saving Trust (EST) beyond April 1995, *writes Pete Roche.*

As a key part of the government's international commitment to return carbon dioxide emissions to 1990 levels by the end of the century, the EST was set up in 1992. Charged with achieving a quarter of the total saving of 10 million tonnes of carbon per year, the EST estimates that it needs a total budget of £1.5 billion. The government expects this money to come almost exclusively from gas and electricity consumers.

Spottiswoode told the Commons Environment Select Committee in March that she will not allow further funding of the EST where this would increase the effective cost per unit of gas. BG is currently funding schemes to promote gas condensing boilers and combined heat and power.

The electricity supply industry (esi) will be providing the EST with £25 million per year over the next four years. It is possible that more money will be forthcoming in 1995, after Offer's current review of the 'distribution price control formula', but this is by no means certain.

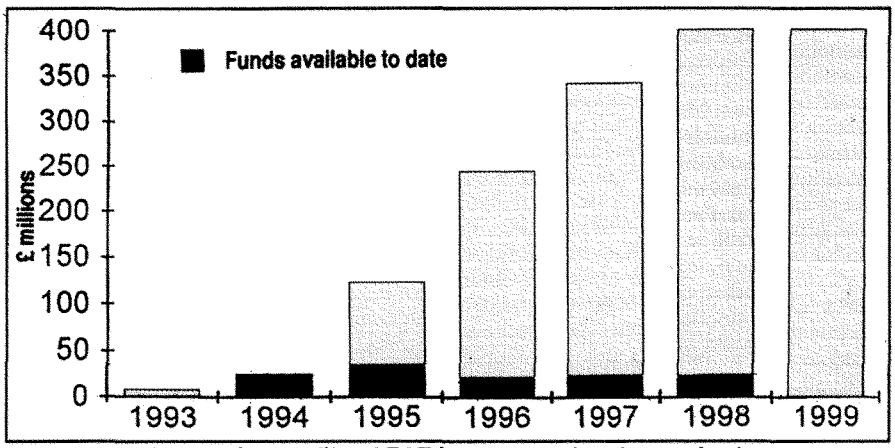
The trust is looking for £300 million per year by 1998 from BG and a further £100 million from the esi. So far it has raised just £112 million towards its £1.5 billion target, seriously undermining the government's carbon emissions strategy.

On 27 April, senior civil servants from the Department of Trade and Industry (DTI) and the Department Environment (DoE) were grilled by the Environment Committee, but no definite plans have been put forward to solve the problem. Spottiswoode is an independent regulator and much is left to her discretion — legally the government has no powers to persuade her to change her mind.

John Mitchell, head of the oil and gas division of the DTI, told the committee that Ofgas is allowed to pass costs on to customers which do not cause a "significant" rise in gas prices. Spottiswoode uses her discretion to define "significant" as zero.

A number of options are being looked at to solve the problem, such as other funding sources, including the Treasury or the utilities making payments out of profits. However, the witnesses admitted that it has become increasingly clear that this is not a "robust mechanism" for funding energy efficiency.

John Hobson, director of the Energy Efficiency Office at the DoE, told the committee that the government was considering introducing clauses in the new gas act, due to be introduced early next year, which would solve the problem. The DTI will be issuing a consultation paper shortly on the proposed new act — intended to introduce more competition to the gas industry — and they will include a discussion of energy efficiency. ❑



Illustrative profile of EST investment levels required

Efficiency measures axed

TWO private members bills on energy efficiency have been defeated in the House of Commons; despite widespread multi-party support both bills have been 'talked out'.

Alan Beith, having come second in the ballot for private members bills, stood a good chance of success with his energy conservation bill ("House energy efficiency bill", *Safe Energy 99*). However, despite the support of the majority of the House, over 400 MPs, the government decided to kill off the bill.

Environment Secretary John Gummer filed no less than 53 amendments and three new clauses, with Tory back-benchers bringing the total number of amendments to over 200, with seven new causes. This ensured that there would be insufficient time to debate all the amendments and, under the rules of the House, the bill was duly 'talked out' on Friday 22 April by energy minister Tony Baldry.

It is widely believed that Gummer and Baldry were acting at the behest of the Treasury. Though Beith's bill involved only modest expenditure in having council's undertake housing surveys and draw up strategies for energy saving, it could have led to greater spending to put these strategies into effect. Also, with the government looking to sell off its remaining 40% stake in National Power, the Treasury believes that anything which could reduce future electricity demand would devalue the electricity generator's share price.

A bill proposed by John McAllion, to widen requirements for energy-saving in building regulations to cover all changes of use and conversions of property for residential purposes, has met a similar fate. With less parliamentary time, McAllion's bill was always unlikely to succeed even though the principle has been approved by the government.

The axe was wielded by fellow Scot George Kynock. During his filibuster, it became apparent that Kynock hadn't a clue which bill he was killing off and had to be handed a copy of the text by a junior government whip. This is how important decisions are made, or not, in the Mother of Parliaments. ❑

Carbon study

DESPITE the disarray over government policy, the UK may still meet its target of reducing carbon emissions to 1990 levels by the year 2000, by luck rather than judgement.

In their new industry publication *UK Energy and the Environment*, analysts at Cambridge Econometrics say that the switch from coal to gas-fired electricity generation will be the key to reaching the target with total emissions from power generation falling from 54.4 million tonnes of carbon (mtc) to 33.5 mtc by 2000

Other factors helping to reduce carbon emissions are VAT on domestic fuel and power, increased duty on petrol and slow growth in industrial output.

However, growth in road transport, the limit in switching from coal to gas and the short-term effect of VAT on domestic energy demand mean that beyond the year 2000 the trend in carbon emissions will be upward again unless further government measures are introduced.

■ European Union (EU) plans for a carbon/energy tax made some progress at the 25 March Council of environment ministers' meeting, despite wholesale opposition from the UK.

It was agreed to analyse the progress made by member states towards emissions stabilisation and to examine how the tax will work with fiscal exemptions and energy excise taxes at national level. An expert group will be set up to carry out an independent assessment of the tax.

The same meeting reached a political accord on an EU proposal to limit sulphur dioxide emissions at new power stations across the Union. This will extend the 1988 large combustion plant directive to cover small power plants for all sites authorised after 1 July 1987. ❑

Wind update

AN inquiry into the development of wind farms in Wales is being carried out by the Welsh Affairs Committee. It began hearing evidence at the end of March and is due to publish its conclusions this summer.

