SAFE ENERGY

No. 101 SUMMER 1994 £2.50

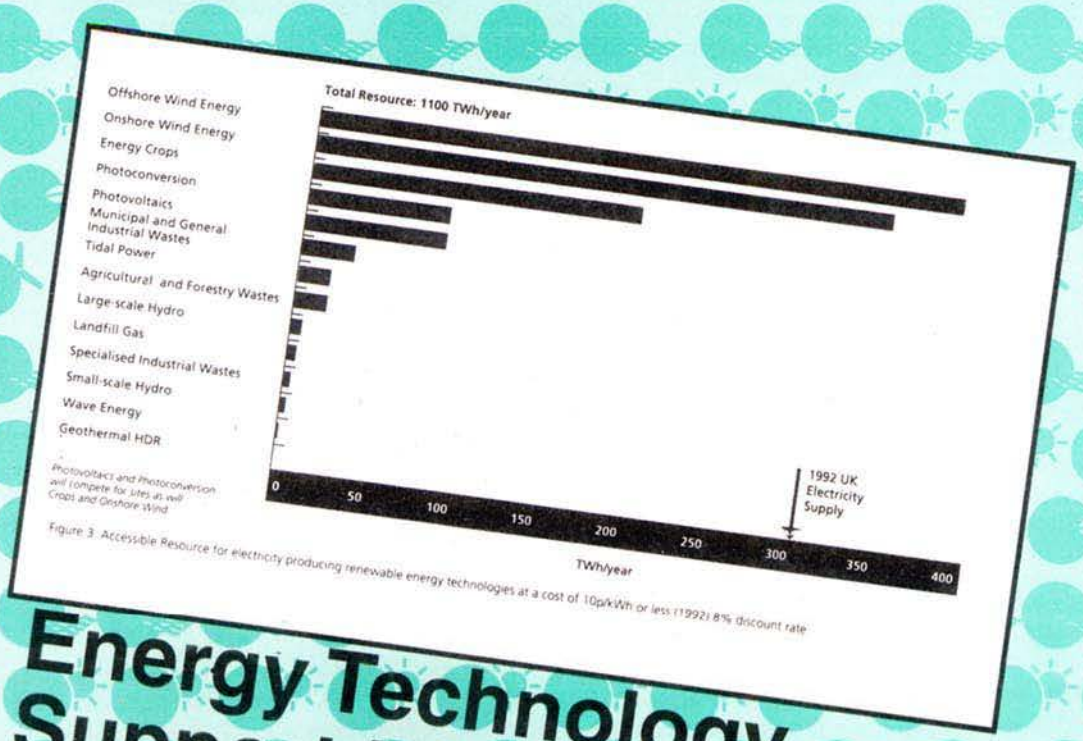

Figure 3. Accessible Resource for electricity producing renewable energy technologies at a cost of 10p/kWh or less (1992) 8% discount rate

Energy Technology Support Unit, Harwell, 1994

power partnership

Recently there has been a strong environmental lobby in favour of renewable sources of power. But, although they are generaly less harmful to the environment, renewables simply cannot produce enough energy to meet the demand in industrialised nations, nor the needs of developing countriesas their demand grows.

Renewables are expected to provide about 10% of the UK's electricity in the near future. We don't have enough sunshine to make good use of solar power, nor do we have vast areas of land with the right wind speeds to develop huge wind farms. Hydroelectricity has been operating for many years, yet it produces only 2% of our electricity.

A balanced energy programme is required where renewables are used alongside other energy sources.

AEA Technology, Harwell, 1994

COMMENT

NUCLEAR POWER is on the ropes, and it's only round one. The bell has rung for the long-awaited government review of nuclear power and already the press is writing it off.

Yesterday's technology? Too expensive? What are we going to do with the waste? How are we going to dispose of decommissioned power stations? These are all questions which have been asked in the columns of august newspapers — the *Financial Times, The Times, The Independent* and of course *The Guardian* — questions which have failed to find answers worth taking seriously.

The nuclear industry's three main protagonists — Nuclear Electric, Scottish Power and the Nuclear Utilities Chairmen's Group — have all submitted their evidence to the Department of Industry well in advance of the 30 September cut-off date. Gone are the bold claims of being the cheapest source of electricity, now they say that one day in the not too distant future all other energy sources will become very expensive and make nuclear power look cheap. An old threat.

