

THE SAFE ENERGY JOURNAL

September - November 1995

Solar power breakthrough

ISSUE 106

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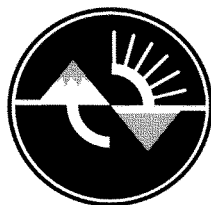
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Twenty years on

SCRAM — the Scottish Campaign to Resist the Atomic Menace — which established this journal, was formed in November 1975. Two decades on, much has changed. Scram itself has become the Safe Energy Unit at Friends of the Earth Scotland, but the original aims remain: the ending of nuclear power, and the promotion of renewable energy and energy efficiency alternatives. And these aims have moved from idealistic, fringe ideas to realistic, mainstream policies.

The government's white paper on the future of nuclear power ("Government opts for selling the family uranium", SEJ 105) showed just how low nuclear's stock has fallen. The party which planned to build ten PWRs in the 1980s now argues that there is no economic, environmental or diversity of supply justification for any new nuclear power stations. The partial privatisation of the nuclear industry next year could well mean the end of nuclear power — though not, sadly, its legacy of nuclear waste.

One of the key 'hidden' subsidies, identified in the *Safe Energy Journal* — the fuel services contracts struck by BNFL with Scottish Nuclear and Nuclear Electric (NE) ("NE signs £14bn deal with BNFL", SEJ 105) — has now become clearer. The deals have cut £180 million from BNFL's 1994-95 profits, while NE has been able to reclaim £829 million of provisions it had previously made under the old cost-plus contract ("BNFL deal a subsidy for NE", p5).

However, BNFL is prepared to go only so far in aiding the privatisation and has made it clear that it will accept the privatisation leftovers — the magnox stations — only if it is given assurances that the government will provide for all of the costs associated with decommissioning the plant. This could take a sizeable chunk of the revenue from privatisation, reducing the scope for cutting taxes before the next general election — the main reason for the privatisation.

Those opposed to nuclear power need to continue to highlight the real costs, economic and environmental, but the future for nuclear power in the UK has never looked so bleak.

On the other hand, renewable energy continues to make steady progress. While the demise of the Osprey 1 ("Wave power ups and downs", p21) is undoubtedly a setback for wave power, if the designers' confidence is fulfilled and Osprey 2 is successful, wave power will have taken a massive step forward. Wind power is now a developed technology, making an increasing contribution to energy needs around the world, in countries as diverse as Germany and India. And photovoltaic technology, providing electricity from the sun, has made rapid progress and could be economic for widespread applications within a few years ("Solar first for Newcastle", p10).

Energy efficiency too has become accepted. It is not about sitting in the cold and dark, it is about providing end services for less fuel, lower cost and less environmental damage. It is also about tackling the problem of fuel poverty. The Home Energy Conservation Act has put energy efficiency onto the agenda of local authorities throughout the country ("Home energy conservation bill", SEJ 105).

The global future

It is an environmental imperative that less developed countries do not follow the high energy use, fossil-fuel and nuclear path of the developed countries. As with nuclear weapons, less powerful countries will inevitably aspire to having the technologies of those which are more powerful.

Renewable energy and energy efficiency offer the prospect of convergent development paths, technologies relevant to rich and poor countries alike. This is not, however, a view which is likely to have reached the economists at the UN. A report assessing the costs of damage from global climate change put the value of a human life in the West at fifteen times that of one in the poorest countries of the world ("Global warming worries mount", p19).

Such an approach is immoral. And it will underestimate the costs of climate change, and therefore the need for preventative action. At the heart of sustainable development is the principle of equity. This is not an idealistic wish — it is an essential prerequisite for concerted global action.

Twenty years on much has changed, but much still remains to be done.

"The ending of nuclear power, and the promotion of renewable energy and energy efficiency alternatives ... have moved from idealistic, fringe ideas to realistic, mainstream policies."

The Safe Energy Journal is the international magazine of Friends of the Earth Scotland's Safe Energy Unit. Views expressed are not necessarily those of FoE Scotland.

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Nuclear waste review does little for environment

GOVERNMENT plans to encourage the use of landfill sites for the disposal of low-level radioactive waste from nuclear power stations have been abandoned.

Commenting on the publication of the white paper on radioactive waste management policy⁽¹⁾ in July, the environment secretary, John Gummer, said: "In light of the genuine anxieties that have been expressed by local residents ... the government has decided not to encourage greater use by the nuclear industry of the 'controlled burial' of low-level waste (LLW) at suitable landfill sites."

Of over 5,250 responses received by the Department of the Environment (DoE) to the radioactive waste consultation (green) paper, some 5,000 were "letters from members of the public as a result of campaigns mounted by Greenpeace" opposing the use of landfill for nuclear industry waste.

However, apart from dropping the landfill suggestion, the white paper offers little in the way of change in favour of environmental considerations, despite claiming the "revised and updated" policy aims now take account of the "concept of sustainable development and its supporting principles" ("Inconclusive nuclear waste review", SEJ 105).

The government remains committed to the Nirex dump for low and intermediate-level waste (ILW) and rejects the notion of delaying the development saying "it should be constructed as soon as reasonably practicable."

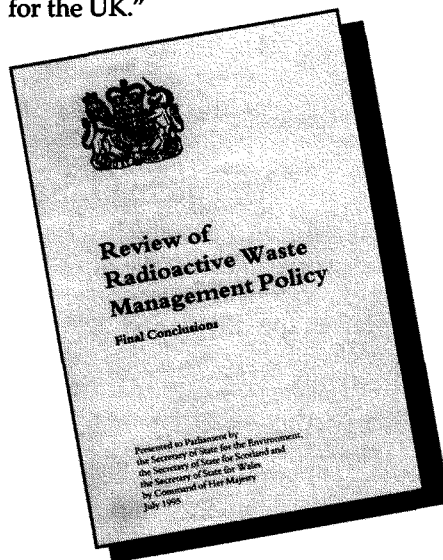
High-level waste (HLW), "once it has been allowed to cool," is also ultimately destined to be buried. Responding to criticisms from the Radioactive Waste Management Advisory Committee (Rwmac) that the closed and secretive nature of Nirex's site selection programme has undermined public confidence, the white paper promises: "In selecting a site for the disposal of HLW, the government will take into account ... the need for transparency of decision making and for public reassurance."

In establishing so-called deep repositories "the government believes that reliance cannot be placed exclusively on estimates of risk to determine whether a disposal facility is safe. Other technical factors, including ones of a more qualitative nature will also need to be considered and the regulators will need to be satisfied that good engineering and good science have been adopted to limit risks."

In producing a safety case for a repository it will no longer be necessary

to show that the chance of someone contracting a fatal cancer or a serious hereditary defect from its operation is less than one in one million per year. In its evidence to the waste consultation Friends of the Earth denounced this approach: "Nirex has been unable to demonstrate that [it] could meet this target. However, rather than acknowledge that the scientific uncertainties rule out disposal for the foreseeable future, the DoE instead propose that the one in a million target be weakened."

While reaffirming "its policy that the wastes resulting from the reprocessing of foreign spent fuel should be returned to the country of origin, and that HLW should be returned as soon as practicable after vitrification", the government accepts British Nuclear Fuel's (BNFL) suggestion that this can be achieved by substituting HLW for ILW and LLW. However, it cautions that this must ensure "broad environmental neutrality for the UK."



While BNFL "may engage in waste substitution for LLW now ... any arrangements they now enter into for the substitution of ILW must be conditional upon confirming, at the time a Nirex repository receives planning permission, that waste equivalence has been properly calculated. Furthermore, these arrangements will need to provide for ILW to be returned should the Nirex repository not be established by the time BNFL is contractually obliged to return the wastes (ie 25 years after they are generated)." A small additional amount of HLW should be added over and above "that calculated on radiological grounds alone ... to account for some minor nonradiological environmental consequences of substitution."

BNFL was positively euphoric in its response: "Waste decision the best

option" screamed the centre page headline of the company newspaper. According to Chris Loughlin, the Director of the giant Thermal Oxide Reprocessing Plant at Sellafield: "It is clearly the best decision for the environment, for future business and for jobs."

At the heart of the proposal is the massive reduction in the number of nuclear waste shipments that will be required to take the waste back to BNFL's foreign customers. According to the company it will reduce the number of shipments from 1,000 to 100. It further argues: "By reducing transport costs by several hundred millions of pounds, it puts BNFL in a strong position to win £2 billion to £4 billion worth of further export business." According to the company, it will help to secure some "5,450 full-time jobs in the UK well into the next century."

BNFL claims the amount of extra ILW and LLW to be handled by Nirex as a result of substitution will amount to less than 8% of the UK total. Environmental groups, however, have reacted angrily to the plan. Martin Forwood of Cumbrians Opposed to a Radioactive Environment (CORE) says people should not be taken in by BNFL's spurious arguments: "What BNFL lists as the so-called advantages of substitution are all geared towards the financial propping up of a dead duck industry. Let there be no mistake that if this option is employed it will act as an added disincentive to inward investment in West Cumbria as potential investors see overseas customers willingly relieving themselves of nuclear waste ... and all by the kind invitation of BNFL."

The white paper also says that further consideration is to be given to the possibility of redefining the current waste categorisation, focusing on the suggestion in the consultation paper that short-lived ILW "might be disposed of at Drigg, provided the overall safety case for the site was not jeopardised."

Decommissioned nuclear powered submarines will continue to be stored afloat at the naval bases at Devonport and Rosyth. The white paper comments that the "MOD has based its long-term plans for the disposal of radioactive wastes from the reactor compartments on the availability of the Nirex repository in about 2010. However, this policy is kept under review." □

Reference

(1) "Review of radioactive waste management policy: final conclusions", Department of the Environment; Cm 2919, HMSO, July 1995.

Nuclear privatisation: political battle lines drawn

DETAILED cost estimates for decommissioning the UK's ageing magnox reactors are to be withheld when the government publishes accounts relating to its plans for privatising the country's advanced gas-cooled reactors (AGRs) and its new Pressurised Water Reactor (PWR) next summer.

While part of the bill for decommissioning the PWR and AGRs will have to be met by the taxpayer, a key feature of whether the City will meet the £3.5 billion or so price tag put on the industry by the government will be exactly what liabilities are to be passed to the private sector. By refusing to publish information on magnox liabilities until after the privatisation, taxpayers — and voters — could be prevented from finding out exactly how much the sell-off will cost in the long-term or at least until after the next general election.

Brian Wilson, of Labour's Trade and Industry team, said: "This confirms that in their desperation to privatise, the Tories are once again happy to leave the taxpayer to

write a blank cheque."

The Labour Party is opposed to the privatisation for a number of reasons, according to the party's energy spokesman, Martin O'Neill. In an address to key energy figures in July he said: "I don't see a case for the nuclear industry being privatised at the moment, and I don't see it in perpetuity."

According to O'Neill the great strides made by the industry in improving its efficiency and driving its costs down in preparation for privatisation show what can be achieved in the public sector and dispels the myth that such gains are the sole prerogative of the 'free' market: "The performance figures of the nuclear industry more than suggest that they have been able to get their act together."

Worryingly for environmental groups, O'Neill appeared to signal that Labour is willing to consider funding future nuclear plant, arguing that "one of the consequences of privatisation has been the diminution in the research budgets of literally all the privatised companies." Any

future commitment to "big science" in the nuclear industry could therefore take place only if the industry was retained in the public sector. A point not lost on some environmentalists who are quietly hoping that this particular privatisation will succeed before the next general election and a possible Labour victory. Many fear that Labour's anti-nuclear stance will simply fade away under pressure from the big trade union's and the MP for Sellafield, Jack Cunningham, Labour's shadow Secretary of State for Trade and Industry.

Public anxiety about a privately run nuclear industry which "may or may not be reasonable," concludes O'Neill, "is reason enough for the industry to be retained in the public sector for as long as it exists."

The big energy unions, unsurprisingly, are also opposed to the nuclear privatisation. The unions are about to launch their campaign to keep the industry in public hands and are expected to publish details of a public opinion poll which shows that 90% of people support their position. □

BNFL deal a subsidy for Nuclear Electric

NUCLEAR Electric (NE) and British Nuclear Fuels (BNFL) have issued their annual accounts, showing that one — to stay in public ownership — is subsidising the other — to be sold to the City.

BNFL says, in the year the Thermal Oxide Reprocessing Plant (Thorp) finally became operational, it has had to cut £180 million from its 1994-95 profit as a result of signing reprocessing and fuel supply contracts worth £18 billion with Scottish Nuclear and NE ("NE signs £14bn deal with BNFL", SEJ 105). Its annual report records a profit of £74 million, down £7 million on last year.

Meanwhile, NE reported an operating loss of £33 million — before the £1.2 billion Nuclear Levy — a great improvement on last year's loss of £434 million. However, the new deal with BNFL shaved some £198 million from this year's loss. NE has also been able to reclaim £829 million of

provisions it had previously made under the old cost-plus contract it had with BNFL.

According to the *Financial Times* newspaper, the result augurs well for privatisation. It comments: "The Levy is used to fund provisions for older magnox stations which are not being privatised. The modern side of the company with five advanced gas-cooled reactors and one pressurised water reactor was profitable."