With one-third of the existing UK wind farms having been built in Wales, including the 103-turbine Llandinam development, it has become a contentious issue in the Principality. The Campaign for the Protection of Rural Wales recently decided to oppose further wind farms.

While the inquiry will focus on the impact of wind farms on the local environment, it will also look at government policy and guidance and the potential for wind energy in Wales.

■ Construction company Taylor Woodrow has denied that it is planning to sell off its wholly owned subsidiary the Wind Energy Group (WEG) ("Wind round-up", *Safe Energy 99*).

Rumours of a sale followed an announcement to shareholders in January that Taylor Woodrow intended to free itself of peripheral activities.

WEG is currently facing problems with its MS-3 turbines; 66 machines at three sites were shut down following storm damage to four turbines at its Cemmaes site in mid Wales last December.

With its one-third share in windpower developer National Wind Power (National Power owns two-thirds) WEG is an important player in turbine construction, and development and operation of wind farms. Any uncertainty over its future could be damaging for the British industry.

Earlier partners in the WEG venture GEC and British Aerospace withdrew in 1986 and 1993 respectively.

■ A group of European renewables experts from government and industry has launched an action plan for renewables to supply 15% of primary energy demand in the European Union (EU) by 2010.

Meeting in Madrid in March, the group, which received support from various EU directorates, published the Declaration of Madrid, calling on the EU and its members to implement the plan which would more than double the use of renewables from the 1992 total, including hydro, of 6.7% of primary energy production.

There is an urgent need to intensify and co-ordinate development of renewable energy sources, to set targets for their contribution to primary energy demand and to internalise the external costs of energy use.

■ Despite fears of a cut-back, the United States wind budget for 1995 will be around the level initially anticipated. At $51.7 million it is 70% higher than in the current year. Windpower has fared best in an overall increase of 15% for renewables. Other gainers are photovoltaics (21%) and solar thermal (10%).

"We must ensure that our budget request is completely aligned with our new mission and goals. The budget request reflects such an alignment," said energy secretary Hazel O'Leary, adding that it would "create jobs, reduce emissions, move technology into the market-place and increase US competitiveness and US exports."

Much of the increased funding for windpower is an allocation of $18 million for wind commercialisation projects.

The budget will cut nuclear research and development spending by one-quarter.

■ Three wind turbines on Rathlin Island off the north-east coast of Northern Ireland have now been producing electricity for the islanders for over a year.

They are part of a wind/diesel/battery system which has been supplying inhabitants with reliable 24-hour-a-day electricity for the first time.

The project, which has attracted interest from around the world, produced 66% of its electricity from the wind turbines.

■ Work has started on a controversial 11-turbine, 5MW wind farm in Cornwall. The site is close to an ancient Celtic standing stone and four Bronze Age burial mounds on St Breock Downs near Wadebridge.

The scheme was opposed by the district and County councils but approved by the Department of the Environment after an inquiry. Developer Ecogen — which has Japanese and American backing and will be using Danish turbines — has enlisted the support of local archaeologists to counter claims from opponents that the project as spoiling a natural landscape.

Steve Hartgroves from the Cornwall Archaeological Unit says: "The modern landscape at St Breock Downs is a 20th century creation which has been ploughed flat, grassed over and fenced in recent years." ❑

Power battle

ELECTRICITY industry regulator Professor Stephen Littlechild has decided against referring National Power (NP) and PowerGen (PG) to the Monopolies and Mergers Commission (MMC) over the big two's influence in the electricity market ("Electric shock", *Safe Energy 99*).

The fix which Littlechild has produced to avoid the need for a referral includes a cap on the electricity pool price and the agreement from the big two generators to sell 6,000MW of their plant.

The move, which it is estimated will reduce electricity pool prices by a total of up to £500 million over two years, was welcomed by the Major Energy Users' Association. Ironically the main losers will not be NP and PG but Nuclear Electric (NE) and independent power companies.

The 2.4p/kWh cap (on annual time-weighted pool purchase prices) "is below the level needed to attract new entrants to the competitive generation market and is particularly damaging to smaller generators," according to David Porter, chief executive of the Association of Independent Electricity Producers.

NE is expected to be hardest hit by the pool price cap because unlike the big two it has few contracts outside the pool. The nuclear generator could lose £250 million as a result. ❑

Ocean heat-energy plan

THE world's first commercial generator using the heat from the ocean surface is to be built in India. Ocean Thermal Energy Conversion (OTEC) exploits the temperature difference between the surface water, warmed by the sun, and the cold depths of the ocean. Running like a refrigerator in reverse, the device uses the temperature difference to produce electricity.

The Tamil Nadu State Government has reached agreement with US company Sea Solar Power to build a 100MW device. It will float in the ocean with pipes running 1km below the surface, exploiting a temperature difference of around 20°C. Although initial costs are several times greater than for conventional power stations, as the 'fuel' is free, running costs are low.

There have been several experimental projects, mainly in Hawaii and Japan, but the Indian project would be a significant step forward for the technology which has considerable potential, particularly in the tropics where ocean temperature gradients are greater. ❑

Mini hydro

BRITISH Waterways, along with several utilities, is looking at the possibility of installing low-head hydro power at up to 22 weirs on six English rivers.

Feasibility studies are now being carried out on schemes up to 1MW in size, for inclusion in a future round of the Non Fossil Fuel Obligation.

Rivers which could be tapped include the Severn, Trent, Ouse (Yorkshire), Don, Aire and Calder. ❑

Eggar's renewables plans

ENERGY minister Tim Eggar has finally responded* to the findings of the Renewable Energy Advisory Group (REAG), which were published over 15 months ago ("Reaaargh!", *Safe Energy 93*).

As with the REAG report — which was published on 17 December 1992, the day parliament rose for the Christmas recess — the response was timed to avoid publicity, coming at around 5pm on Maundy Thursday, as journalists were disappearing for the Easter break.

The biggest blow in the announcement is that funding for wave power is to be stopped "as this technology has limited potential to contribute commercially to energy supplies in the next few decades" ("Wave set-back", below). Also axed is further support for geothermal R&D and tidal programmes beyond current commitments.

The main thrust of the government programme is to "stimulate the development of new and renewable energy sources wherever they have prospects of being economically attractive and environmentally acceptable". This is to be done principally through the existing Non Fossil Fuel Obligation in England and Wales and the new Renewables Obligation in Scotland.