They say that there is no nuclear waste crisis, who would believe that, certainly not UK Nirex. The costs have all been quantified and can be met by modern power stations, but not by the old ones. So they now want us to sell the PWR and the AGRs to the highest bidder while the taxpayers, who have already paid for decommissioning nuclear power stations, will be left holding the bill for the bulk of the liabilities.

Nothing has really changed for nuclear power despite bold statements of new prosperity made in the companies' annual reports, any gains in productivity or operating profit will be temporary and pale into insignificance when staked against the industry's liabilities. The 'City' will not be slow to notice this.

It won't be the 'City' which saves nuclear power from extinction, that particular privilege belongs to government if it dares!

If there is any resurgence in the industry's fortunes it will be because the government has bought its dubious environmental claims and rudimentary rejection of renewable energy and energy efficiency backed by clean-coal technology.

Although the current debate may be economics-led we must remember it is environment-driven, and only by driving home nuclear power's alarming environmental implications can we warn the public, the 'City' and ultimately the government that nuclear power is simply too hot to handle.

NAILING THE MYTH that there is only a small renewable energy resource, the Energy Technology Support Unit's (ETSU) latest report ("Renewable energy potential", page 18) shows that renewables could meet the UK's electricity needs. It is a useful contribution to the debate on future energy supply, but once again ETSU has downplayed wave power.

Ever since 1982, when the government's wave energy programme was cut in suspicious circumstances, ETSU has taken an unduly negative view of wave power.

Tom Thorpe, while undertaking ETSU's 1992 review, tried hard to mend fences with wave research teams, but still the cost estimates for wave power were overly pessimistic. That report has led to a further downgrading of wave power and its virtual exclusion from government RD&D funding — a move which put at risk European Union (EU) funding for two UK wave power projects.

The 1994 assessment gives a tiny 'accessible resource' for offshore wave power, using a 10p per unit of electricity (8% discount rate) cut-off.

The justification for its findings is the 1992 wave energy review; yet three of the seven offshore devices considered in that report were costed at less than 10p per unit.

ETSU's explanation to *Safe Energy* for this apparent anomaly is coherent, but not convincing.

Two of the devices costed below 10p, the ART Osprey and the PS Frog, were excluded from the '94 study because the analysis in the '92 review had not been sufficiently rigorous; the third device, the SEA Clam, was costed at 8—9p at only one specific site and at exactly 10.3p at other potential sites.

So, we have a total accessible resource which could be met by just five ART Ospreys, priced at 7p in the '92 study and now being developed off Dounreay with EU support.

Wave power has, for over a decade, suffered from an unjustified lack of enthusiasm at ETSU. There is a real risk of the self-fulfilling prophecy: ETSU says there isn't the technology to exploit the resource, the government cuts RD&D funding, the technology isn't developed, QED.

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

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to shut-down a nuclear reactor in an emergency.

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BACK ISSUES

Back copies of the journal are available for most issues. Copies from the previous year cost £1.50 (inc. p&p). Issues more than a year old are £1.00 (inc. p&p).

PRODUCTION

Editors: Mike Townsley, Graham Stein

Cover design: Tony Wylie

Published by: SCRAM, 11 Forth Street, Edinburgh EH1 3LE

☎ 031-557 4283
Fax : 031-557 4284

ISSN 1350-5114

SAFE ENERGY

FEATURES

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Nirex all wet

INCONSISTENCIES between computer models and observed groundwater flow at Sellafield cast considerable doubt over Nirex's choice of the site for a deep dump, according to the government's Radioactive Waste Management Advisory Committee (Rwmac).

The committee's 14th annual report states that "a very significant amount of work will have to be done before the state of knowledge of the Sellafield area could be sufficient to provide a confident basis for the detailed assessment of the safety case for a deep repository."

While Nirex's computer models show groundwater flow through the area moving steadily away from the site into rock deep under the Irish sea, Rwmac chairman Sir John Knill said it was "just as conceivable" that groundwater would flow up from the volcanic rock, in which the waste would be buried, through the sandstone above it and onto the surface.

"A few years ago," said Knill, "we thought Sellafield would be a simple site, in fact it is incredibly complex."

Not only did Nirex's computer models contradict observations on the site but, according to Rwmac, they also contradict basic physical laws. For example, one model shows lower-density fresh water moving downwards into higher-density brine.

Another six or seven years' research, including the possibility of another deep borehole in the Lake District, will be required before a clear picture of the groundwater flow in the area can be obtained, said Knill.

While Nirex's estimated date of 2010 for completion of its repository is the most realistic yet, in Rwmac's view, it does not account for the possibility of regulators demanding further tests. Knill further warned that within "a small number of years, although not immediately ... the storage issue will be critical."