■ Meanwhile, BNFL, which is to take ownership of the magnox stations after privatisation, has said it will do so only if it is given assurances that the government will provide for all of the costs associated with decommissioning the plant.

This could be achieved by the government granting BNFL a dowry to take on the decrepit reactors. In turn, that dowry would be invested by the company against the day — anything up to 150 years

away — when the stations must finally be taken completely apart.

However, should the government accede to the company's demand it would be forced to hand over a sizeable chunk of the revenue from privatisation of the newer parts of the nuclear industry. Such a move would further impede its ability to cut taxes in the run up to the next general election — the main reason for the privatisation in the first place.

BNFL director John Guinness said: "I have made it clear that the board wants the wherewithal to fund liabilities."

Hoist by its own petard, the government has its own free market philosophy to blame. By making BNFL a public limited company and therefore quasi private, it gave the company the power to reject the imposition of billions of pounds worth of liabilities which could render it technically insolvent. □

Torness deceit admitted by Scottish Nuclear

SSCOTTISH Nuclear has admitted that Torness nuclear power station was built not because of any need for its generating capacity but to prop up the nuclear engineering industry.

At the Torness public inquiry in 1974, the SSEB — later split into Scottish Power and Scottish Nuclear — based its case for building Torness on an estimated 6% per year compound growth in electricity demand up to the end of the century. Despite criticism of these projections from objectors, planning permission for a steam generating heavy water reactor was

granted in 1975 by the Labour Secretary of State for Scotland, Willie Ross.

In 1978, Ross's successor, Bruce Millan, issued a fresh consent to allow an advanced gas-cooled reactor (AGR). In the early 1980s, with construction of the Torness AGR under way, the SSEB was still arguing that there would be a need for the station's capacity by 1992/3.

This year, in a letter to a degree student, Scottish Nuclear's Corporate Communications Manager, Irene Currie, stated: "By the time the decision to build an AGR had been made at the end of the

1970s, it was clear that ... the need to increase capacity ... was no longer there. The decision to build Torness — and its sister station Heysham II in England — was taken in order to support the UK engineering industry through what was obviously going to be a lean period."

This is an admission that the electricity utility misled the public to justify the building of an unnecessary nuclear power station, and it raises serious questions about the information supplied for the 1974 public inquiry and the 1978 decision. □

Dounreay pitches for reprocessing work

WHILE the Dounreay management awaits a decision by the Clinton Administration on whether or not to throw a lifeline to its materials testing reactor (MTR) reprocessing plant ("US backs Dounreay reprocessing", SEJ 105) a row has broken out over German plans to send 52 spent highly enriched uranium (HEU) fuel rods to the site.

The rods were to be sent from Berlin's Hann Mietner Institute (HMI) to the US earlier this year for storage and eventual disposal. However, the Governor of South Carolina, in whose state lies the giant military industrial nuclear complex at Savannah River, obtained an injunction to prevent the material being unloaded at the Sunny Point military port. The US Department of Energy (DOE) then launched a counter court action seeking to have the injunction overturned.

The German government has become increasingly frustrated over the repeated delays in dispatching the rods, which could force the closure of HMI, which is running out of storage space for its spent fuel. Bonn warned Washington that it would turn to Dounreay unless it was permitted to off-load the rods to the USA soon. The DOE and State Department's hands were tied and they

said it was unlikely that the shipment could proceed until late this year.

The Germans duly went to Dounreay and though the MTR reprocessing plant was mothballed last year due to a lack of orders, it has now emerged that it is to re-open in mid-October for "a short campaign to reprocess fuel from UK and European research reactors." However, if "additional and substantial work from the reactor operators is not obtained ... this could be the last campaign before closure," said AEA, which runs Dounreay.

Statement awaited

Dounreay must now await the publication, late this year, of the long-overdue Environmental Impact Statement and Record of Decision on what the US should do about over 20,000 US-origin HEU fuel rods dispatched around the world since the late fifties.

Even if Dounreay does attract significant business under the umbrella of the crisis in US waste management, it may still have to face stiff opposition. Not least of which looks likely to come from Highland Regional Council (HRC), previously a staunch ally of the site.

Following the latest spate of revelations about the extent of radioactive contamination on the site

("Dereliction of duty at Dounreay", p7) the council's Director of Law and Administration, Harold Farquhar, wrote to the US outlining a number of concerns about the suggestion that it might endorse the reprocessing of US-origin spent HEU fuel at Dounreay. "The uncertainties" over the condition of Dounreay's controversial waste shaft and general environmental pollution "have led the Council to conclude that no negotiations on further reprocessing at Dounreay should take place until all such matters are investigated and remedial actions put in place." Further, the letter notes that "many [council] members have strong reservation regarding the whole question of the importation of foreign fuels."

HRC has also asked its planning department to examine whether the site's current planning certificates would allow the work to be carried out: "It is not clear at this time that Dounreay has all the necessary statutory permissions to undertake the work that may be offered."

The council further warns that: "Obtaining such necessary permissions will almost inevitably attract the closest public scrutiny and debate, with the possible prospect of potentially lengthy public examination of the issues and, at this stage, there is no guarantee that such permission will be obtained." □

Nuclear transport troubles

A flask carrying spent nuclear waste from Sizewell and bound for Sellafield was left dangling off the back of a lorry for 12 hours in March, while railway managers argued about who was responsible for dealing with it.

The flask was left in a perilous position after the 30-year old crane which was transferring it to a freight train wagon failed, dropping the flask back onto the lorry.

Railtrack argued that as the flask wasn't actually on the rails, it wasn't its responsibility.

A leaked report from Mainline Freight which operates the crane reveals that the soon to be privatised BR company is very concerned about the lack of safety procedures: "The inquiry [by four senior railway managers] highlighted many areas where the response from management fell short of what could be expected."

While the operators of the UK's nuclear trains, Transrail Freight Ltd,

stressed that there was no danger of the flask releasing its deadly load, the incident caused such concern that all nuclear traffic on the railways was stopped for a week after the incident while all of the cranes used for lifting nuclear flasks were checked for faults.

■ Meanwhile, the discovery of radioactive contamination on the outside of a flask used to transport high-level radioactive waste from France to Japan has raised fears that safety procedures may not be as stringent as the French reprocessor Cogema has claimed.

This was the first of many transports scheduled to take place over the next two decades, from France's Cap La Hague and the UK's Sellafield reprocessing plants to Japan, and was viewed by the industry as an important test run to prove to the world that such shipments are safe.

The radioactive contamination

was found during a series of tests carried out on the 28 flasks used in the transport. One flask was found to have radioactive caesium on its outer skin.

While Cogema believes that the caesium was spilt when the flasks were being filled, some Japanese officials are saying privately that the flask leaked during transport. □



The Pacific Pintail on its way to Japan

Dereliction of duty at Dounreay

IMAGINE, if you will, a nuclear site where radioactive waste was 'tumble tipped' into a convenient hole for over 20 years, where public beaches have been fenced-off because of radioactive pollution, where an explosion blew radioactive particles high into the air, where radioactive particles fell off the back of lorries, where highly engineered nuclear waste flasks failed to hold their deadly load, where low-level radioactive waste pits were open to the elements and to any scavenger that dared to pick at their contents, where radiation is found even in the so-called non-active areas.

Now, cast your mind's eye around the globe for a likely place to find such a site. It would come as no surprise to hear that it has an unpronounceable name and is in Eastern Europe or the former Soviet Union. After all, the nuclear engineers there were badly trained and more importantly, perhaps, badly paid and ill equipped.

However, the site in question isn't a communist relic or a throw-back to the early days of atomic weapons production, it is Dounreay in the North of Scotland and run by the Atomic Energy Authority (AEA). Its engineers can plead no mitigating circumstances: its staff are highly trained and well paid, and for over forty years have enjoyed free access to the public purse.

So enthused by the potential of the atom were politicians and scientists in the 1950s, that they decided to build a massive nuclear research centre dedicated to fast breeder research. At Dounreay they built fuel cycle facilities, a materials testing reactor, reprocessing plant and two fast reactors, spending over £4 billion in four decades.

The idea was that fast reactors would produce more fuel (plutonium-239) than they burned (uranium-235) — providing unlimited power supplies. In April '94 the dream turned sour and all fast reactor research was stopped.

Only now is a picture emerging of just how carelessly the site has been run. Incompetence or just crass indifference, there can be no excuses for the radioactive midden that has cost the taxpayer over £4 billion and will cost billions more to clean up and make safe.

The latest round of Dounreay revelations has been dominated by a joint report⁽¹⁾ from two government advisory bodies. Initially, the Committee on the Medical Aspects of Radiation in the Environment (Comare) was asked by the Scottish Office to investigate the possible health effects of over 140 radioactive particles found on the Dounreay foreshore and one on the nearby Sandside beach. The particles have been turning up at a rate of about 12 per year since 1984, when routine monitoring of the foreshore began ("Dounreay contamination", SEJ 103). Comare in turn sought the help of the Radioactive Waste Management Advisory Committee (Rwmac) in finding the source.

Having twice reported on the possibility that activities at Dounreay were responsible for the increased incidence of childhood leukaemia near the plant, Comare has so far dismissed the theory that planned or accidental radioactive discharges are responsible. It has not, however, ruled out a potential link between some aspect of reprocessing at the site and the leukaemias.

Now, however, it has emerged that Comare was not told about all accidental releases. In compiling its second report, in 1988, Comare sought details of "any unplanned or experimental releases which might have had off-site radiological consequences." Several incidents were reported to the Committee by Dounreay's management, but it neglected to mention the 1977 explosion in its so-called intermediate-level waste shaft, which contained an unrecorded quantity of low and intermediate-level radioactive waste. It was the Authority's view that, despite the violent nature of the explosion which hurled metal scaffolding poles — which were in the shaft — up to forty metres away, and threw its steel top plate 12 metres to one side, contamination had occurred only around the mouth of the shaft.

Tall stories

Comare was further told that the foreshore particles came from a 1965 spillage, when a fractured pipe released contaminated water from the Dounreay Materials Testing Reactor fuel pond. Firemen had been instructed to hose the spillage down a storm drain, close to the mouth of the waste shaft. In 1983 the drain itself was damaged by a storm and this, said the AEA, is when the particles were dislodged and began making their way to the beach.

In preparing this latest report, Comare was stunned to find, last year, that both the AEA and HM Industrial Pollution Inspectorate (HMIPI) were investigating several possible sources for the particles on the beach and had been doing so since 1984. It has also been revealed that the particles themselves were far more radioactive than Comare was originally told. Despite this, the Committee concludes in this latest report: "based upon the evidence

Mike Townsley assesses the implications of a series of accidents, contamination and cover-ups at Britain's most northerly nuclear establishment.

Councillors inspecting a waste pit in 1993



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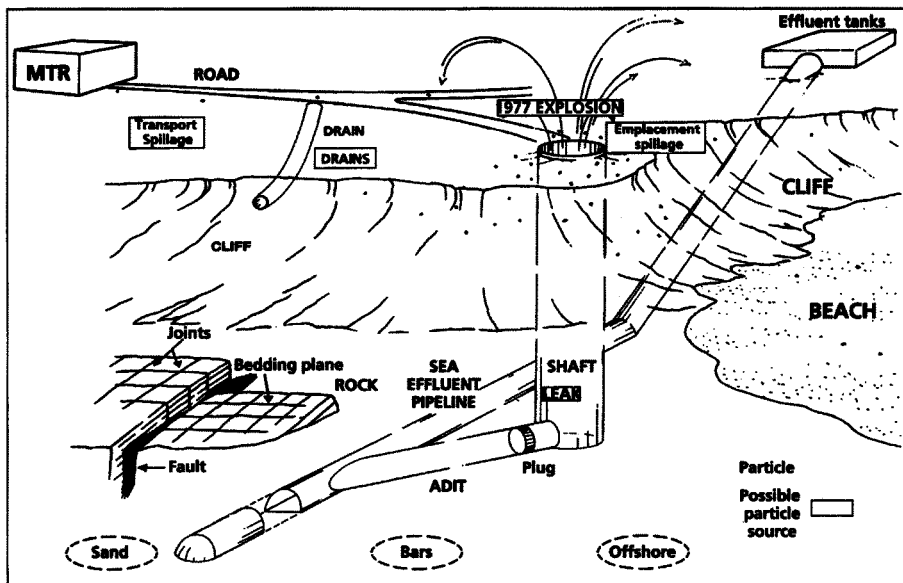


Diagram of the intermediate-level waste shaft

"If you ingested one of these particles and it lodged in your gut, you would probably be dead from gastrointestinal burns within the week."

Dr Tom Wheldon, head of the Committee's special beach contamination group.

currently available, that whilst the most active particles could cause acute effects, the metallic particles are most unlikely to explain the observed excesses of childhood leukaemia in the Dounreay area."

Rather than express concern for the health of those living near the plant, Comare appears far more preoccupied with the effect on its credibility: "Comare has noted that its authority depends upon the accuracy of the information given to the Committee by the responsible authorities ... [it] is concerned that the authority of its Second Report may have been diminished by the lack of timely relevant information concerning both the activity and source of the particles."