In addition, a ten year Research, Development, Demonstration and Dissemination programme is also planned. This will receive £19.78 million in its first year, 1994/95.

Technologies specifically mentioned by Eggar as suitable for receiving help to become competitive were coppice (woodfuel), waste, wind, solar and fuel cells.

The target for new renewables by the year 2000 remains at 1,500MW (declared net capacity).

The report shows that the government has finally realised that development of renewable energy technology offers a worldwide market for UK industry, and it is anticipated that industry could invest £3 billion over the next ten years.

However, the concentration solely on short-term commercial prospects means the government has failed to take on board the importance of investing in technologies like wave, tidal and offshore wind which have a tremendous long-term potential for clean energy supply. ❑

*** "New and renewable energy — future prospects in the UK", Energy Paper 62, DTI, HMSO; "An assessment of renewable energy for the UK", ETSU-R-82, HMSO.**

Tidal fall and rise

WHILE plans for a Mersey barrage have been mothballed because of a lack of government support, Tarmac, one of the companies involved in that project, is looking at the possibility of a tidal scheme on the River Forth.

Outline plans for a £90-110 million barrage at Kincardine, to replace the ageing road bridge, have been put to the Scottish Office. The scheme, at 34-40MW, would be one tenth the size of that proposed for the Mersey, and Tarmac believes it could prove the technology.

Financial viability of the scheme is dependent on it being accepted as part of the Scottish Renewables Obligation (SRO) and on a toll being levied on road traffic.

Tidal power is not being considered in this year's round of the SRO, but Tarmac hopes that it could be included in the second round in 1995/96. With a declared net capacity of around 12MW it would be a major part of the expected 50-60MW total.

Central Regional Council, which has previously considered the possibility of a Kincardine barrage, is supportive of the basic idea at this preliminary stage. ❑

Wave set-back

THE government has turned its back on wave energy — as it tried to do in 1982 — in its new strategy for renewable energy ("Eggar's renewables plans", above), *writes David Ross.*

The decision that "no further commitments would be undertaken" on wave energy puts in jeopardy £850,000 of funding from the European Union (EU), threatening the future of two new wave power stations in Scotland.

It is particularly serious for the 1MW shoreline project on Islay, which is planned as a major step on from the device already operating on the Hebridean island. The success of the original project encouraged the European Union to make a grant of 550,000 ecus (£425,000), but this is dependent on equal funding from government or industry ("EC boost for wave", *Safe Energy 97*).

The other Scottish device, the ART Osprey, to be sited off Dounreay, has a better chance because it has support from industry — British Steel, GEC, Scottish Hydro-Electric and the Atomic Energy Authority — and Highlands and Islands Enterprise. But it too had hoped for government support, and some of the industrial supporters may be adversely influenced by the government decision. One of the arguments used against wave energy by the government and its agencies in the past was a failure to attract support from industry.

A third project offered EU support is an oscillating water column device on the island of Pico in the Azores. That is assured of support by the Portuguese government and will receive 550,000 ecus from Brussels. It appears that Britain, which still enjoys a technical lead in wave energy, is liable to be overtaken because of a withdrawal of government support. ❑

Ron Lindsay

The ART Osprey

Dounreay drops wind

AEA TECHNOLOGY at Dounreay has scrapped its renewable energy unit which was part of a diversification programme designed to save jobs after the closure of the fast breeder programme.

While the company is to continue to supply contractual support to the Osprey wave energy device planned for the sea off Dounreay, it has sold equipment and data gathered during a £250,000 wind research programme to a former employee, Mike Davies, who has set up NGT(Scotland), a Danish-backed renewable energy company. AEA's plan for a £4 million wind farm near Thurso has been abandoned.

Dounreay site manager Roger James said that the company would still carry out consultancy work and "it is not true to say that we have pulled out of renewable energy." However, a spokesperson at Dounreay confirmed that no jobs at the plant are now dedicated to renewable energy, and James admitted that "it is not part of [Dounreay's] core mission to engage in renewable energy research or any other form of diversification," but to concentrate on the decommissioning of redundant nuclear plants. ❑

REVIEWS

The sunshine revolution; by Harald N Røstvik.

Sun-Lab Publishers; 1992, 188pp, $39.

Everything you ever wanted to know about solar power but were afraid to ask. From solar cars to solar fridges. In the kindest possible sense, this is a book written by a fanatic, a sun worshipper, and yes, there is even a section on the sun as a deity.

"All the figures and arguments you need as an environmentalist, consumer, investor, professional designer, architect, engineer, as a grandmother, responsible father or student," according to the accompanying blurb. This might be overstating things, but not much; it is certainly an excellent starting point for almost anyone interested in the subject, packed full of pictures, diagrams, graphs and quotations to go along with the text.

The book has the hard facts that some people will be looking for, while its presentation makes it ideal for browsing which should appeal to others, especially children.

I confess that I adopted the browsing rather than cover to cover approach, and in such a wide-ranging book (or at least as wide-ranging as you can get on such a specific subject) it makes sense to pick out the topics of particular interest.

The book, originally published in Norwegian, has been translated into English after being well received in Scandinavia. And there is an accompanying 15-minute video, also available in English, narrated by Morten Harket of pop group a-ha, and with music by Chris Rea. The video won the 1991 Gro Harlem Brundtland Environmental Foundation Award.

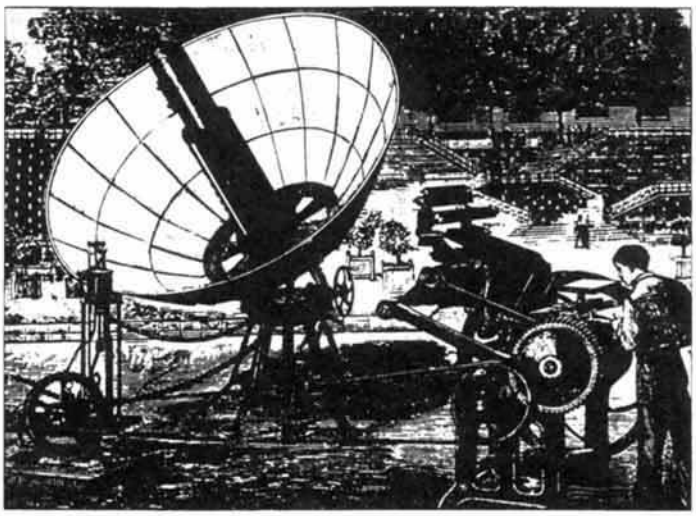
The book contains lots of quotes, and it's worth reproducing a few of them to give a flavour of the book:

"Our technological society exhibits at one and the same time breathless intelligence and abysmal lack of wisdom. That we can produce Trident submarines shows how smart we are; that we do in fact produce them shows how completely idiotic we are."