Nirex, however, is not unduly disturbed by Rwmac's criticisms. A spokesperson for the company said that the past year's research had left it "more confident, not less" that Sellafield would eventually prove suitable.

Nirex is expected to submit a planning application for a £200 million Rock Characterisation Facility sometime in the next few weeks.

■ Meanwhile, things across the Atlantic appear to be moving just as slickly for the dumping industry.

A coalition of US state utilities and regulators has filed a suit accusing the federal Department of Energy (DOE) of defaulting on its promise to take spent fuel.

Under the 1982 Nuclear Waste Policy Act the DOE was to begin accepting waste in 1988 but the Department is now arguing that the federal government is not obliged to take the fuel if it has no central store.

The search for a permanent waste dump has dragged on for many years, and the DOE now says that its proposed central dump at Yucca Mountain in Nevada will not be ready until 2010 at the earliest.

Under the 1982 law, and amendments made in 1987, in return for abandoning its right to veto the site Nevada State would have been paid by the federal government to accept the waste, however, the State refuses to give up its right of veto.

Many US utilities built their nuclear stations with limited storage facilities, believing that the government would take possession of their radioactive waste in 1988. However, after paying some $10bn in fees to the government, many will run out of storage in the next few years.

■ Several hundred police, in a dawn raid, removed over 400 protesters from a makeshift village outside the proposed nuclear dump site at Gorleben in Germany, at the beginning of July.

While the action remained peaceful, with the police showing good faith by arriving unarmed, the move has highlighted the growing confusion over Germany's plans to dispose of its nuclear waste.

The Lower Saxony state authority, in which Gorleben lies, controls the state police and ordered them not to charge any of the protesters, but the district authority banned any public assembly, forcing the police to take action.

The federal government in Bonn and the state authorities have been a loggerheads for the past two decades over plans to dispose of high-level waste in a salt mine currently being excavated at the site.

Repeated calls for extended planning inquiries have now run their course and Monika Griefahn, the state environment minister, admits that her efforts have been exhausted. Shipments of vitrified high-level waste, to be stored at Gorleben pending a decision on final disposal at the site, are expected imminently.

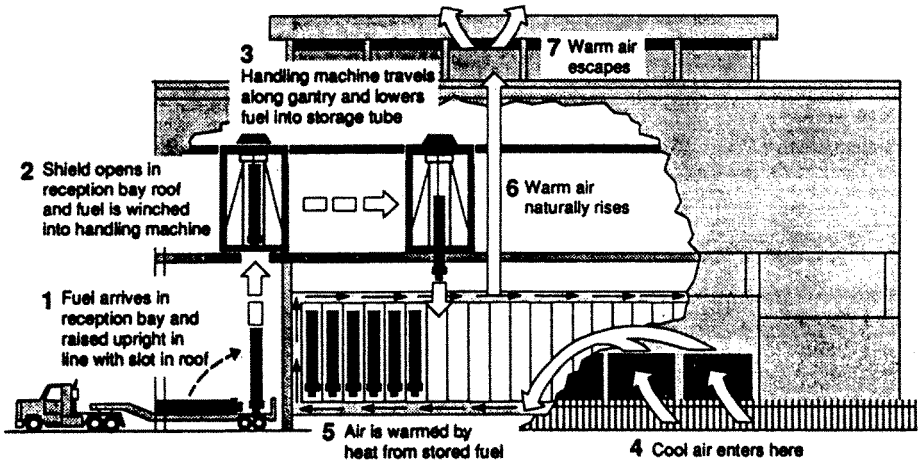
Just how soon they can begin will depend upon the speed at which the access roads to the site can be repaired as a number of tunnels were dug under them by the demonstrators. ❑

Dry-store delay

SCOTTISH Nuclear (SNL) has denounced the decision by Scottish Secretary Ian Lang to postpone a judgement on the company's plans for on-site storage of nuclear waste at its Torness power station until after the Department of the Environment's review of radioactive waste management ("Skewering our energy future", p10) as "totally unnecessary".

SNL is angry that seventeen months after the report from the 2-month inquiry into the proposed dry-store was submitted to Lang it is facing yet another delay. The dry-store concept is central to the company's drive to reduce costs. If built at both Torness and Hunterston, SNL believes they will save the company £45 million annually.