However, one Comare member was willing to go further. Speaking to *New Scientist* magazine, Dr Tom Wheldon, head of the Committee's special beach contamination group, said: "If you ingested one of these particles and it lodged in your gut, you would probably be dead from gastrointestinal burns within the week." Elsewhere in the body, warned Wheldon, most of the particles could irradiate the bone marrow enough to significantly increase the risk of leukaemia.

If, as Rwmac believes, the particles are worn away by the action of the sand on the beach after two or three years, and more particles like the one found on Sandside beach — which contained 100,000 becquerels of activity — had been present then they could easily explain the excess childhood leukaemias in the area. It is, Wheldon said, "a horrifying scenario".

So, are the particles coming from the waste shaft? Probably, says Rwmac. Given the steady rate at which the particles are turning up, Rwmac believes a reservoir of "such particles is almost certainly present which is releasing particles into the environment at a relatively steady rate." It further notes that "the seasonal variation in rate

of discoveries suggests that storm conditions may be a factor in delivering the particles onto the foreshore."

Despite assurances that all contamination was cleared up around the mouth of the shaft in less than 24 hours, following the explosion, the AEA now considers the area as being "contaminated". Rwmac states: "Investigations, which have not yet been reported in detail, have revealed an area of contamination both at the surface and at depth, and both inside and outside the Site boundary, in the vegetated ground around the top of the shaft."

Rwmac concludes: "On the present evidence, the source of the particles is most likely the turfed soil which covers the low cliffs close to the top of the shaft and outside the Site boundary." But adds: "There could well be other sources within the site but these are less likely to provide, or have provided, a large reservoir from which a steady flow of particles onto the foreshore could have arisen."

It further warns that owing to the shafts proximity to the cliff face it "is likely to be breached within the next hundred years or so." Therefore, "steps should be taken, over a relatively short timescale, to fully evaluate the situation and propose a solution and a timetable for the treatment of the waste in accord with modern standards."

Hear no evil ...

Did the AEA lie to Comare and Rwmac? Not exactly, says the latest Dounreay site director, John Baxter: "The report suggests we have been withholding information. I looked into that and I can't anywhere find an attempt to mislead them ... We are talking about 1987 when they are saying they were misled. It is quite difficult to track back into the records to see whether that was or was not the case."

Sir John Knill, until recently chair of Rwmac, said: "The contamination on the beach and within the site has proved to be higher than I had previously been told. I received the highest radiation dose I have ever recorded during my time with Rwmac while standing at the top of the waste disposal shaft." But, did they lie? Knill again: "to say they were lying is not an unreasonable conclusion to reach." Prof Bryn Bridges, chair of Comare, adds that both the AEA and HMIPI had been "considerably economical with the truth."

Yet, amidst all the criticism of Dounreay's negligent attitude and sideways hints at the two Committees' belief that they had been lied to, Rwmac's statement of gratitude "to HMIPI and to UKAEA at Dounreay for the positive and helpful approach developed throughout" the study, seems particularly misplaced. It presents a worrying indication of the close relationship between Rwmac and the nuclear industry. Indeed, six of its 19 members come directly from

the industry, and others inevitably have links with the industry.

It would seem that the statement was geared towards fostering the attitude that that was then, and this is now. Dounreay is under new management, in preparation for partial privatisation which will leave responsibility for the clean up with AEA Government Division, and the cost with the taxpayer. However, what exactly has changed and can the new management be trusted to be honest?

About 90 patches of contamination recently identified within the Dounreay site — including 21 potentially 'fatal' hot spots — are now being put down to the use over a 20 year period of cheap flasks to move nuclear waste around the site — quite simply, radioactive waste fell off the back of a lorry. Unlike the flasks used to transport waste between nuclear sites, according to the AEA, these flasks were not "leak tight" and they leaked! Yet again, claims the AEA, there is no need for the public to worry.

Such is the growing level of concern about Dounreay among those living in the far north, the AEA distributed a public relations leaflet to thousands of homes. The leaflet, bearing Baxter's by-line, confidently asserts that while "we cannot, of course, absolutely guarantee that no radioactive particles could have been carried off-site on people's shoes ... we believe that this is unlikely." In justifying this claim, Baxter boasts that: "Buses and certain other vehicles have always been routinely monitored on leaving Dounreay ..." Yet another terminological inexactitude. Monitoring of buses did not begin until 1975 — months after the leaky flasks were taken out of use.

Error or omission

When confronted with this, the site spokesman Derek Milnes said: "This was an error. It should have said they have always been monitored since 1975." It is difficult to believe that this was an accidental omission. The unprecedented move of issuing thousands of newsletters to people living in the area would not have been made lightly. It would not have been made without recourse to highly paid PR consultants, who should not have made such a simple mistake, nor used the poor grammar Milnes claims should have been in the newsletter.

When the decision to build a fast reactor research centre was taken in the early fifties, the Atomic Energy Division of the Ministry of Supply told the Scottish Health Department, in a secret memorandum, that there was a "remote possibility of an explosion in the operation of the reactor" which would spread contamination downwind of the site. This could require the evacuation of people from their homes for "several years" and the control of milk production. "In view of this risk," it concluded, "it is undesirable that the factory should be located within some miles of any town, and it should be a considerable distance from any large town."

Fortunately, the reactors didn't explode — only the waste shaft. However, the absence of a Chernobyl-style explosion does not mean that Dounreay is not a nuclear disaster. It is, and should be treated as such. It is time the government and its regulatory agencies put a stop to the ad hoc approach to investigating the state of the site. It is time the responsibility for informing the regulatory agencies and the public about contamination was taken away from the contaminators.

Procurator fiscal

Although Dounreay benefited from crown immunity until 1990, HMIPI has had five years to get to grips with the site. It has, so far, manifestly failed in its duty to protect the public. HMIPI says it is preparing a dossier on the 'hot spots', which will be passed to the procurator fiscal if it "feels there is sufficient evidence to sustain a prosecution."

So far, the only proactive step taken by the Inspectorate has been to write to the AEA and Highland Regional Council expressing its concern about the siting of a pioneering 2MW wave power station off the Dounreay coast:

"When the investigation on the foreshore is ongoing, and when we have not established where the contamination is coming from and how wide-spread it is, it is not perhaps the most sensible time to be putting a wave machine there.

"We have written to Highland Regional Council, as the planning authority, asking for our view to be considered in any planning-related issues. HMIPI does not have a policing role but we have let our reservations be known."

Yet, Allan Thompson, the director of Applied Research Technology which is behind the project, has not been contacted by HMIPI. Absurd but true!

How much more contamination needs to be found before the site is closed, scrutinised and steps are taken to make it safe, or at least safer? □

Reference

(1) "Potential health effects and possible sources of radioactive particles found in the vicinity of the Dounreay nuclear establishment"; Comare and Rwmac. HMSO, May 1995.

"HMIPI has had five years to get to grips with the site. It has, so far, manifestly failed in its duty to protect the public."



The Dounreay site

□ Mike Townsley is a freelance journalist and consultant on environmental issues.

Solar first for Newcastle



Britain's first photovoltaic-clad building was officially opened in January; Dr Nicola M Pearsall describes the project and how it has been performing.

□ Dr Nicola M Pearsall is Senior Research Associate, Newcastle Photovoltaics Applications Centre, University of Northumbria at Newcastle.

ONE of Europe's largest building-mounted photovoltaic systems is operating at the University of Northumbria, Newcastle upon Tyne. During the late summer and autumn of 1994, a 40kW photovoltaic (PV) facade was installed on Northumberland Building on the main city centre campus of the university, with PV modules fully integrated into rainscreen overcladding used to refurbish the building. The Northumbria Solar Project will provide technical information on the performance of the PV system under UK conditions, and increase awareness of the technology and provide a practical demonstration of the possibilities for generation of electricity from sunlight in the urban environment.

Support for the £1.5 million project has come from: the Commission of the European Communities under the Thermie Energy Demonstration programme; the UK Department of Trade and Industry; and a number of private sponsors, including Northern Electric and the Greenpeace Environmental Trust. The project team includes the Newcastle Photovoltaics Applications Centre, based at the University of Northumbria, Ove Arup & Partners, BP Solar, IT Power Ltd. and, of course, the University of Northumbria Estate Services Department, which is responsible for the maintenance of all university buildings.

The PV array comprises 465 BP Solar modules which are integrated into the aluminium rainscreen cladding on the south facade of the building. The cladding is inclined at 25 degrees to the vertical to give better solar collection and to increase the aesthetic qualities of the facade. Modules are connected in series in strings of fifteen to give a nominal operating voltage of 270V at maximum power. An inverter is used to convert the DC power from the array to 415V, 3-phase AC power which is fed directly into the distribution system of the building. The electricity is used to meet all types of loads

within the building, with the remainder of the supply being taken automatically from the conventional grid. The users inside the building are generally unaware whether they are using electricity from the PV system or from more conventional sources.

Officially opened in January 1995 by Mr Ian Taylor MBE MP, Parliamentary Under Secretary of State for Trade and Technology, the system has been providing electrical power continuously and had generated more than 15,000kWh by the end of July. There have been no problems with the inverter or the PV system apart from a small fault in the wiring of one of the strings. The system performance is being closely monitored and, in accordance with the regulations for Thermie projects, data are sent regularly to the European Solar Test Installation at the European Commission's Joint Research Centre in Italy. The data are then analysed and compared with information from other installations around Europe. The exchange of information and experience within the Thermie programme allows more rapid development of the technology.

Defying the weather

Output from the system varies according to the weather conditions since the power is directly related to the sunlight level. In addition, the surrounding buildings cause some shading which moves across the facade during the course of the day. Any shading will reduce the power output, but the severity of the effect varies depending on the number of modules shaded and the electrical connections in the system. In an urban environment, it is very difficult to eliminate shading and so methods of minimising the effects are being investigated, with the detailed behaviour of the PV system providing useful information.

Having now experienced most of the typical UK weather conditions, the effect of the changing day length with season can be clearly seen, with around 16 hours of operation recorded in the middle of June compared to typical values of around 8 hours in mid-January. Thus, although the power levels are quite low at the extremes of the day, the system is still providing some electricity for almost all daylight hours.

Despite the increased day length in the summer months compared to the winter, the system does not necessarily provide more electricity over the course of the day. This is for two reasons. First, the photovoltaic cells become more efficient as the temperature decreases: the same sunlight level on a cold winter's day will result in more electricity being produced than on a hot summer's day. Second, the tilt of the modules is better suited to the winter sunshine.

The highest sunlight intensities are received when the module surface is perpendicular to the

incoming sunlight. This is achieved more often for the low sun elevations of the winter months. So, even though a horizontal surface will receive higher intensities in the summer, the vertical or near-vertical surface will experience higher values in the winter months.

The highest daily output of the PV array recorded so far was 166kWh in early April, although days of good weather in June have yielded around 150kWh. The peak DC power of 39kW recorded by the inverter occurred in March. This was achieved under sunny conditions around midday, but when the morning period had been overcast and the panels were still cold. For a similar sunlight level on a day when the sun had been shining all morning and the PV panels were warm, a power level of 30-32kW would be more typical. This is an interesting feature for the design of systems for northern latitudes. The combination of clear skies and low temperatures means that, whilst the overall energy output of the system may be lower than that for a more southerly site, the electrical system has to be designed to cope with higher DC power levels for short periods.

The PV cell responds almost instantaneously to a change in sunlight levels and, therefore, under the variable weather conditions in the UK, the power level from the PV system can change rapidly. In order to allow the variations to be studied, a range of system parameters are recorded every minute. The two graphs show examples of the DC outputs from the PV system (Figure 1) and the contribution to the building power requirements (Figure 2) for two different days in March, and illustrate some of the features of the system's operation.

Graph 1 shows the electrical output of the PV array for a day with typical variability in sunlight level. The irradiance curve shows a clear early morning and midday period, but with two extended periods of cloudy conditions in the late morning (10.15-11.45 approx.) and again in the early afternoon (12.30-13.45 approx.). Cloudy conditions were also experienced in late afternoon. Both the electrical current from the array and the DC power level can be seen to follow the irradiance curve closely for most of the daylight period. The effect of shading on the east end of the facade is seen in the early morning when both current and power tend to stay low. The system voltage, on the other hand, remains around 250 V throughout the operating period since the voltage is a weak function of the sunlight level. The operating voltage is chosen so as to obtain maximum power.

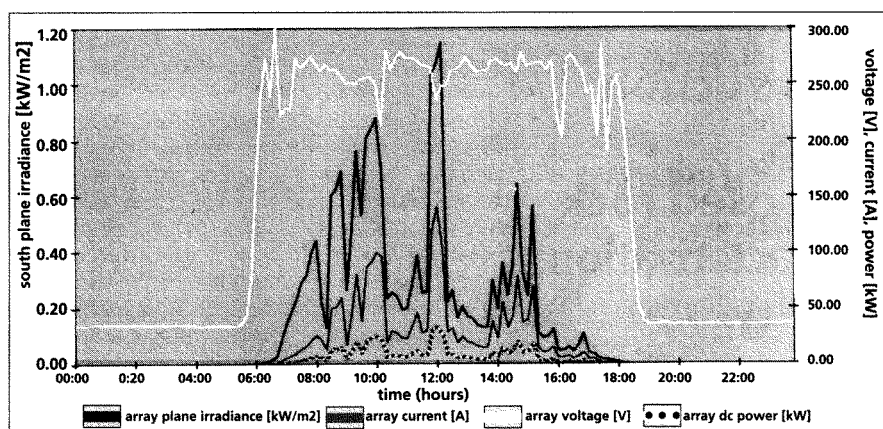
Graph 2 shows an example of the contribution of the PV system to the building requirements. Again, close correlation can be observed between the array plane irradiance and the array DC power. This day was not particularly good in terms of power output as sunlight conditions were poor in the afternoon. However, the inverse relationship between the import of electricity from the grid and the production of electricity by the PV system can be clearly seen in the afternoon period. The load conditions in the

building are quite high since it houses a large number of computer laboratories, but the PV system still manages to make a significant contribution over the morning period. It has been estimated that the system could provide up to one third of the annual electrical energy required by a typical office building of the same size.