F E Turner, "Abandon affluence".

"It would be prudent to invest just as much money and imagination in solar energy as has hitherto been put into nuclear power. We must scale up research into the potential of solar energy. In the long term this form of energy is the only alternative to nuclear power."

Gro Harlem Brundtland, Berlin 1987.



Pifres "sun engine" which powered a steam printing-press in Paris in 1878.

"The World Bank spent more than $3.3 billion on energy projects in 1990, but less than 1% of this money was spent on energy-saving measures."

Worldwatch Institute, 1991.

Fusion power is dealt with briefly and neatly: "Experts agree that it will take many decades, maybe five, for such a process to be commercially viable and offer energy to consumers. In the meantime other clean energy from the sun, wind, waves and biomass will, in all probability, have conquered the market. In addition: why face all the costs and risks of making a 'copy' of the sun when we already have the original."

The book confines itself to direct solar power, that is, it does not cover energy crops or wind, wave and hydro power. One solar technology which is surprisingly not covered — or escaped my browsing aided by a rather poor index — is OTEC (ocean thermal energy conversion).

My main (and fairly minor) complaint with the book, apart from the above mentioned index, is that, quotes aside, most 'facts' are unreferenced.

Anyone reading this book must surely be persuaded that solar power has a tremendous potential for future energy supply. And its strong coverage of sustainable development issues should also convince that such potential needs to be tapped.

GRAHAM STEIN

Details of the video and book, $39 each plus postage, from Sun-Lab, Steingaten 87, 4024 Stavanger, Norway; Tel +47 51 53 34 42, Fax +47 51 52 40 62.

DATA ABOUT THE SUN

Age	:	Almost 5 billion years.
Mean distance from earth	:	149 600 000 km.
Period of rotation	:	25 days at the equator
Diameter	:	1 392 000 km (109 x the earth's diameter.)
Mass	:	1 993 x 10^{27} tons. (333 000 x earth's mass.)
Temperature	:	15 000 000 °C at centre. 6 000 °C on surface.
Energy radiation	:	380 000 000 000 000 000 000 000 kW.
The earth receives	:	170 000 000 000 000 kW.
Total world energy consuption	:	7 000 000 000 kW (1979)

THUS SOLAR RADIATION REACHING THE EARTH WAS 20 000 TIMES GREATER THAN THE WORLD'S TOTAL CONSUMPTION OF ENERGY - EVERY YEAR (1979) ! BECAUSE OF INCREASED ENERGY CONSUMPTION, THE 1990 FIGURE WAS : 15 000 TIMES GREATER.

REVIEWS

Ablaze: the story of Chernobyl; by Piers Paul Read.

Secker & Warburg; 1993, 478pp, £16.99 (hb) £5.99 (pb).

There is no doubt that the fire and explosion which ripped apart reactor number four at Chernobyl on the 26th of April eight years ago was the world's worst nuclear accident, so far.

Read takes the task of trying to tell the Chernobyl story very seriously: "To exaggerate the damaging consequences would confirm fears about nuclear power; to minimize them would not just encourage its development but also implicitly dismiss the pleas for foreign aid made by charitable organizations like the Chernobyl Union, Chernobyl Help or Children of Chernobyl ... I have embarked upon the project with no particular axe to grind and have done my best to report what happened, leaving it to the protagonists of the different points of view to speak for themselves." Here, he sets himself a difficult task and one which, in the main, is achieved.

What emerges is a sorry tale of bureaucratic intransigence which has become synonymous with the politics of the former Soviet Union, where the health of the public was routinely sacrificed to maintain the 'communist' myth of excellence in all things.

Read's book reflects his work as both novelist and journalist, reading like a political thriller, a whodunit, except in the end there is no answer quite as simple as 'the butler'.

With access to recently declassified information relating to nuclear power in the former Soviet empire and taking advantage of the release of many key figures who were imprisoned in the immediate wake of the disaster, Read presents the story with a human face. He not only interviews those who were at the plant on the fateful night in 1986 but also members of their families.

Clearly, the immediate blame for the fire lies with the plant's operators who, casting aside safety procedures, pushed the reactor beyond its limits of endurance. However, the entire atomic culture and surrounding secrecy is also to blame, the RBMK design used at Chernobyl was known by Soviet authorities to be faulty, but the brainwashing process over generations, that nuclear power is perfectly safe, also took its toll. The ill-trained plant operators just didn't seem to realise that what they were playing with was more dangerous than fire.

Confusion seems to be the watchword of Chernobyl. Read documents a conversation between Vladimir Babichev and Alexander Akimov in the control room of the stricken reactor: "Finally Babichev reached Akimov in the control room of the fourth unit. 'What happened?' he asked.

"Akimov shrugged. 'During the test there was an explosion. We don't know what went wrong.'

"'I seem to remember you saying that the chances of an accident were one in ten million.'

"'Yes,' answered Akimov, 'and this seems to be it.'"

This is not only a fascinating account of one of the world's worst disasters but also the story of the collapse of 'communism' and when one takes the example of nuclear power under the former Soviet regime it is not difficult to see why the Union collapsed.

MIKE TOWNSLEY

LITTLE BLACK RABBIT

Two heads ...

Following the demise of the Soviet Union, Russia's President, Boris Yeltsin, has scrapped the hammer and sickle, reintroducing the old imperial two-headed eagle as the country's symbol.

The new/old logo now appears on official documents, passports and the like. Word has reached Little Black Rabbit that the citizens of the new Russia refer to the two-headed bird as the Chernobyl chicken.

Taxing question

Alan Beith's bill on energy conservation audits was scuppered on orders from the Treasury which was not prepared to accept the financial implications of the bill.

But at least one MP had an answer to funding such a scheme — 12 years ago. As a newly elected member, he wrote enthusiastically that funding of home energy audits should come from a levy on gas and electricity utilities' profits. He went on to propose that the utilities subsidise interest-free loans to cover the costs of implementing energy efficiency measures.