Although R M Hickman, the inquiry reporter, concluded that the "proposal presents a sound engineering solution, where the spent fuel can be held safely, monitored, and retrieved if necessary," he recommended that "the decision be deferred until an appraisal of the implications of a multi-store strategy, compared with the potential benefits to a single-store strategy, has been carried out, preferably as part of the wider review of the nuclear industry that is intended." By this, he means that on-site storage should first be compared to central storage.



A modular vault dry-store

SNL chair James Hann lamented the decision saying: "It really does seem that every time our industry tries to take a step forward it is being halted in its tracks as a result of operating in the public sector." However, such a project regardless of its ownership would be bound by planning law which would require a public inquiry and therefore a decision from government. ❑

Decommissioning sham

NUCLEAR Electric's (NE) public consultation on what to do with the closed Trawsfynydd Magnox reactor in the Snowdonia National Park has been dismissed as a sham by the Welsh Anti Nuclear Alliance (WANA).

NE states: "Whilst wholeheartedly committed to a meaningful consultation process, NE has a duty to ensure whatever option is adopted for decommissioning Trawsfynydd meets with the approval of the government as well as with the nuclear industry's regulators," Its consultation literature offers three options two of which it immediately rejects.

The first option would involve spending £500 million over the next 18 years to return the site to so-called greenfield status. NE reject this as being dangerous, "very expensive" and involving "large quantities of radioactive waste" with nowhere to put it.

The second option — NE's preferred approach — would involve entombment of the radioactive parts of the site at a cost of £60 million, waiting for about 135 years, to allow radiation levels to drop, with site clearance taking place by 2146.

The final option would see a mountain of local quarry waste being heaped upon the decaying reactor building at a cost of £95 million and landscaping by 2032. This is unlikely to be acceptable to government authorities, argues NE.

WANA's response* argues that: "The information provided was heavily biased towards variants of NE's preferred choice, (the sarcophagus), yet too limited to provide details of other options. This crude exercise was insulting both to the public and the local authorities. There is very little evidence that NE understands what measures will be acceptable to protect the human environment from radioactive waste."

The Alliance believes that any delay, regardless of the economic and practical justifications, is morally unacceptable: "Our generation created the mess, so our generation should clear it up ... Delay will build up hazards for future generations."

WANA agrees with the government's Radioactive Waste Management Advisory Committee which pointed out that even if there is a general proposal to defer decommissioning then it is still necessary to demonstrate that the technology exists to do the job safely. "There are 26 Magnox reactors in Britain, so a Research and Development programme based upon the prompt dismantling of Trawsfynydd would justify the expenditure," argues WANA.

■ Meanwhile, NE has abandoned plans to build an incinerator at Trawsfynydd for disposing of radiation-contaminated oil at the plant, despite having just gained Department of Trade and Industry approval for the plan.

Any move to burn the radioactive oil would have required new site discharge permits from HM Industrial Pollution Inspectorate which has confirmed that, following the March "Potts" ruling in the Thorp case, NE would need to show that the process offers a net benefit to society.

Instead, NE now plans to have the oil incinerated at Hinckley Point, in Somerset, which already has a certificate of authorisation for burning contaminated oil.

According to NE, there will be about 12 lorry loads in total, andt the plan "will not be used" to send "vast quantities" of radioactive waste to Hinckley.

While the quantities of radioactivity involved are fairly small, it does raise the worrying posibility of the industry using discharge permits at operating sites to 'launder' waste from decommissioning. ❑

*** "Trawsfynydd — decontaminating the future" by Hugh Richards. Welsh Anti Nuclear Alliance, June 1994.**

Chernobyl choices

PLANS for Western aid to Ukraine geared towards closing the remaining reactors at Chernobyl continue to be shrouded in confusion following a G7 meeting at the beginning of July.

In total, Western governments have offered $800 million towards the costs of closing the station the International Atomic Energy Agency has denounced as unsafe. The Ukraine says that Chernobyl cannot close until the country has alternative power supplies.

At the meeting, France and Germany called on Western donors to pay to shut the station and to finish Ukraine's five new VVERs. The VVERs would cost about $2.7 billion to complete and produce about 5,000MW — roughly 3-4 cents/kWh, and the US Department of Energy calculates that it would cost another $786 million to close Chernobyl. The G7 approved aid of only $200 million to be added to the $600 million already promised by the European Union.

Even if the VVERs were to be finished they would still not be up to Western safety standards. Last year the IAEA highlighted 16 areas in which the VVER design failed to meet Western safety standards, including fire risk, embrittlement of pressurised steel vessels, and containment of radioactive emissions. It is also unclear who exactly would carry out the work.

Western companies are not protected under law against law suits for damages in the case of accidents in Ukraine involving stations they have worked on.