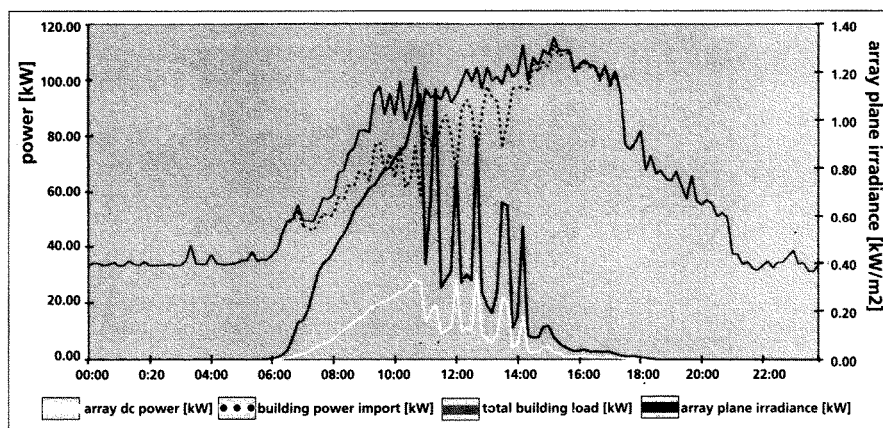
The project has already demonstrated that it is possible to integrate photovoltaic modules into a building facade in a visually pleasing manner and that reasonable amounts of power can be generated, making a meaningful contribution to the power requirements of the building. Although the electricity produced, at around 45p/kWh, is not cost competitive with that from conventional sources at the moment, projections suggest as little as ten years before competitive systems can be installed on commercial buildings in the UK.

Of course, this does not take into account the environmental benefits of this type of electricity generation technology. The only carbon dioxide emissions associated with the system are those relating to the energy used for manufacture and installation, since there are no emissions of any kind during operation. It is estimated that the PV modules could generate the same amount of energy as was used in their manufacture in less than five years. System lifetimes are estimated to be at least twenty-five years. Thus, the building integrated PV system could play a major role in the development of sustainable and environmentally acceptable ways of supplying our energy needs. □

"The project has already demonstrated that it is possible to integrate photovoltaic modules into a building facade making a meaningful contribution to the power requirements of the building."



Graph 1 - Northumberland building (16/03/95): array current, voltage and power



Graph 2 - Northumberland building (22/03/95): PV contribution to building supply

Nirex's nuclear waste dilemma

Following publication of the government's long-awaited white paper on radioactive waste management policy, Nirex will have to find new reasons to justify construction of its proposed rock characterisation facility, suggests Dr Patrick Green.

ON 5 September, the long-awaited, and much restricted, local planning inquiry into Nirex's proposed rock characterisation facility (RCF) commenced. If approved, it is a development that most objectors believe will tie Nirex to the Sellafield site and represent the first stage in the construction of an underground nuclear waste dump. An interesting new dimension to the inquiry has been provided by the unexpected outcome of the government's review of radioactive waste management policy.⁽¹⁾

The inquiry, expected to be over by Christmas, will, following the final decision of the Environment Minister, determine whether Nirex is granted planning permission to begin construction of its so-called RCF. Nirex's investigations at Sellafield have been subjected to unprecedented scientific criticism from a broad spectrum of opinion; environment groups like Friends of the Earth, Cumbria County Council, the Royal Society Study Group and the government's Radioactive Waste Management Advisory Committee.

Despite this, environment secretary John Gummer's decision to hear Nirex's appeal at a local planning inquiry, rather than at a major inquiry, appeared to stack the odds in Nirex's favour. Normally local planning inquiries do not require the developer to prove the need for the proposed development, nor do they discuss the merits of alternative sites. Within this system, there is a clear presumption in favour of the development. Objectors have to present planning grounds for refusal of planning permission — scientific criticism alone would be insufficient.

However, the RCF inquiry is not a normal local planning inquiry. Although the terms of reference are limited, and exclude consideration of the merits of nuclear waste disposal, they do focus attention on Nirex's main weaknesses — its existing investigations at Sellafield and the question of why it wants to build the RCF at all. The terms of reference specifically state that the Secretary of State wishes to be informed on: "The results available so far from studies and surveys of the geology and hydrogeology of the area; the additional information that might become available **only** from the RCF, if developed; and the benefits to be gained from obtaining that additional information, if any, weighed against the possible impact the RCF might have on the site and the surrounding area." [Emphasis added]

Further, the Inquiry Inspector's preliminary views also show he accepts that 'need' and the availability of alternative sites, will be a material consideration: "The nature of the development and the national need may make the relative availability of suitable alternative sites material to the decision."

However, in July, after a 12-month consultation period, the government published its revised radioactive waste management policy. Against these revisions, Nirex may find it difficult to demonstrate that there is a case for RCF construction — need may well prove to be a difficult issue for Nirex to address.

When Cumbria County Council refused planning permission for the RCF it argued:

- The proposed development was more a major national development than local. Consequently, the county council was not satisfied that the sum of national, regional and local benefits clearly outweighed the adverse environmental impact.

- The RCF represents a "significant pre-commitment to eventual repository development in economic terms." Nirex's evidence to the Inquiry shows that the RCF's cost, in 1995 money, has increased from £120 million to £195 million.

- Based on existing geological, hydrogeological and safety assessment information, the potential repository zone holds insufficient promise to justify proceeding with the RCF.

If the county council sustains any of these arguments at the inquiry, Nirex plans to argue that "the need for the development justifies the grant of planning permission." Nirex considers that the need for the RCF overrides all other considerations. The question of how need is defined is therefore a central issue. Nirex's statement of case variously states that:

- "The purpose of the RCF is to provide data on the geological and hydrogeological characteristics of the potential deep repository host rocks and overlying strata, which are required for model validation for long-term safety assessment purposes, for repository design and for selection of repository construction methods."

- "The RCF is part of the extensive science programme that will enable Nirex to decide whether or not to make a planning application to develop a deep repository for disposal of radioactive waste at Sellafield and to produce a full assessment of post-closure safety."

- "The RCF development is an integral part of the Appellant's [Nirex's] science programme."

However, ultimately, Nirex argues: "It is the Appellant's case that it is acting in conformity with government policy."

In other words, if all else fails, compliance with government policy is Nirex's primary justification for the RCF — Nirex intends to

construct a deep underground nuclear waste repository to comply with government policy, and first needs to construct an RCF.

Unfortunately for Nirex, government policy is not what it previously was ("Inconclusive nuclear waste review", SEJ 104). The government remains committed to the eventual disposal of nuclear waste, but the key word here is eventual. While the overall policy objective has not changed, the way in which it is expressed has. The white paper now presents disposal as an ultimate objective that the industry should work towards — this is justified on the basis that the industry, and this generation, should solve the problems it has created. However, the government now accepts that this is a meaningless statement until the nuclear industry can prove that disposal is safe.

The government explicitly states that the nuclear industry should store radioactive wastes in the interim. Of particular significance is the government's abandonment of any fixed deadline for operation of a future repository and its implicit acceptance that Sellafield may not be a suitable site.

Regulatory requirements

The government has instructed Nirex to proceed with its investigation programme to "identify a suitable site ... and once a suitable site has been found, it [the repository] should be constructed as soon as reasonably practicable." However, the precise timetable will "depend on the granting of planning consents and compliance with regulatory requirements, including the establishment of a sound safety case."

Herein lies the problem for Nirex. In the absence of a firm government deadline to justify the haste with which it is conducting site investigations at Sellafield, Nirex will need to do far more than simply state that it is complying with government policy. The government may still be committed to eventual disposal, but the manner in which this policy is implemented is now as important as the overall policy objective.

The white paper further states that the government is now of the view that: "Radioactive waste management policy should be based on the same principles as apply more generally to environment policy, and in particular on that of sustainable development", namely:

- decisions should be based on the best possible scientific information and risk analysis;
- where there is uncertainty and potentially serious risks exist, precautionary action may be necessary;
- ecological impacts must be considered, particularly where resources are non-renewable or effects may be irreversible.

Implementation of the government's policy objective, ie disposal, now depends on "the establishment of a sound safety case" by the

industry through the use of the best possible scientific information. Where uncertainty exists, there is a clear policy requirement for the industry to adopt the precautionary principle. These requirements should be clearly borne in mind when reading the government statement: "The government has made clear that it was for Nirex to obtain the necessary planning permissions for its exploratory work through the normal procedures."

In its evidence to the inquiry, Nirex argues that the proposed RCF development is consistent with the government's revised policy: "The government's 1994-1995 Radioactive Waste Management Policy Review concluded that Nirex should work towards developing the deep repository without any unnecessary delay and that once a suitable site has been found it should be constructed as soon as reasonably practicable. Government stated in July 1995 that Nirex should continue with its programme to identify a suitable site and that the RCF would form part of investigations which Nirex is undertaking at Sellafield ... The RCF proposal sits within a clear national policy context and is consistent with it."

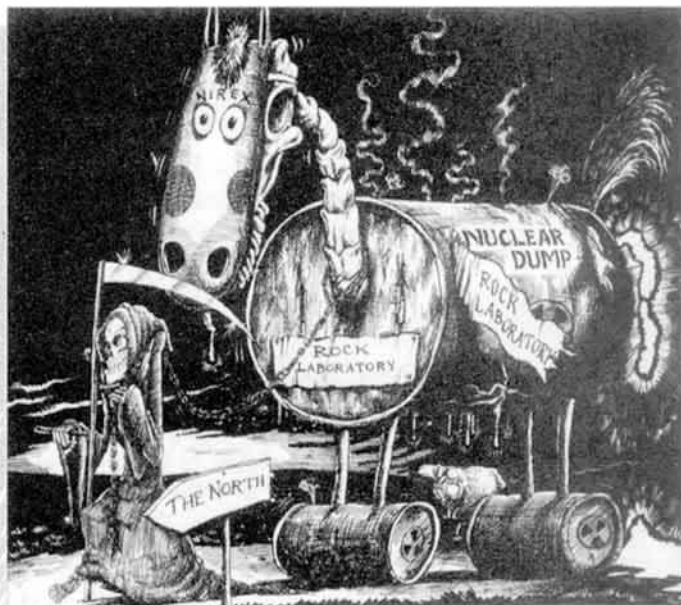
However, the requirement to use the best possible scientific information and follow the precautionary principle has significant implications for the RCF inquiry. The inquiry Inspector has stated "that relevant government statements of policy in a non-planning field should be treated in the same manner as statements of planning policy. That is, given that they are relevant, they must be taken into account; and, if they are not to be followed in the appeal decision, then clear and convincing reasons for the departure from policy must be given."

The implications of this for Nirex are clear: justification for the building of the RCF at this time and at this site cannot be by simple recourse to government policy. Nirex will have to show that its plans are based on the best available scientific opinion.

Given the strength of scientific opinion on Nirex's existing site investigation, this may prove to be more difficult than Nirex envisages. Further still, the onus is now on the Secretary of State to show that his ultimate decision is based upon the best available scientific information. If it is not, there is now a clear framework to challenge the decision. □

Reference

- (1) "Review of radioactive waste management policy: final conclusions", Department of the Environment; Cm2919, HMSO, July 1995.



Martin Rawson

"Nirex will need to do far more than simply state that it is complying with government policy."

□ Dr Patrick Green is senior energy, nuclear and climate campaigner for Friends of the Earth (England, Wales & N Ireland).

Energy saving pays off



While energy efficiency measures offer savings in both energy and money, there are many barriers to their introduction; Robert Barnham outlines a scheme which aims to promote the use of energy efficient domestic appliances.

GIVEN sufficient priority, and associated investment, it is already possible to significantly reduce the amount of energy used to run domestic heating and hot water systems. The technology and techniques required have been known about for many years: a super-insulated house can be run with minimal amounts of energy required to heat it, 100 watts would be sufficient, together with the heat generated by occupants, appliances and lighting. However, up to 40% of household energy use can be attributed to non space or water heating costs: cooking, lighting and other appliances. But the exact savings in this area are only now becoming apparent, through the work of the Billsavers project, run by Lothian and Edinburgh Environmental Partnership (LEEP).

The potential savings were reported in a government report published in 1990.⁽¹⁾ This desk research compared data from a range of sources, and LEEP decided to field-test the theory and see if these potential energy efficiency savings could be used to justify householders investing in energy savings through the low energy lights and energy efficient appliances.