Who was that MP, and where is he now? It was none other than Tim Eggar, the energy minister.

Tilting at windmills

Calder Valley has been much in the news over local opposition to windpower. This is not entirely unconnected with the activities of Sir Bernard Ingham: former press secretary to Margaret Thatcher; resident of Hebden Bridge in the Calder Valley; vice president of anti-wind pressure group Country Guardian; and paid adviser to the nuclear industry.

But it is also due in part to the local Tory MP Sir Donald Thompson who has been lobbying in Parliament against wind farms. It has now emerged that this member of the Don Quixote tendency is a paid adviser to British Nuclear Industry Forum.

Local campaigner

The new chair of the Council for the Protection of Rural England, Lord Marlesford has written to members introducing himself. He was eager to tell them of his success in persuading Eastern Electricity to put their low-voltage cables underground through his village and 15 others nearby.

Obviously owning 900 acres of land in the area gave Lord Marlesford a keen interest in the move. So, was this success an example of grassroots environmental campaigning?

Perhaps, or it might have had something to do with his Lordship's presence on the board of Eastern Electricity.

For peat's sake

VAT on fuel is hardly popular anywhere, but in the North of Scotland a colder climate means higher fuel bills and more tax. Unless, that is, you are lucky enough to have your own peat bank, or so people thought until a circular letter arrived from the Ministry of Domestic Heat.

Satellite monitoring, the recipients were told, had found them out, they used peat and would have to pay a special tax.

Their peat use would be monitored by a peat reek meter in the chimney, the weekly weighing of fireplace ashes by the refuse collector, or annual measurement of use of their peat banks.

While some of those who received the letter were outraged and began planning protest campaigns, others read to the end of the letter from Rayburn Place, Peaterborough AGA 12 — the new tax would begin on April the 1st!

Nuke bloop

Sellafield's own newsletter has announced the arrival of a new chaplain at the nuclear site, Rev Bert Galloway. "In addition to his work at Sellafield, which will take up 12 hours a week," the newsletter informs readers, "the Rev Galloway will also ruin the parish of Gosforth."

The curse of LBR

LBR reported in the last issue of the Japanese nuclear industry's video character Pluto, who demonstrates to teenagers that drinking plutonium contaminated water is harmless.

Since then United States Energy Secretary Hazel O'Leary has written to the Japanese nuclear company behind Pluto warning of the danger of inhaling or swallowing plutonium, even in minute quantities, and calling on the Pluto video to be withdrawn.

Being in control?

Back in December, the Energy Saving Trust — the UK's saviour from global warming — was so short of money that British Gas had to step in to ensure that staff wages could be paid.

Two ways to promote safe energy

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

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

- ☐ £15 (individuals)
- ☐ £7.50 (concession)
- ☐ £25 (supporting)
- ☐ £38 (organisations)

Overseas (£ sterling please):
Europe add £2.50;
Outwith europe add £4.00.

2 I would like to make a **donation** to **SCRAM** and enclose a cheque for:

- ☐ £10
- ☐ £25
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To: **SCRAM, 11 Forth Street, Edinburgh EH1 3LE**

RENEWABLE ENERGY

THE group of energy sources commonly referred to as 'renewables' are so called because unlike fossil fuels (coal, oil and gas) and nuclear power (which uses uranium) renewable energy sources are not depleted and will not run out.

The use of renewables is linked to the ideas of sustainability and environment protection. A society which depends on polluting and declining sources of energy is ultimately unsustainable and, sooner or later, alternative energy sources must be used.

Renewable energy (with the exception of geothermal and tidal power) comes from the sun. The solar energy which reaches the earth is equivalent to about 15,000 times the total amount of energy from all sources that we currently use. The sun heats the earth and causes wind, waves, rainfall and plant growth, offering a range of options for utilising its energy.

The problem with renewable energy is not the quantities available but finding ways to harness them to do useful work providing heat, light, motive power, etc.

The history

The use of renewable forms of energy is far from a new idea. Wind, hydro and tidal power for milling grain or draining land, and the burning of wood for heat and light were all important sources of energy until the 18th and 19th centuries. They were largely superseded in countries which underwent the industrial revolution powered by coal-fired steam engines.

Windmills and water mills came to be seen as quaint relics of the past.

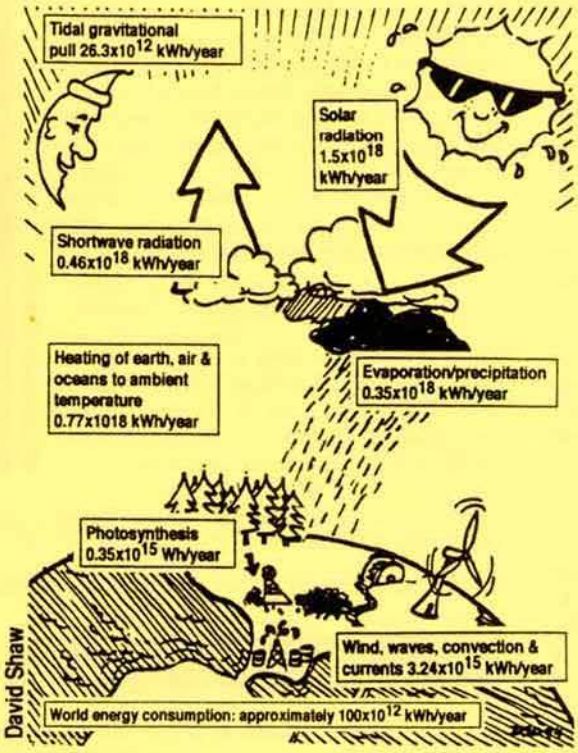
The world has come to realise that fossil fuels are limited resources and that their use is causing serious environmental damage. And, nuclear power has failed to fulfil its promise of cheap fuel while leaving a deadly legacy of dangerous nuclear waste.

Some people see a return to renewable energy as a backward step which couldn't possibly meet industrialised countries demand for energy.

Modern wind and water power devices are far removed from their predecessors, utilising state-of-the-art technology in turbine design and control mechanisms. Together with energy efficiency — producing the same end service for less energy input — they offer a realistic option for making a major contribution to our energy needs.