Normally, companies that build nuclear plants are protected from liabilities by national law or by an international treaty, the Vienna Convention. Ukraine has no such laws and has not signed the Convention.

In June a US consortium which includes the Brookhaven National Laboratory abandoned a contract to build training equipment for nuclear plant operators in Ukraine becasue the US government refused to assume liability for the work.

Claims by French officials at the G7 meeting that the VVERs could be completed by Ukrainian firms were rejected by the former head of the UK's Central Electricity Generating Board, Walter Marshall, who is working with the Ukrainian nuclear authorites. Marshall said that they could not supply the electronics required for safe plant.

At the G7 meeting the US DOE had attempted to steer Western donors away from funding the completion of any of the unfinished reactors — an approach favoured by the US Sate Department — by arguing that energy efficiency and renewable energy sources offered a much cheaper and safer route.

According to a paper produced by the DOE, by the time the VVERs could be finished basic improvements in industrial efficiency — from turning off unused equipment to installing more efficient lighting and motors — could save 4,250MW at a cost of between 1 and 2 cents/kWh.

Further, the DOE calculates that by speeding up existing plans for wind farms and upgrading hydro stations Ukraine could generate a further 2,000MW at a cost of 2-3 cents/kWh. ❑

Dounreay dumped

ONCE described as a "gold-mine", Dounreay has all but abandoned any hope of securing further contracts from the world's beleaguered research reactors to store and possibly reprocess spent highly enriched uranium fuel.

The UKAEA, which operates the Dounreay site, had hoped to capitalise on a 1989 US decision to suspend its policy of taking back US-origin highly enriched uranium (HEU) research reactor fuel from around the world pending an environmental assessment. That decision left a number of research reactor operators in a difficult position. Many of the reactors were built with American assistance and with minimum spent fuel storage capacity as US policy at that time dictated that the weapons grade material be returned for reprocessing and disposal.

Now, however, the US is planning to resume taking back the HEU as part of its non-proliferation policy. The Clinton administration hopes to continue a drive begun under the Carter administration to force research reactors to use non-weapons grade low-enriched uranium (LEU) fuel with its promise to keep the highly active spent fuel being used as a lever.

The US is strongly opposed to Dounreay entering the market and even offered a Belgian reactor operator some $500,000 to break a contract with Dounreay in 1993.

Last year the US Department of Energy also said that research reactors facing a "bona fide emergency" would be allowed to begin returning their spent fuel immediately using a Presidential waiver on environmental laws. The US is expected to lift its embargo on imports of spent research reactor fuel early next year.

While many operators are reluctant to switch to LEU they may have little choice as the US option is about five times cheaper than using Dounreay. In addition, any contract with Dounreay would involve all waste generated during reprocessing being returned to the customer.

A Dounreay spokesman said that the US's attempt to entice a Belgian operator away from the site "obviously cast a question mark over the future of the plant."

He added: "It is purely a market situation which depends on US policy. If the US policy is confirmed, and they take back something like 15,000 fuel elements from around the world, that would be a cheaper option for those operators than having it reprocessed at Dounreay.

"We came to the end of the outstanding contracts and decided to undertake the regular maintenance programme. The plant will be mothballed."

Even if the US decided against resuming spent HEU fuel imports, there is considerable doubt over whether Dounreay could attract any further contracts.

According to the industry journal *Nuclear Fuel*, a German fuel cycle study has concluded that reprocessing at Dounreay would be twice as expensive as storage and direct disposal of spent HEU fuel.

Dounreay refused to comment on the report, saying: "It is a commercial business. We discuss costs with our customers, not in the press." ❑

Dounreay reprocessing

PLANS to force Dounreay to reprocess 30 tonnes of spent fuel from its now closed prototype fast reactor (PFR) in only three years have been dropped by the government.

It is believed that the tight time-scale originally demanded by government for "economic reasons" has been extended because the site's reprocessing plant could simply not have coped with the throughput.

Since 1974, when the reactor opened, only 17 tonnes of its spent fuel have been reprocessed. According to information supplied to Highland Regional Council by Dounreay, the plant has an annual design throughput of 6 tonnes, assuming a 50% load factor and a 10% burn-up rate in the fuel.

However, the PFR has achieved fuel burn-up in excess of 20%, greatly increasing its radioactivity. Even without considering the burn-up rate it would take five years to reprocess 30 tonnes of spent fuel.