Demonstrated savings might then be used to 'kick-start' the market, and a small business could be developed. This recognised the fact that because of the low level of government funding for energy efficiency, and the scale of the problem to be addressed, it was unlikely that there would ever be a subsidy or grant to let people buy into this technology. If ordinary householders are to reduce their energy consumption, showing them how to pay for capital investment through reduced fuel costs is the only way.

Billsavers was set up — with core funding from Edinburgh District Council — to assess the potential for developing a small business to promote the take-up and use of energy efficient domestic appliances and low-energy lighting. The project is one of a range of energy efficiency initiatives which LEEP has developed including energy advice to households and small businesses through the Home Energy Advice Team (HEAT), in Urban Aid areas in Edinburgh, and Lothian and Edinburgh Energy Advice Centre. Other energy efficiency work had been concentrated in lower-income areas, and the new project was designed to 'piggy-back' onto these.

The original project was designed in two phases, based on before-and-after comparisons. The first, feasibility, phase: a preliminary survey of the potential market, financial mechanisms and technical monitoring to develop a picture of the current usage of appliances and their relative efficiency; including information on the range of appliances present, their condition and method of purchase.

The second phase involving the application of four different levels of intervention and support:

- Comprehensive energy advice and client education.
- Maximising the energy efficiency of existing appliances, through repair services and the use of power control devices, and optimum patterns of use.
- Promoting the use of low-energy light fittings.
- Promoting the use of energy efficient washing machines, refrigerators, freezers, etc.

The two phases of Billsavers were expected to demonstrate the viability of delivering services to households based on the capital costs being more than offset by savings in fuel bills. It was hoped to develop community-based businesses building on the findings of the project, and that any such development might be replicated elsewhere. The feasibility stage of the project started in 1992, with Scottish Power providing sponsorship and technical support with the balance of funding coming from LEEP itself.

From December 1992 to March 1993 an initial survey was carried out to verify the number, condition and age of domestic electrical appliances (fridges, freezers, washing machines, cookers etc.) in 300 low-income households in three peripheral housing schemes in Edinburgh: Wester Hailes, Craigmillar and Pilton/Muirhouse. Of these, 100 were selected for longer-term monitoring, being representative households in terms of household size, appliance ownership and so on. An 'energy audit' was carried out on each of the homes, using the National Home Energy Rating (NHER) 'Homerater' program, which provided both background data on the thermal efficiency of the

property, and indicative annual fuel running costs for heating, hot water, lighting and appliances. This data can be a useful basis for comparison, not least since the program is based on certain typical national averages, and the program also allows each household's fuel consumption and related carbon dioxide (CO₂) emissions to be analysed and remodelled by selecting various intervention options. Particular actions can, therefore, be expressed in terms of the environmental benefit they can generate.

Meters were fitted to individual 'white goods' appliances and to the lighting circuits in each of the 100 households, to allow the recording of the electricity consumption of each. A Billsavers project worker subsequently visited each household fortnightly to record the meter readings and the data were entered into a computer database. Each householder has kept an 'energy diary' recording their pattern of use of appliances for each week since metered data means nothing without reference to actual patterns of use. Particular examples are fill-ratios for fridges, or numbers and types of washes made when using a washing machine.

Counting the cost

The first year of the project allowed LEEP to establish a 'baseline' of electricity consumption across all four seasons for each household. After analysing the first year's data an intervention strategy was designed for each household. Participants in the feasibility project had proved both enthusiastic and very loyal, 96% of households still participating after 12 months. *Counting the cost*, a report on the first year of monitoring was published in April 1995.⁽²⁾

Since the underlying principle of the project is to develop a model which can be applied elsewhere, LEEP secured funding under the EU LIFE programme both for the intervention work for the low-income households and to extend the range of participants to households on middle to high incomes, making the project outcomes more relevant to the wider Scottish population. Other project sponsors have included: GE Lighting and Osram, manufacturers of compact fluorescent lamps (CFLs); Energy Action Scotland; the Energy Action Grants Agency Trust; and the Scottish Office.

Each low-income household was provided with energy-efficient light bulbs where their use of lights warranted this. For those with high-consuming appliances these were replaced with new, more efficient appliances. In certain cases their electricity use appeared to justify the repair of an inefficient appliance. However, subsequent estimates of repair costs indicated that in terms of pay-back, through reduced bills, replacement was a far better option.

All households were given advice on how to save energy, in particular with respect to lighting and appliances. The project is continuing to monitor consumption via the meters and energy diaries, to establish new patterns of electricity use, and exactly how much energy is saved in this second year. Further sub-metering is also being undertaken for sample analysis on other appliances, such as microwaves and kettles, and

portable light fittings not metered through the lighting circuits.

Expansion of the project to include middle to high-income households began in January 1995. The three target areas of Edinburgh were in the New Town, Morningside, and Fairmilehead. Of 300 households recruited for initial interviews, again 100 were selected for longer-term monitoring. These are participating in a two-year monitoring programme, replicating the process carried out with the low-income sample. The final project results will be available in June 1997.

Already from the first few months of the second year monitoring of the low-income sample, significant savings are being achieved from installing CFLs, the most extreme example being overall savings/reductions of 70% of consumption relating to lighting use. The data on the appliance replacement will take longer to emerge but there are already cases where replacement of an appliance is expected to result in first-year running cost savings matching the replacement costs. The most significant savings are through replacing fridges and fridge/freezers; though low rated in terms of actual wattage, they are on continuously and in certain cases older models are using up to ten times the energy of an efficient replacement model.

The project findings will be used to develop the setting up of a service supplying energy-efficient appliances and lighting to clients, who will pay for them from the savings they make on fuel bills. LEEP is currently in discussion with various agencies over setting up self-financing of energy efficiency 'soft' loans. The first of these is a CFL loans and purchasing project being run by Billsavers in partnership with local credit unions, which is already providing CFLs to credit union members at the lowest possible cost, and at very low interest rates. Development of an energy services company may be a longer-term opportunity, incorporating advice, soft financing, retailing and contracting, and wider aspects of domestic contract energy management.

Billsavers is also working with the Consumers Association for independent verification of data, and some of the appliances taken out for replacement are being laboratory tested.

What is already apparent is that, at no net cost to the householder, everyone can reduce their energy consumption through the use of energy efficient appliances and lighting, and thereby significantly contribute to reductions in CO₂ emissions, as well as saving considerable amounts of money in the process. The financial savings could then be reinvested by the householder to fund further energy use savings. It may well prove that direct forms of subsidy promoting energy efficiency are less effective than the empowerment of individual householders. □

References

- (1) *Energy Efficiency in Domestic Electrical Appliances*, Energy Efficiency Office, Department of the Environment. HMSO, 1990.
- (2) *Counting the cost*, Lothian and Edinburgh Environmental Partnership, April 1995.

"At no net cost to the householder, everyone can simply reduce their energy consumption relating to the use of energy efficient appliances and lighting, and thereby significantly contribute to reductions in CO₂ emissions"



Further information about the Billsavers project:

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Testing time for the NPT

Nuclear testing has put considerable strain on the nuclear non-proliferation treaty, only recently given an indefinite extension, reports Pete Roche.

PRESIDENT Chirac's decision to resume French nuclear testing has provoked worldwide outrage, and further dented trust in the Non-Proliferation Treaty, already battered after the New York review conference in April and May.

The Japanese have been particularly incensed by the decision which came in the run up to the 50th anniversaries of the bombings of Hiroshima and Nagasaki. French nuclear testing "will cause the world to lose trust in the nuclear non-proliferation treaty," according to Japan's chief cabinet secretary, Kozo Igarashi. Prime Minister, Tomiichi Murayama, has accused France of "betray[ing] the trust of non-nuclear countries". Although not government policy, Finance Minister, Masayoshi Takemura, has also called for a boycott of French imports in an appeal calculated to arouse wide public support.

Having agreed at the beginning of May at the Non-Proliferation Treaty (NPT) Review and Extension Conference in New York to exercise "the utmost restraint" in the lead up to a comprehensive test ban treaty (CTBT), President Chirac announced on 13 June that France would resume nuclear testing in the South Pacific. Between September 1995 and May 1996, France intends to carry out a series of eight underground nuclear tests. The French argue that they stopped testing "a little too early", and need to calibrate equipment to allow computer simulations to check the reliability of their nuclear weapons before signing the CTBT — now expected to be ready by autumn 1996.

But the tests are also needed to develop new warheads for France's submarine-launched ballistic missile to be used on the Triphante class of submarine. France also plans to introduce a new air-launched cruise missile (Air-Sol Longue Portée) in 2005 which will also require a new warhead.

Chinese test

Strong protests also followed China's 42nd test, which was carried out at the Lop Nor testing site a mere three days after the end of the NPT conference. The Japanese government announced that it would cut grant aid to China. Reportedly, China plans five more tests before the CTBT is concluded, and testing may continue after 1996, since it has only said it will stop testing once the treaty "has entered into force".

A Conference on Disarmament was held in Geneva in June to prepare for the CTBT. France and China came in for some severe criticism, including a blistering attack from Switzerland, which referred to the "moral incompatibility" between the decision to resume testing and the commitments undertaken in New York. Expressions of regret and condemnation following the French announcement have come

from governments all over the globe, though not the United Kingdom's.

The Group of 21 non-aligned countries at the Conference on Disarmament said the French decision "jeopardises the credibility of the NPT regime [and] raises serious questions about the nuclear weapons states' real intentions with regard to continued development of nuclear weapons." The Iranian ambassador to the conference, Sirous Nasseri, probably summed up the feelings of most non-aligned countries when he said that two alternative views had been expressed at the NPT conference: that indefinite extension of the Treaty would promote a climate of confidence which would lead to disarmament; or that indefinite extension would give the nuclear weapon states *carte blanche* to pursue their own agendas and objectives, unhindered by the prospect of future treaty extension conferences. Clearly the Iranians believe the latter viewpoint has been vindicated, but their ambassador stopped just short of saying "we told you so" to the many countries which had favoured indefinite extension but issued protest statements in Geneva against the Chinese and French.

Exemptions sought

Britain and France reportedly sought exemptions in Geneva for tests up to the equivalent of 500 tonnes of TNT, a position supported by the Pentagon, which has also been trying to persuade President Clinton to allow nine more nuclear tests before 1996. The UK has refused to rule out the resumption of testing in Nevada should the US restart testing. There has also been renewed debate about testing in Russia.

There is pressure from the military in the nuclear weapons states to allow an exemption for hydronuclear experiments (HNEs): detonations of nuclear weapons in which the chain reaction is prevented from progressing effectively, and thus the yield is very low. A series of HNEs would be difficult to distinguish seismologically from a series of low yield weapon tests, so they pose a grave problem of credibility for a CTBT. There is even concern about computer simulations being used to develop new weapon designs. Such loopholes would make a test ban treaty largely meaningless in effecting greater steps for nuclear disarmament. A genuinely comprehensive test ban treaty must ban all tests for all time in all environments including cyberspace.

The New York NPT review conference opened with the seemingly constructive promise from Douglas Hurd that the UK would cease production of fissile materials for weapons. Closer examination, however, reveals the shallowness of this announcement. The UK has around three tonnes of weapons-grade plutonium, and has probably not produced any since 1979 — simply recycling material from old

News of the Rainbow Warrior and Greenpeace's French Testing Campaign can be found on the World Wide Web on <http://www.greenpeace.org/>

warheads. And most UK highly enriched uranium has been imported from the United States. Given that the UK has already said it would recycle the plutonium coming out of dismantled WE177 free-fall bombs, this new announcement will place no new constraints on our weapons production whatsoever. Hurd ignored appeals from Germany, Australia, Sweden, Switzerland, Finland and Canada for an end to this recycling.

Nor did Hurd make any mention of the so-called 'civil' plutonium stockpiles at Sellafield. In particular there are 7.6 tonnes of 'civil' grade plutonium, owned by the Ministry of Defence, extracted from spent fuel from the Chapelcross and Calder Hall reactors. The Secretary of State for Defence made clear on 26 April that there are no plans to transfer this to the civilian stockpile. Nor are there any plans to end the right of the UK, under the International Atomic Energy Agency/Euratom/UK tripartite agreement, to remove material from civilian safeguards.

Britain and France were strongly criticised in New York for their high-handed attitude and lack of commitment to agree stronger measures for the implementation of their own obligations. These criticisms were not just coming from non-aligned countries, but also from a number in the West including some EU countries: Ireland, Sweden and Austria.

Mexico raised the 1958 US-UK Mutual Defence Agreement, which allows the transfer of equipment and the exchange of information between the two countries, and US and UK nuclear weapons based in Europe. They were supported by several other non-aligned countries, notably Nigeria which expressed concern "about the extent of the commitment of the nuclear weapon states ... not to transfer nuclear weapons or other explosive devices and related technology to other states [and] selective compliance which has enabled non-parties to acquire nuclear weapon capability".

Indefinite extension

Ultimately the Conference agreed to an indefinite extension of the Treaty with a 'strengthened' review mechanism, involving yearly meetings from 1997. A Principles and Objectives statement included a commitment to a CTBT by 1996 and "utmost restraint" on testing until then, as well as immediate negotiations on a fissile cut off treaty and a "determined pursuit" of nuclear disarmament.