The failure, so far, to make full use of renewable energy has been due in part to the emphasis placed by governments in the UK, and other countries, on nuclear power. Since the 1940s, nuclear power has been widely seen as the energy source of the future. It has received the lion's share of research, development and demonstration (RD&D) money, depriving the wide range of alternatives of resources.

When the electricity supply industry was privatised in 1990/91, it was necessary to find a way of providing financial support to the unsaleable nuclear sector. In Scotland a debt write-off of £1,400 million was considered sufficient, but in England and Wales the Non Fossil Fuel Obligation (NFFO) was created. A levy of around 10% on consumers' electricity bills, was set up to subsidise the generation of electricity from non fossil-fuelled stations. The bulk of this money, initially 99% dropping to 97% by 1994, goes to nuclear power with the rest going to renewables and waste incineration.



This modest support for renewables has at least allowed a fledgling renewables industry to be established. Under the first two 'renewables orders' of the NFFO in 1990 and 1991, a total of 197 schemes were approved, totalling 559MW.

By February 1994 there were 29 completed windpower projects in England and Wales with two others under construction. Nineteen of the completed projects and both those under construction are developments comprising more than three turbines and therefore classified as 'wind farms'.

Because of the NFFO's support for an established energy source, nuclear power, the European Commission insisted that it last only until 1998. This meant that there were high subsidies (up to 11p per unit of electricity in the case of windpower) for a short period of time — renewables schemes under the 1990 and 1991 orders will have to survive unsubsidised after 1988.

A third order of 300-400MW is to be made in 1994 with subsidies running for 15 years. Similar schemes are being introduced in Scotland and Northern Ireland in 1994 of 30-40MW and 15MW respectively.

As part of its international commitment to stabilisation of carbon dioxide emissions (mainly from fossil fuels) the government has set a target of 1,500MW of new renewables by the year 2000, and further orders in 1996 and 1998 are planned to help meet this.

While the more developed renewables, like wind, hydro and landfill gas are now receiving some government support, there is concern amongst supporters of renewables that the more long-term technologies like wave power and off-shore wind are not being given significant research and development (R&D) money to allow them to advance to the stage where they can be economically viable.

A government decision to halt a wave power R&D programme in 1982 was highly controversial. Wave power had been regarded as one of the best prospects for renewable energy until a critical report which led to the withdrawal of government funding. In the case of one project — Salter's duck at Edinburgh University — the report's findings were not those of the consultant who studied the device: key conclusions had been changed and even reversed.

Many people believe that funding was stopped *because* the technology was becoming an economic prospect and therefore a threat to the nuclear industry.

Solar power

Perhaps the most obvious use of solar power is in the direct heating and lighting from sunlight. The benefits of direct solar heating and lighting can be enhanced through building design. For instance, large windows (or conservatories) on south-facing walls increase the amount of heat gained (north-facing in the southern hemisphere) while small windows on the colder north-facing walls reduce heat loss. Other more advanced methods can improve 'solar gain' even further.

At Strathclyde University in Glasgow, a student residence was constructed using 'transparent insulating material' in the walls which allows heat from the sun in and keeps it in. Even in mid-winter almost no heating is required to maintain the internal temperature of 23°C.

While there are extra costs involved in designing and constructing buildings which utilise solar heat, the savings in heating costs means they save money in the long term. And surprisingly, countries at higher latitudes, like Britain, are better placed to benefit because, although they get less heat from the sun, these areas are colder and have a longer heating season (that part of the year when heating is required) so the savings that can be made in heating costs are greater, and the payback on the extra construction costs quicker.

Solar power can also be used for water heating — usually through roof mounted panels. Even on dull cloudy days the sun's energy can be used to heat water and reduce or eliminate the need for gas or electric water heating.

Photovoltaics

Photovoltaic cells — based on semi-conductor material, usually silicon — convert the energy of sunlight into electricity in a process known as photo-electric conversion. These cells are already used in equipment like solar-powered calculators, and water pumping and telephones in remote areas.

Continued development of photovoltaics should increase their efficiency and reduce cost, and in the future they could have widespread use, particularly in countries near the equator, for large-scale production of electricity.

OTEC

Another form of solar energy which can be used in warmer climates is ocean thermal energy conversion, or OTEC for short. The sun's heat raises the temperature of surface water making it warmer than water below the surface.

Where the temperature difference is sufficient, then it can be used to power a heat pump (like a refrigerator in reverse) and produce electricity. The most promising work on this has been carried out in Hawaii, USA.

Wind power

Wind power has developed rapidly in Britain in recent years thanks to financial support through the Non Fossil Fuel Obligation in England and Wales; similar schemes have now been set up in Scotland and Northern Ireland.

The power of the wind is converted into electricity by turbines: usually two or three-bladed machines attached to masts (or towers). The blades rotate in the wind and this motion is converted into electricity by a generator. Wind farms consist of several of these turbines carefully arranged so they don't block each other from the wind.

Because the turbines have to be widely spaced out, critics argue that they take up a lot of land for all the power they produce, but 99% of the land is still available to the farmer for grazing livestock or growing crops.

Although larger test turbines of over 1MW have been built, most commercial turbines (for grid connection as opposed to individual use) are around 350-500kW maximum output. These have masts of around 25-30 metres in height and blades of 12-17m in length. Each such turbine can produce electricity for around 200-300 homes.

Opponents of wind power argue that it is noisy and visually intrusive. There have been some noise problems for a few households living near to wind farms, though this can be minimised by sensible site selection and better design of turbines. The problem of visual intrusion, which is largely subjective — some people see them as ugly and oppressive, others consider them attractive — can also be reduced through sensible site selection.

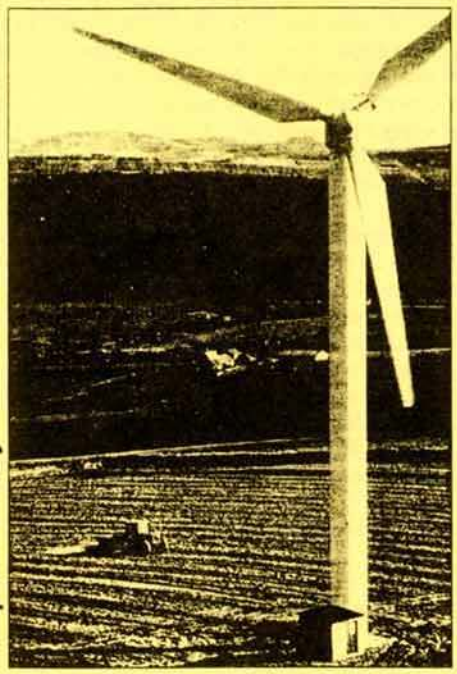
Wind power is a relatively diffuse energy source, and large numbers of turbines are required to contribute significant quantities of electricity. Also because windpower is more economic at higher wind speeds and on exposed hill tops, their is a conflict between economics and environmental amenity.

Many of the problems associated with wind farms can be reduced or alleviated through community involvement. Opposition to the erection of wind turbines is likely to be much less if local people derive benefit from the development rather than it being done for the profit of some remote developer. Much of the present conflict over wind power is a result of the subsidy structure which encourages developers to go for maximum profit rather than minimum environmental damage.

Offshore

In the longer term, there is the possibility of siting wind turbines offshore. While this would involve additional cost in construction and maintenance, it would avoid the environmental problems of visual intrusion and noise.

There is already a demonstration offshore wind farm in the Baltic Sea off the Danish coast.



Windpower Monthly

One of the 15 turbines at Carland Cross in Cornwall

Wave power

The up and down motion of the waves, caused by the wind, can be converted to electricity by a variety of different methods — some of these are at the development stage, but there are no commercial wave power devices at present.

A wide variety of different devices have been considered for capturing the energy of waves, they fall into two main categories: shoreline and off-shore.

Many devices of both types use the motion of the waves to push and pull air back and forth with the airflow turning the blades of a turbine which then generates electricity.

Shoreline devices have the advantages of being easier to construct and maintain, without the problems of anchoring the device. However, they are dependent on suitable sites, and the energy potential for shoreline devices is therefore a small fraction of the total which could be obtained from off-shore development.

The potential for wave energy in Europe was assessed by the European Community as being 85% of the Community's total electricity demand. Much of this resource is off the UK coast, particularly in Scotland.

Hydro power

Hydro power, in rivers and streams, comes from the raising of water during the rain cycle — powered by the sun. It is the best developed of all renewable energy sources; in Scotland it supplies 10-15% of the electricity.

Water mills, like windmills, have been around for centuries. In the 1880s, as electricity supplies were being developed, hydro power was amongst the first methods used to generate electricity.

The energy of a flowing stream can be better used by damming the river — this provides the energy in a more concentrated form, and allows more control of electricity generation, rather than being dependent on the amount of flow in the river at any one time.

The potential for hydro power is dependent on rainfall and topography (contours of the land). Creating reservoirs by building dams and flooding valleys can be environmentally damaging at a local level and require the relocation of local communities — this limits the overall potential, but there is still scope for more such developments, particularly in Scotland where present capacity of around 1,270MW (supplying 10-15% of Scotland's electricity) could be doubled or perhaps even tripled.

An alternative to large dams and flooded valleys is also available. Small-scale developments — low-head hydro and run-of-the-river — can generate electricity without being as disruptive to the local environment. While each individual development does not generate a great amount of electricity, collectively they could make a considerable contribution to electricity supply (most estimates put the figure at over 300MW).

Tidal power

The tides are caused by the gravitational pull of the moon on the oceans as it orbits around the earth. By using a barrage to trap water in a reservoir at high tide until the tide has gone down, the energy stored in the raised water can be used to power turbines in the same way as hydro power. It is also possible to generate electricity the other way, excluding water from the reservoir until high tide.

Tidal water mills were used in Europe from Norman times until the 18th and 19th centuries when they were replaced by steam engines.

While it would be possible to use tidal power at any shoreline site, if used in tidal estuaries the volume of water (and therefore the amount of energy) trapped is much greater.

Tidal barrages are a proven technology and they can also be used as a river crossing, with the cost saved in not having to build a bridge offsetting the barrage construction costs.

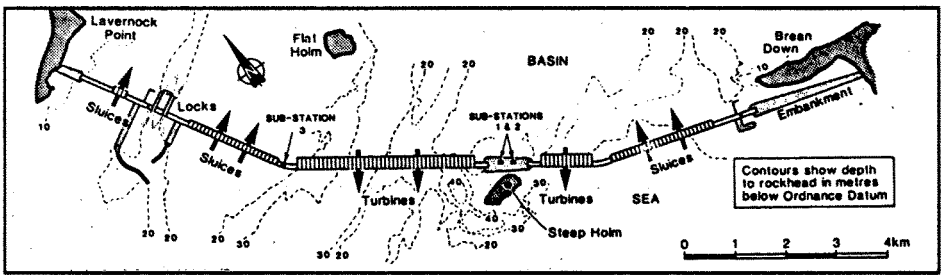
A 240MW tidal barrage at La Rance in France has been successfully generating electricity since the 1960s and several possible schemes have been looked at in the UK. The largest of these is on the Severn which, at 8,000MW, could provide around 6% of the UK's electricity demand. Other smaller schemes have been studied including on the Mersey, Solway and Forth.

Environmental concerns have focused on the damage to wildlife and plants, in particular the reduction in inter-tidal mud flats which provide feeding and breeding grounds for a large number of birds. The amount of such disruption of wildlife would clearly vary with each individual scheme.

Tidal streams

The tides cause sea water to flow from one area to another, and this produces tidal streams which, at certain locations causes a powerful flow of water. By placing turbines under water, electricity can be generated from these tidal streams.

As with tidal barrages, site location is important. A 1993 government study estimated that around the UK coast there was the potential for generating 20% of the country's electricity demand.



Proposed Severn barrage layout

Geothermal

Geothermal energy is the heat in the rocks just below the earth's surface. Naturally occurring 'aquifers' (reservoirs of water) in the rocks can be pumped up to several kilometres through bore holes to the surface.

An alternative method, called hot dry rocks, can be used where there are no aquifers to tap. Two boreholes are drilled and using either water under pressure or explosive charges, the rock is fractured to produce 'fissures' (cracks) between the two boreholes. Water is then pumped down one hole, flows through the fissures, is heated by the rocks, and returns to the surface up the second bore hole.

In the UK, water which can be obtained by either method is typically around 100°C and even drilling to a depth of 6km produces steam at only around 200°C. Compared to other methods of electricity generation, even using steam at 200°C is inefficient, though it can be used to provide heating for homes, offices and factories.