Although indefinite extension was adopted without a vote, the decision in no way represented a consensus. There is considerable resentment at the way the indefinite extension was bulldozed through by the nuclear weapons states and their Western allies ("Proliferation", *Safe Energy* 105).

The Conference was unable to agree a Final Declaration for the 1995 Review of the Treaty. Clearly the strengthened Review process adopted is unlikely to result in increased accountability from the nuclear weapon states.



Pacific islanders demonstrating against nuclear testing

The NPT Conference failed to result in the dismantling of a single nuclear weapon, or stop the production of a single gram of plutonium; it effectively endorsed nuclear power and civil plutonium reprocessing, in spite of the proliferation risks these activities pose. Indefinite extension of the Treaty, with its fundamental contradictions and flaws still intact, will make a sham of international efforts toward nuclear disarmament and non-proliferation unless the nuclear weapon states begin to live up to their promises.

The world is not a safer place because of the indefinite extension of the NPT. On the contrary, as diplomats talked: more than one tonne of plutonium was produced; a new nuclear submarine went on patrol in Britain; the US moved closer to ordering the construction of new tritium facilities to maintain its arsenal at Start II levels until the year 2050; Israel, Pakistan and India, all with nuclear weapons capability, remained outside the Treaty; and a controversial shipment of highly radioactive waste — the first of dozens of plutonium and radwaste shipments over the next decade — completed its journey from France to Japan.

If the nuclear weapons states were serious about following their rhetoric at the NPT with genuine political commitment, there would be: no further nuclear testing; a moratorium on the production and use of all plutonium and other nuclear weapons-usable material pending the negotiation of a fissile material cut-off treaty; a ban on the production of all new nuclear weapons, and commencement of negotiations on a convention to eliminate nuclear weapons forever before the next review conference in the year 2000; and a new energy deal based on renewable sources and energy efficiency to replace the existing nuclear power promotion function of the NPT to meet the genuine energy needs of developing countries while reducing proliferation risks.

Unfortunately, as the French and Chinese tests have shown, the decision to indefinitely extend the NPT conference was not only a missed opportunity, but an impediment to the creation of a genuine and effective nuclear disarmament and non-proliferation regime.

"The world is not a safer place because of the indefinite extension of the NPT."

□ Pete Roche is a campaigner in the political unit of Greenpeace UK.

Electricity supply industry faces major changes

THE UK's electricity supply industry continues to cause controversy, not least as a result of the actions of the regulator, Prof. Stephen Littlechild.

The leaking, in July, of Littlechild's plans for further distribution price controls on regional electricity companies (recs) brought a jump in share prices and claims of insider dealing. Coming so soon after the controversy that surrounded the government's sale of its remaining stake in National Power and PowerGen ("Electricity deals under scrutiny", SEJ 105), the credibility of Littlechild and the regulatory system has been further eroded.

Littlechild announced cuts of between 10 and 13 per cent in electricity distribution charges from next April, and a restriction on prices to 3% below inflation for the following three years. But this was less severe than many had expected, and on the day the leaked news became public electricity company shares soared by £1 billion.

Littlechild believes the cuts, which together with earlier announcements represent reductions of around £4 billion over five years, are "the maximum ... that can reasonably be secured for customers ... consistent with improving quality and reliability of service."

He also says the measures are in line with a Monopolies and Mergers Com-

mission (MMC) ruling on Scottish Hydro-Electric (HE), which followed the utilities rejection of price controls put forward by the regulator. The MMC recommended tighter distribution price controls, but a relaxation on the supply side which will increase HE's revenue by about £5 million a year.

Release of the regulator's price controls also sparked a flurry of takeover bids. Within one working day, US company Southern Group (SG) had launched an ultimately successful dawn raid for shares in South Western Electricity. Other takeover bids have followed: Scottish Power (SP) for Manweb and Hanson Trust for Eastern Group. There was also a temporary revival in the possibility of Trafalgar House bidding for Northern Electric, and an aborted bid for South Western Electricity by the English rec Southern Electric.

Ian Lang, President of the Board of Trade, has decided not to refer to the MMC the takeover bids by SG, SP or Hanson.

■ There is growing concern over the planned liberalisation of the electricity market in 1998, when consumers below 100kW will be able to purchase from suppliers other than their local electricity company. The regulator's track record, and the continued problems with billing in the

100kW market, are adding to fears that 1998 could be chaotic.

The House of Commons Trade and Industry Committee has criticised the electricity industry for failing to prepare for 1998, and says it is "astonished" that "no-one is willing to take overall responsibility" for the massive reorganisation of the industry.

The Committee, however, fully backed Littlechild in his insistence that National Power and PowerGen dispose of 6,000MW of generating capacity. In pursuing this, Littlechild has accepted that more relaxed terms of sale may be necessary because of contractual links with RJB Mining on the supply of coal to power stations until 1998. But Littlechild, and the Committee, believe it is important that this plant is sold off to fulfil a crucial role in price-setting for mid-merit generating plant.

■ The government has called on the recs to relinquish all their holdings in the National Grid Company NGC, which is due for a £4 billion floatation later this year.

■ ICI, after long battles over electricity prices, has finally decided to generate its own electricity. It plans to build a 700MW combined-cycle gas turbine station at its site at Runcorn, Cheshire. □

Coal and gas projects

ONE of the world's largest circulating fluidised bed (CFB) coal-fired power stations could be built in Cheshire. Manweb, Finnish utility IVO and soda ash maker Brunner Mond are considering construction of a 300MW (electricity) output combined heat and power plant, likely to cost over £200 million. As well as improved efficiency, 38-45%, CFB includes the feeding of limestone into the combustion chamber, avoiding the need for a separate desulphurisation unit.

■ Results have been announced for the first year of operation of the world's largest coal-gasification power station at Buggenum, Netherlands. The operator (SEP, the central Dutch generating board) believes the results show a promising future for the technology which "integrates gasification, air separation, gas and steam turbine technologies for the first time to

provide electricity."

The plant uses a new type of catalytic converter to desulphurise the gas and NOx emissions of below 75g/GJ.

■ National Power is planning to convert half of its 2,000MW Didcot A coal-fired power station to dual coal/gas firing. It will be the country's first major power plant capable of burning both fuels. The costs for the supply of gas will be reduced because the company is also building a 1320MW combined cycle gas turbine power station at the site.

A similar scheme by Scottish Power at its 2,400MW plant at Longannet is expected to be completed within a year or so.

■ General Electric has announced a new generation of gas turbines which it claims will break the 60% efficiency barrier when used in combined-cycle power plants. □

Efficiency moves

INCREASED funding and a widened remit for the Save (Specific Action for Vigorous Energy Efficiency) programme have been proposed by the European Commission.

A budget of Ecu150 million has been suggested for a five-year Save II programme from 1996 to 2000. It will continue the main activities of the current programme, including energy labelling, and incorporate monitoring of energy efficiency progress at national and EU levels, new projects geared to improve energy management, and aim to include energy efficiency criteria in other EU-funded programmes.

The absence of an energy-related article in the Maastricht Treaty means it is unlikely that original aims of the programme to establish European performance standards for buildings and electrical equipment will be achieved.

■ The chronically underfunded Energy Saving Trust (EST) has received a modest boost of £25 million to its annual funding from 1996 to 1998. Environment secretary John Gummer secured the funding for the EST following the decision to end the Nuclear Levy — which adds about 10% to electricity bills in England and Wales — two years early in 1996.

Gummer argued that the money was needed to counter a possible increase in fuel use, and therefore in carbon dioxide emissions, from cheaper fuel prices. □

EC R&D funding diverted

MEPs have accused the European Commission science and research directorate, headed by European commissioner Edith Cresson, of diverting renewable energy project funding to other schemes.

A spokesperson for Cresson stated: "We want to encourage research into renewables ... but we cannot accept just any

project. The criteria are very strict to protect the taxpayer."

But MEPs claim criteria for schemes were changed without notice, in defiance of expert advice, and that up to Ecu40m of funds were diverted after pressure from large energy companies. Several companies which had expected to receive funding may now face bankruptcy. □

Global warming worries mount

THE Washington DC-based Worldwatch Institute has reported findings that, after a temporary downturn, global temperatures are once again rising.

The cooling effects of emissions from the 1991 eruption of Mount Pinatubo volcano, Philippines, led to a short-term reversal in the trend of increasing temperatures. But the effects of the largest volcanic eruption in a century are beginning to wear off, and CO₂ emissions, after a period of stability, are again on the increase.

The institute is forecasting a one to two per cent increase per year in global CO₂ emissions up to the end of the century, while the world scientific consensus is that cuts of 60 per cent are

necessary to stabilise the level of atmospheric carbon.

■ Norwegian scientists from the Nansen Environmental and Remote Sensing Centre in Bergen have warned that sea ice around Antarctica is melting, which is thought to be one of the first signs of global warming.

■ Canadian geologists believe that higher than previously thought levels of methane are contained in upper levels of permafrost. This could cause a viscous circle as melting permafrost releases methane adding to global warming.

■ The United Nations (UN) has produced an outrageous report which

undervalues the lives of people in developing countries. UN economists, calculating the economic costs of climate change, have valued lives in Europe and North America at £940,000 each, but put a price of just £62,500 on the lives of people in developing countries.

The evaluation, which comes in a report by a working group of the Intergovernmental Panel on Climate Change, goes completely against the principle of equity which underpins the concept of sustainable development. The effect of this disparity in the valuation on human life will be to distort assessment of the damage that will be done by climate change, and restrict and delay action to limit the extent of global warming. □

UK government criticised on climate change

GOVERNMENT measures to tackle global warming and air pollution have been criticised as inadequate in a report to the 1996 United Nations Commission on Sustainable Development (UNCSD).⁽¹⁾

The April 1996 session of the UNCSD will review progress since Rio on combating atmospheric pollution: transboundary pollution, ozone depletion, low-level smog and global climate change.

The report, the only independent assessment of the UK government's record being submitted, comes from the Scottish Environmental Forum, Scotland's co-ordinating body on issues of sustainable development.

Four of the main pillars of the government's strategy have run into trouble. With VAT on fuel now only being

implemented at 8%, gas and electricity prices are still lower in real terms than they were a decade ago. The 5% per annum increase in road fuel duty until the year 2000 is now thought likely to achieve just half the savings in fuel consumption that the government envisaged. The Energy Saving Trust is chronically underfunded following Ofgas's refusal to sanction a levy on gas bills. And the Combined Heat and Power (CHP) Association has cast doubts on the government's ability to realise its target of 5,000MW of CHP by the end of the century.

Despite this, the government's pledge to stabilise carbon dioxide emissions at 1990 levels by the year 2000 will be easily achieved. Indeed, a real cut of between 7 and 14 million tonnes is now being predicted, the result of industrial stagnation and the 'dash for gas' by the

privatised utilities. However, such changes are transient and even on the government's own figures, emissions will begin to rise again next century unless there is concerted action.

The report provides possible solutions and their positive social benefits, exploring the potential in Scotland for energy conservation and the development of renewables. Progress on the combating of acid deposition, urban air pollution and ozone depletion is also examined. □

Reference

(1) "Report on atmospheric pollution to the 1996 UN Commission on Sustainable Development", Scottish Environmental Forum. Available for £6.00 (including p&p) from SEF, 72 Newhaven Road, Edinburgh EH6 5QG. Tel (0131) 554 9977.

European carbon/energy taxing differences

CONFUSION appears to be the order of the day as European countries consider introducing carbon and/or energy taxes. The latest plans from the European Commission ("Berlin mandate on climate change", SEJ 105) received a mixed reception from national energy ministers. Many countries are now looking at introducing their own schemes, with varying degrees of success.

In Germany proposals by the opposition SPD for an electricity tax in the 1996 tax package were rejected by the ruling CDU/CSU and FDP coalition. But Wolfgang Schaeuble, head of the CDU/CSU in the Bundestag has set up a committee to draft a 'Tax Concept 2000' to emphasise ecological concerns; some form of energy or carbon tax may be included

in the package. Economics Minister Guenter Rexrodt is known to favour the introduction of a fiscally neutral CO₂/energy tax from 1997 if no European Union-wide agreement is reached.

The Dutch government is to introduce a new energy levy on gas and electricity from January 1996, in an effort to cut CO₂ emissions by three to five per cent from 1989/90 levels by 2000. The tax will be fiscally neutral, with revenue raised being returned to the target groups — households, utilities, and small and medium-sized businesses — as tax cuts in other areas. Renewable energy will be excluded from the levy, and the government believes it is on target to be generating three per cent of its electricity from renewables by the end of the century.

Denmark plans to tighten its CO₂ tax with the level of taxation increasing annually up to 1998. Money raised will provide energy saving subsidies and lower company social security contributions. The Austrian government seems close to agreeing the introduction of an energy tax in 1996, despite criticism that its purpose is not reducing CO₂ emissions but general tax raising. The Swiss and Norwegian governments recently weakened their plans on CO₂ taxes.

■ Nuclear power is three to four times more expensive for reducing carbon dioxide emissions compared with a mix of renewables, energy efficiency and combined heat and power, according to a study by the Öko-Institute, Germany. □

Scottish wind developments

SCOTLAND'S first wind farm, at Hagshaw Hill, Lanarkshire, is nearing completion, with the 26 turbines being erected throughout September. The 15.6MW wind farm — technically two separate but adjacent projects under the Scottish Renewables Obligation — is expected to be generating electricity by October, in advance of its 15-year supply contract which begins in November.

Project developer, Trigen, is confident that another wind farm, at Largie Estate, Argyll, will shortly receive planning permission. The proposal is with the Secretary of State for Scotland, having received approval from Argyll and Bute District Council in July — against the advice of its planning department. Scottish Natural Heritage opposed the development because of concern for Greenland white-fronted geese, though Trigen presented research suggesting only one goose would be killed every four years.

In a surprise move, a wind farm planning application was, after much delay, 'called in' this April by the then Secretary of State for Scotland, Ian Lang. The proposed wind farm, on Hare Hill near New Cumnock, south-west Scotland, (backed by Scottish Power) is in an Environmentally Sensitive Area, but this is a largely agricultural designation, administered by the Scottish Office Agriculture and Fisheries Department, allowing financial support for traditional and low-intensity land management rather than for the protection of areas of outstanding nature or landscape value.

With only one local objection, and initial concern from Scottish Natural Heritage largely allayed, the two local councils concerned (Cumnock and Doon Valley, and Nithsdale) both approved the application and were surprised by the calling in.

The two concerns cited by the Scottish Office are visual and landscape impact, but its precise concerns are not yet clear. There will now be a local public inquiry held and a ruling by the Secretary of State. Wind developers are puzzled by the move which may mark a swing against wind power in the Scottish Office.

■ Planning guidelines for wind farms issued by the Irish Department of the Environment are strongly supportive of wind energy.

■ Full production of American-design Kenetech wind turbines began in July in Ukraine at a former intercontinental ballistic missile plant. It is planned to produce 5,000 of the 100kW machines for use in Ukraine before exporting to other parts of Eastern Europe and the former Soviet Union. □

Green electricity pool under consideration

ANNOUNCEMENTS on the 1996 rounds of the Non-Fossil Fuel Obligation (Nffo) and the Scottish Renewables Obligation (SRO) are expected soon, but many renewable energy developers are already looking beyond these government schemes.

The final contracts under Nffo and the SRO are due to be made in 1998, the year that liberalisation of the electricity market is extended to all customers, who will be able to buy their electricity from companies other than their local utility.

With Nffo and the SRO both involving expensive and lengthy tendering processes, and massively oversubscribed, the option of ignoring the schemes and becoming 'second tier' suppliers is being seriously considered by some developers ("Scotland's renewables", SEJ 104).

Prices for many wind and hydro projects are at about 4-5p/kWh, and with transmission/distribution costs of about

1p/kWh, they could be supplying electricity to customers for about 5-6p/unit. And customers near renewables projects could benefit from lower transmission/distribution costs.

There is also the possibility of a group of renewables developers forming a green pool, which could overcome any problems of intermittent supply, and provide improved marketing.

A similar scheme started up in June this year in the city of Tilburg, Netherlands, with regional energy company PNEM hoping to supply 'green' electricity to 100,000 households by 2000. The green electricity is about 50% more expensive, though the gap will decrease slightly next year when a new carbon dioxide levy is introduced for domestic customers. Research by PNEM suggests that 10% of customers are willing to buy green electricity.

A Scottish-based energy con-

sultancy, Ian Pope Associates Ltd, is hoping to secure European Commission funding to investigate the potential for a green pool in the UK.

Friends of the Earth Scotland has written to the electricity regulator, Offer, suggesting that by 1998 electricity supply companies be obliged to state on their bills and in their advertising material the sources of electricity they supply. It is hoped that this would encourage the companies to invest in and buy renewable energy and also help in the formation of one or more green pools.

■ Developers are hoping for two major changes to the next SRO: an increase in the contracted capacity for wind power from the present 43% of installed capacity, which is considered too low for windier sites in Scotland; and expansion of the scheme to include wave power. □

Asian hydro schemes ignore environment

HYDRO-ELECTRIC developments around the world continue to cause controversy, particularly in Asia.

In India, a government-appointed panel of experts has found that around 90 per cent of dams built over the past 15 years breached government environmental protection rules.

Plans to turn the Himalayas into a hydro-electric powerhouse for southern Asia suffered a set-back in August when the World Bank refused funding to the Nepalese government for the Arun III dam, the first of three dams in a planned 1,500MW scheme. An independent

study found that the Nepalese government had broken the bank's rules on environmental assessment.

Other proposed dams causing environmental concern include several in the Mekong River scheme, south-east Asia ("Hydro dams controversy", SEJ 104). □

Wave power ups and downs

SADLY, euphoria over the launching of the world's first commercial-scale offshore wave machine in August did not last long, with the machine surviving in the water only a few weeks. But the developers, Applied Research and Technology (ART), are confident of the concept and are looking to build a replacement.

On 2 August, amidst worldwide interest, the 850 tonne device was officially named *Osprey 1* with the breaking (at the second attempt) of a bottle of 12-year-old malt whisky. The omens were not good. The actual launch was delayed because of an electrical fault on a tug. It wasn't until three days later that the *Osprey* (Ocean Swell Powered Renewable Energy) started its four-day journey north from the UIE yards on the Clyde (where the QE2 was built) to its installation site 300 metres offshore in the Pentland Firth at Dounreay, where it was sunk to the sea bed prior to being filled with ballast.

A bizarre twist came from Her Majesty's Industrial Pollution Inspectorate, which declared Dounreay an inappropriate site for the wave machine because of possible radioactive contamination ("Dereliction of duty at Dounreay", p7).

Within a week of *Osprey's* arrival, it became known that two of nine ballast tanks on the *Osprey* were damaged and that it would have to be refloated and towed away for repairs. However, further damage to the structure, including holes above the waterline and cracked welds resulting from the original damage and the effects of the waves, caused difficulties with refloating and stability of the *Osprey*. It was still off Dounreay on the weekend of 26/27 August when the remnants of Hurricane Felix reached the Pentland Firth, further damaging the machine.

It is believed that *Osprey 1* will be declared a write-off by the insurers, Lloyds London marine market, and ART's managing director Allan Thomson is keen to see an *Osprey 2* being built as soon as

possible. Thomson's bullish approach, which got the project off the drawing-board in the first place, is based on his belief that the design is right. The company refuses, however, to state the cause of the problem, presumably until insurance liability is sorted out. It is known that some damage occurred during the launch of the machine, but no one is saying if it was this which led to the later damage.

Backers of the project, including public sector enterprise companies, which have invested £500,000, and private sector companies including British Steel, GEC-Alsthom and Scottish Hydro-Electric, remain committed to the £4 million project, which also received about £500,000 from the European Union's Joule programme.

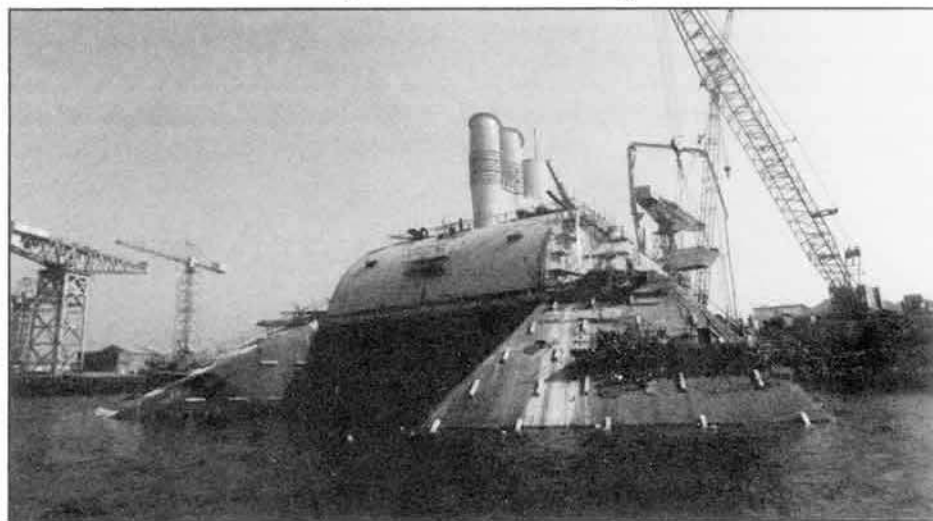
The generating units of the oscillating water column machine had been removed from *Osprey 1* before it was wrecked, and ART believes that a second device could be built in less than the six months taken to construct *Osprey 1*.

Even before the demise of *Osprey 1*, several engineers had expressed concern over the device and its siting in the

Pentland Firth, a particularly hostile environment. However, one early sceptic, Prof. Stephen Salter, designer of the nodding duck wave machine, was won over to the design, expressing satisfaction with modifications to improve the base of the machine and make it more secure.

If *Osprey 2* is successful, the 2MW device will sit on the sea bed in 16.5 metres of water, with six metres of the superstructure above the surface. The amplified rise and fall of the waves will push out and suck in air through two funnels containing Wells turbines and electrical generators. A 1.5MW wind turbine will also be mounted on the *Osprey*. ART says that in its short life promising data was obtained from *Osprey 1*, suggesting that *Ospreys* could provide even more power than had been anticipated from wave tank models.

■ Prof. Salter, who has been pursuing his wave power project in a piecemeal fashion since government funding was withdrawn in 1982, is to receive Ecu760,000 from the European Commission to work on a variable pitch turbine to improve efficiency of oscillating water column machines. □



Osprey 1 at the UIE yard before its launch

Borowski

Solar firsts

IN the Netherlands, a unique project incorporating solar panels into a sound-proofing barrier on a 550 metre stretch of motorway has started operating. The panels, with a life cycle of at least 15 years, are expected to produce 44,000 kWh of electricity a year.

■ Mobile solar generators powered a simultaneous launch at Cyberia cafes in London and Edinburgh of Greenpeace solar information pages on the World Wide Web. The pages include news of innovations in solar power technology and details of current industrial and political barriers to solar power. Internet access is via the Greenpeace home page at <http://www.greenpeace.org/>. □

Biodiesel growing

PRODUCTION of biodiesel will more than double over the next two to three years, according to an Austrian industrial consultant, Werner Korbitz. He forecasts biodiesel will achieve a five percent share of the global diesel fuel market by the year 2005, with production increasing from 550,000 to 1.3 million tonnes.

Biodiesel is carbon dioxide neutral (emission during combustion is equal to uptake while growing), although nitrogen fertiliser and energy use in conversion and distribution reduces this benefit.

Korbitz points out that biodiesel is also non-toxic and highly biodegradable, and produces less sulphur, soot and black smoke than conventional diesel. □

Energy from waste

A system for turning waste into electricity, ThermoCrack, claimed to be twice as efficient as conventional incinerator plants, has been developed by UK company Waste Gas Technology.

The process is suitable for most organic wastes, including sewage, plastics and tyres. After recyclable material is removed, the waste is subjected to high temperatures in an oxygen-free atmosphere, producing a gas with 70-110% of the heating value of natural gas.

■ Energy Supplies, operator of waste-to-energy plants in Newcastle and the Isle of Wight, has gone into receivership after legal problems and lower than anticipated energy content of waste pellets. □

The how-to-do-it guide to environmental auditing

A guide to local environmental auditing;

by Hugh Barton & Noel Bruder

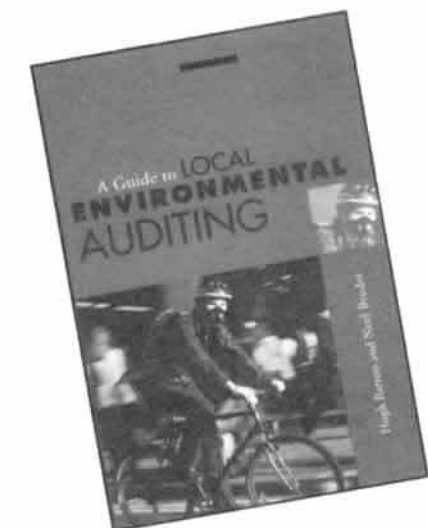
Earthscan, 1995, 370pp, £18.95.

THIS is basically a how-to-do-it guide and reference book for local authorities. It is therefore difficult to provide a review on the basis of just sitting down and reading through it. However, during the weeks that this volume has sat on this reviewer's desk, I have often dipped into it to look up information. On these occasions, the book has provided me with what was required or has pointed me in the right direction.

The guide is divided into three sections: the first makes the connection between auditing and the move towards sustainability and the need to comply with Local Agenda 21; the second looks at carrying out environmental audits in particular sectors (energy, transport etc); and the final section is an overview of current practice.

In section 1 the first two chapters deal with why environmental audits should be carried out, how they should be carried out, what the process involves and who should be involved.

Each chapter in section 2 gives a brief overview of the important issues in the



sector being covered. Relevant legislation, a checklist of required actions and a useful bibliography are given for each area. Occasional case studies and examples of good practice are also provided.

Section 3 is a review of current practice, based on a survey of authorities carried out by the University of the West of England. Chapter 14 discusses how Environmental Assessment (EA) has been carried out in local authorities at present, provides models of the process and draws out some dos and don'ts with relevant examples. It takes the reader through each step of the

process, describing the reasons why they are necessary.