The UK government had funded a research project on hot dry rocks at Rosemanowes until March 1994 but, having spent £42 million decided that the technology was not worthwhile at present. However, in other countries like Iceland, an abundance of natural aquifers and geysers makes the use of geothermal energy an economic option.

Biomass, waste and crops

'Biomass' is the name given to a variety of different organic material (ie produced from living matter), this ranges from household waste like paper packaging and food scraps to specially grown plants and trees. Other wastes such as car tyres — made from oil — are not 'renewables' but are often lumped together with organic wastes, and are included in the government's schemes to promote renewable forms of energy.

Wastes with an energy content equal to 21 million tonnes of coal are discarded every year in the UK.

These can be used to provide power directly by incineration (burning) or by chemical or biological treatment to provide solid, liquid or gaseous fuel.

Organic waste dumped in landfill sites breaks down naturally to produce methane gas (known as landfill gas). Tapping this gas and using it to provide heat and/or generate electricity has a twin benefit. It reduces the demand for more-polluting energy sources, and it prevents the release of methane to the atmosphere — which would otherwise add to the problem of global warming.

Amongst the possibilities for energy crops being developed are the planting of fast-growing trees like willow and the cultivation of plants such as rape seed which produce oil. Willow trees can be cropped (or coppiced) to remove branches which can then be burnt as a fuel. Rape seed oil can be treated to produce a fuel similar to diesel for use in cars.

With the over-production of food within the European Union, the possibility of using the land to produce environmentally less-polluting fuels surely makes more sense than paying farmers to leave their fields empty.

The environment

No form of electricity generation comes without some environmental impact. The recent, limited development of windpower in England and Wales has seen opposition because of visual intrusion and noise, which has been widely reported in the media. Tidal power in estuaries could affect wildlife and large-scale hydro power may require the building of dams and flooding of valleys.

These problems should not be ignored, and they should certainly be minimised, but they should be compared with the environmental effects of other forms of electricity generation.

Burning of fossil fuels result in the emission of various pollutants. Oxides of nitrogen and sulphur dioxide cause acid rain which damages plant and animal life (and also damages stonework on buildings); while action is now being taken in many countries to reduce these emissions, it is expensive especially when being fitted to existing stations.

Carbon dioxide (CO_2) emissions are also a problem. CO_2 is the most important 'greenhouse' gas which scientists believe is contributing to global warming and climate change. This could lead to rising sea levels, droughts and crop failures. The UK, along with most other countries, agreed at the United Nations' Earth Summit in Rio in 1992 that the increasing emissions of CO_2 must be halted.

Nuclear power also has environmental problems. Routine discharges of radioactive materials increases the radiation in the environment leading to higher levels of cancers.

Nuclear waste produced in generating electricity has to be isolated from the environment as it is highly dangerous, remaining deadly for up to 240,000 years.

There is also the risk of massive releases of radiation from an accident as with the explosion at Chernobyl, Ukraine, in 1986. It has left 23% of neighbouring Belarus contaminated and more than 250,000 hectares of farmland has been abandoned. The contamination has spread worldwide, and while the death toll will never be known precisely, it is likely to be tens of thousands.

When weighed against the alternatives, renewable energy sources, sensibly used, offer relatively bènign methods of generation with minimal impact for future generations.

As well as choosing environmentally less damaging sources of energy, it is important to invest in energy efficiency which can reduce demand and therefore cut environmental damage from whatever energy sources are being used.

Renewable energy sources, together with energy efficiency offer the least damaging option and the best prospect for long-term sustainability.

The economics

Comparing the costs of different forms of energy is much more complicated than might be expected. In the now complex electricity market the price at which electricity is often no indication of its cost of production.

Because energy supply is such a crucial part of the economy, most forms of electricity generation receive or have received some form of subsidy.

Before electricity privatisation it had been possible for the CEGB (central electricity generating board) to claim that nuclear power was as cheap or cheaper than other forms of electricity generation. In actual fact there was a massive cross-subsidy from fossil fuel stations to nuclear.

Even after privatisation of non-nuclear stations, the true costs of nuclear power remain unclear. The expense involved in decommissioning of nuclear stations (dismantling of the plant and disposal/storage of radioactive waste) remains a matter of guesswork; and the costs of a major accident are incalculable.

The arguments over the announcement in November 1992 of a massive pit closure programme and the subsequent review (which effectively maintained the original closure plan) concentrated on the relative costs of coal and gas-fired power stations. Apparently contradictory costings were produced. Generally, the contradiction was not due to any miscalculation of costs, but that different assumptions were made and different methods were used.

Discount rates

'Discount rates' are used by economists in assessing the viability of projects. Higher discount rates are used when a quicker return on an investment is desired. Under this method money is devalued over the life of a project which means that expenditure and income in future years is considered of lower value than money spent or received in the early years of a project.

Traditionally government projects were assessed at lower discount rates (5% or less) than were used by private companies. Nowadays, though, the government assesses projects on an 8% or 15% discount rate.

High discount rates are disadvantageous to many renewables which have a relatively high construction costs but, with 'free' fuel, low running costs and long lifetimes.

Nuclear power also has high construction costs, but benefits from high discount rates as its decommissioning costs can be delayed for 100 years or more when they are considered to be much lower than if such costs were incurred at the start of the project.

Further information:

Centre for Alternative Technology, MACHYNLLETH, Powys SY20 9AZ.

Friends of the Earth (England, Wales & N Ireland), 26-28 Underwood Street, LONDON N1 7JQ.

Greenpeace, Canonbury Villas, LONDON N1 2PN.

NATTA (Network for Alternative Technology and Technology Assessment), c/o Energy & Environment Research Unit, Faculty of Technology, The Open University, Walton Hall, MILTON KEYNES MK7 6AA.

SCRAM (Scottish Campaign to Resist the Atomic Menace), 11 Forth Street, EDINBURGH EH1 3LE.

Further reading:

Wind power leaflet by Mike Townsley, SCRAM, 1990, 4pp.

Woody biomass leaflet by Dave Spence; SCRAM 1991, 4pp.

An introduction to sustainable energy by P Daley & J Glover; Natta, 1993, 24pp.

Energy without end by Michael Flood; Friends of the Earth, 1991, 74pp.

The energy alternative by Walter C Patterson; Boxtree, 1990, 186pp.

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Written by Graham Stein

Copies of this and other SCRAM leaflets at 15p each (plus 50p p&p per order) available from SCRAM.