The next chapter covers the management of the EA process. Rather than provide a particular recipe or model, the authors argue that for EA to be most effective it needs to be structured and managed to fit in with existing practice. It also looks at how best to use outside consultants and involve the community and discusses the resources necessary to start the process off. The final chapter looks to the future and how EA might develop. It ends with the conclusion that it is important to emphasise the role of EA as part of the process of sustainable development and the role it plays in changing people's attitudes.

The appendices provide a series of checklists for carrying out an EA identified at the start of the book.

This is an extremely useful and well written book. Almost every council should have one. My only criticism, which I would argue is fairly fundamental, is that it concentrates solely on the English and Welsh authorities. While there are many similarities, Scottish local authorities exist within a different legal structure to their English and Welsh counterparts, so while the general advice may be applicable the details provided are not so useful.

Chris Revie

Dealing with weapons-grade material

WITH the end of the Cold war comes a fresh set of problems, not least of which is the question of what to do with the large quantities of weapons-grade plutonium and highly enriched uranium (HEU) liberated from dismantled nuclear weapons.

Adding this to the already vast stockpiles of plutonium and HEU created during over forty years of so-called civil nuclear power and its attendant reprocessing programmes, Arjun and Anne Makhijani have produced a concise volume focusing on:

- ways of transferring weapons-grade material into non-weapons usable forms;
- long and short-term implications of plutonium disposition;
- disposition of plutonium from civil reprocessing;
- the compatibility of fissile material disposition with achieving an end to reprocessing;
- linking plutonium and HEU disposition to achieve non-proliferation objectives; and
- institutional issues relating to fissile material disposition and storage.

Fissile materials in a glass, darkly:

technical and policy aspects of the disposition plutonium and highly enriched uranium;

by Arjun and Anne Makhijani.

Institute for Energy & Environmental Research, 1995, 126pp, US\$ 10.00.

Sadly no solution leaps out for the problem of how to make this material safe and remove the proliferation dangers for all time. The authors lament: "Like other researchers we have found that there is no good solution to the disposition of weapons-usable fissile materials; we must select from a menu of poor choices. There are no currently feasible solutions that will get rid of these materials for good." The pros and cons of each poor choice is explored in detail.

Interestingly from a UK perspective, the authors note that only the US, amongst key nations in nuclear policy, has opted to forego reprocessing and therefore must take a lead in persuading others of the attendant dangers of continuing to separate out weapons-grade material. Indeed, as can be seen from this journal

("Dounreay pitches for reprocessing work", p6) the US is currently considering promoting Dounreay as a site to reprocess vast quantities of spent US-origin HEU fuel. If it does so, it will leave itself open to accusations of hypocrisy which would undoubtedly undermine any attempt to persuade other nations to forego a similar option.

In conclusion, the authors observe: "A failure now to recognise the threat to ourselves and to future generations and to deal with it urgently would compound tragically the historic mistake. We must attempt to minimise the weaknesses of our solutions."

All too often political debates take place in ignorance of the technical arguments and technical debates take place in isolation of the political context; here however, both are given equal prominence. This book does not represent the end of the debate, but scientists, politicians and environmental campaigners who wish to make a constructive contribution to one of the most vexing problems facing society today, and for a long time into the future, would be well advised to begin by reading this book.

Mike Townsley

Gemma D'Arcy: not just a statistic

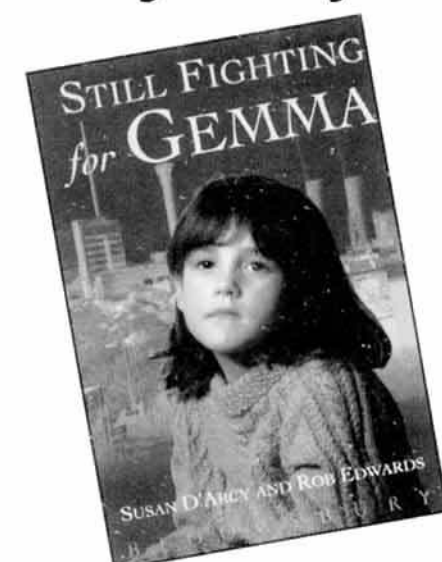
**Still fighting for Gemma;
by Susan D'Arcy & Rob Edwards**

Bloomsbury, 1995, 176pp, £14.99

AN emotional roller-coaster of a book, vividly recounting the anguish and despair, interspersed with joy and hope, of a mother whose young daughter has been diagnosed as having leukaemia. If that was all this book was about, it would still be well worth reading; but it is about so much more.

Susan D'Arcy is convinced that her daughter's leukaemia was due to the Sellafield nuclear complex. They lived near it, played on the local beaches and Susan's husband, Steven, worked at the site. Sure of Sellafield's guilt, she was prepared to go against the prevailing view of the local community, speaking out against the plant and taking legal action against its management. Her courage must have been immense in a region dependent on Sellafield. As she writes: "Most of the families we came into contact with included Sellafield employees. The plant ... dominated the local economy, contributing over a third of the rates bill and employing one in every three workers."

Indeed, initially Susan D'Arcy did not even have the support of her husband, Steven. Only with the Gardner Report, which suggested a link between paternal radiation doses and childhood leukaemia, was he won over. At the time, advice from Sellafield's health and safety director to concerned male workers was: "If someone



is that worried, it may be the proper advice not to have a family."

Many readers will already be familiar with the story of Susan D'Arcy's daughter Gemma: *The Safe Energy Journal* has reported on the court case brought by lawyer Martyn Day, and a 1993 Granada Television drama documentary *Fighting for Gemma* featured the D'Arcy family and the legal case.

Still fighting for Gemma adds much to this story, concentrating far more on Gemma, her illness and what it meant for the family, and less on the legal case. For Susan D'Arcy the likelihood of Sellafield being the cause of her daughter's leukaemia is just common sense: she doesn't need the squabbling between experts over the statistical significance of small numbers. As this book so vividly shows, Gemma D'Arcy was not a number,

she was a young, vibrant human being, diagnosed as having leukaemia when she was just three years old.

Whatever the cause of Gemma's leukaemia, and we shall never know, Sellafield's management emerges as heartless, authoritarian and arrogant. By contrast, the Sellafield workers raised money to send Gemma and her family on a trip to Disneyland.

Having fought for her daughter, Susan D'Arcy continues to fight for justice. An "ordinary" person, her experiences have transformed her views of authority.

The medical profession makes mistakes, sometimes very big mistakes. The legal system does not provide equality of justice. Sellafield is not a benign, benevolent employer. Science does not have all the answers. The media — while they can provide much-needed publicity: for fundraising, in the search for a suitable bone marrow donor, and in campaigning — can be insensitive and intrusive.

Susan D'Arcy is not prepared to have her views dismissed by "pro-nuclear scientists" as "emotional", she is not ashamed that her campaign is driven by emotion. "Only a fool — and an arrogant fool at that — could carry on pretending there is nothing to worry about."

Still fighting for Gemma is highly readable, undoubtedly benefiting from the input of co-author Rob Edwards — an environmental journalist and co-founder of this journal. But it is Susan D'Arcy's story, one which is open, honest and deeply moving.

Read this book!

Graham Stein

Trading in energy after the Cold war

ONCE again the Energy and Environment Programme at the Royal Institute of International Affairs has produced a very useful publication.

The European Energy Charter was born out of the ending of the Cold war. To take a cynical view — not one taken in this book — it was designed to allow the West to get its hands on former Soviet Union countries' oil and gas as cheaply as possible; or, as the Treaty puts it, establish "a legal framework in order to promote long-term co-operation in the energy field".

The book takes the reader through the lengthy negotiating process which began in 1990 and saw the signing of the Treaty in Lisbon on 17 December 1994.

**The Energy Charter Treaty:
origins, aims and prospects;
by Julia Doré & Robert De Bauw**

Royal Institute of International
Affairs, 1995, 89pp, £12.50

Despite its name, the European Energy Charter was not restricted to European countries, with many others, including the USA and Japan involved, though Middle-East countries were restricted to observer status. Along the way, the sharply contrasting wishes of the many different countries made agreement difficult.

New Zealand decided the process

was more trouble than it was worth and dropped out, and the US was finally unable to sign the Treaty because of constitutional problems with its federal structure not allowing it to bind individual states. Other federal countries, such as Russia and Germany, have been able to accommodate these problems.

It remains to be seen if the Treaty will achieve its objectives and encourage trade and investment in energy between East and West.

This book provides a helpful guide to the negotiation and outcome of the Energy Charter Treaty.

Graham Stein



Virtual reality

An irritating new TV advert from BNFL — ripped off from BP — includes scenes of a shepherd and his flock in a scenic, unspoilt Cumbrian valley. What the advert doesn't say is that back in the 1970s BNFL supported plans to dam and flood a sizeable acreage of the valley, to provide a reservoir supplying seven million gallons of water daily. It took a strong campaign from environmentalists at a public inquiry to save the valley from the ambitions of thirsty BNFL.

Hann out



The planned merger of Nuclear Electric and Scottish Nuclear in preparation for privatisation caused a storm of protest north of the border.

Opposition was defused by a number of moves. First, Scottish Nuclear and Nuclear Electric will continue as separate operations, but as parts of a single company. Second, the overall chairman of the two parts, would have "strong links with Scotland" and the chosen man, John Robb, was indeed born and schooled in Edinburgh, before heading south. Third, the UK HQ would be in Scotland, and an office will be opened in Edinburgh, though estimates of the number of staff who will work there go as low as fifty. Fourth, SN was given a guarantee of autonomy, safeguarded by the Secretary of State for Scotland, Ian Lang.

However, a cabinet reshuffle followed and Lang was moved to President of the Board of Trade. Within days Robb, technically employed as an adviser to the Department of Trade and Industry and therefore accountable to Lang, had "asked" Scottish Nuclear's chairman, James Hann, to step down. Hann's crime was to have fought too hard for an autonomous Scottish Nuclear!

Generation gap



The long-running criticism by anti-nuclear campaigns about Scottish Nuclear's 240,000 year legacy of deadly nuclear waste has obviously been hitting home with Scottish Nuclear. The company's PR advisers have come up with a new slogan, appearing on everything from their franked mail to the front of their mobile exhibition trailer: "Generating a better environment for the next generation."

Lies, damn lies and Scottish Nuclear



On a tour round Scottish Nuclear's highly expensive but unimpressive mobile exhibition trailer, Little Black Rabbit noted a claim that it would take 25,000 wind turbines with 25 meter diameter blades to match the output of Torness and Hunterston B nuclear power stations.

With the aid of a solar powered calculator, LBR quickly determined that the nuclear industry was up to its old trick — making false statements about renewables. The actual number of turbines required of the size quoted is just two fifths of SN's figure; and for the size of turbine now typically being installed in the UK, only 5,000 turbines would be required. In reality, with energy efficiency measures, and a range of other renewables, far fewer turbines would be required to replace Scotland's nuclear capacity. And for comparison, Scotland has over 18,000 electricity pylons.

Ten out of ten for brass neck; nothing out of ten for truthfulness.

Dounreay news



Concern grows in the community around the Dounreay nuclear complex as every month more news leaks out of accidents, contamination and cover-ups. Apparently in an effort to allay local fears, a special edition of *Dounreay News*, normally just a staff news-sheet, was distributed with the *Caithness Courier* newspaper.

The news-sheet, written by site director John Baxter, assured the public that 67 patches of contamination and 20 or so highly radioactive particles found in non-active areas of the Dounreay site were unlikely to mean that any contamination had been carried off site.

However, as the *Caithness Courier's* sister paper, the *John O'Groat Journal*, reported later in the week that the news-sheet had been economical with the truth. One of Baxter's reasons for confidence on containment of radioactive particles within the site was: "Buses and certain other vehicles have always been routinely monitored on leaving Dounreay." But Baxter believes the contamination dates back to the 1960s and 1970s, and it now emerges that bus monitoring was not introduced until 1975.

The times they are a changin'



Now that Dounreay's third and final nuclear reactor, the Fast Breeder Reactor, has been switched off, Dounreay has become an importer of electricity. With electricity bills to pay, the management has suddenly discovered energy efficiency.

An initial survey by consultants of the twenty worst buildings on the site has identified possible energy savings of around 25% through simple conservation measures. Given the many other revelations about operations at Dounreay, this is a fairly minor example of past mismanagement, but the change of outlook is highly symbolic.

With, hopefully, an Osprey wave and windpower device offshore at Dounreay early next year supplying electricity to the site, and energy efficiency measures being undertaken, the former vanguard of the nuclear industry is demonstrating what this journal has spent almost two decades arguing for: the replacement of nuclear power with renewable energy and energy efficiency.

Well done Dounreay!

Jackass or jackal?



Dr Jack Cunningham, Labour MP for greater Sellafield and ardent supporter of nuclear power, is the current Opposition spokesperson on Trade and Industry.

"New" Labour is against nuclear power privatisation, and Cunningham has the job of masterminding Labour's opposition. Bad Jack's main criticism of the sell-off so far has been to accuse the government of undervaluing the industry.

So what will be the effect of this tactic by Cunningham? Undervalued shares mean big profits for investors; thus ensuring a successful privatisation of the industry!

If Cunningham actually wanted to try to stop the sell-off he would be better highlighting the liabilities and uncertainties of the industry. But that might be asking too much of the ex-chairman of the short-lived Friends of Sellafield.

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