Given the decision to extend the reprocessing timetable, Dounreay may now be forced to revise downwards its application for new site discharge permits, which for some isotopes involved massive increases of more than 1000%. ❑

HEU not for sale

FOLLOWING intense pressure from the US, the UK has announced that it will not resell any of its inventory of 600-800kg of US origin weapons-grade highly-enriched uranium (HEU) to its European Union (EU) partners.

France, the Netherlands and Germany have all approached the UK government in the hope of buying some of the HEU for their research reactors and are now reported to be furious about the government's decision.

According to one US official quoted in the industry journal *Nuclear Fuel*, the US views the EU area as a "black box where Euratom is trafficking in HEU," the UK's decision "has begun to tighten the noose" around research reactors using HEU.

The US is also believed to be trying to block off other possible sources of HEU — France, Russia and China. Russia is already thought to have accepted a US deal which prohibits it from selling any of its 1,000-tonne inventory. ❑

Decommissioning costs

DECOMMISSIONING nuclear sites operated by the UK Atomic Energy Authority could cost £12 billion — treble the previous estimate — according the energy minister Tim Eggar.

Announcing the new estimates in the House of Commons, Eggar said that the UKAEA's decommissioning liabilities, at £8.2bn, were more than double the earlier figure of £3bn to £4bn. However, he added that the new estimates were still open to "considerable uncertainty" and could rise to as much as £12bn.

Eggar said: "The increase reflects the more systematic review, together with the inclusion in the new estimate of the costs of infrastructure, of care and maintenance where final decommissioning is deferred, and of programme management and supporting research."

The Authority is soon to be privatised, but the liabilities will remain on the books of UKAEA Government Division, according to Eggar.

Nuclear Electric has been quick to distance itself from the massive decommissioning price-hikes, arguing that the AEA's plans had no relevance to its own.

According to the industry, the AEA's task is complicated by the fact that it has nuclear operations on more than 100 sites or units and because "each site is unique, requiring delicate handling. The early estimates failed to take this into account, assuming they could all be dismantled in the same way." ❑

N Korea turns critical

CRUCIAL talks between the US and North Korea aimed at resolving the crisis surrounding the North's suspected nuclear weapons ambitions are due to resume shortly, following their collapse, on the first day, because of the death of the Korean dictator Kim Il Sung.

Sung, who had ruled the Democratic Peoples Republic of Korea (DPRK) since 1948, had, after years of tense conflict over the country's nuclear ambitions, finally begun to talk to the US government in an attempt to avoid UN economic sanctions. He had also agreed to holding discussions with the South Korean prime minister for the first time since Korea was partitioned.

It is widely believed that Sung was playing games on a grand scale, using the suspicion of a nuclear weapons programme as a tool with which to prise diplomatic recognition and economic aid from the US.

While continually denying that it has a weapons programme North Korea has persistently refused International Atomic Energy Agency (IAEA) inspectors adequate access to its nuclear facilities to allow an agreed 'safeguards' programme to be carried out. North Korea signed the Non-Proliferation Treaty in 1985 and accepted a safeguards package in 1992.

If the North, under Sung's son, Kim Jong Il, agrees to abandon or proves that it has no weapons ambitions, then the US, South Korea and Japan are all prepared to make efforts to improve the DPRK's international standing and are willing to offer aid.

However, if the North continues to stall on the issue of full IAEA inspections the US has warned that it will push for potentially crippling UN sanctions. Sanctions that the ailing North Korea and its unstable new dictator can ill-afford.

Even if full IAEA inspections are acceded to its difficult to say what it would tell us about the North Korean weapon's programme. According to the IAEA director, Hans Blix, "Humpty Dumpty has fallen down." Blix said that even if tests were carried out on spent fuel rods from the Yongbyong nuclear complex the Agency would not be able to determine how much weapons-grade material had been extracted in the past.

He said the Agency had no way of telling where in the reactor the rods had come from, which is vital to the method of testing developed by the inspectors: "There is no way to put Humpty Dumpty together again. Maybe we can learn something, but never to the extent that might have been possible with the method we had."

The situation has been further confused by claims made by two North Korean defectors who have said the country possess five nuclear bombs.

According to *The Independent* newspaper, one of the defectors, Kang Myong-do, the son-in-law of the North Korean prime minister, told a press conference in the South Korean capital, Seoul: "North Korea is not simply trying to use its nuclear development programme as a negotiating card. It sees nuclear development as the only means to maintain Kim Jong Il's regime."

However, the *Financial Times* reports him as saying: "By possessing nuclear weapons, North Korea thinks it can be relieved from security worries and will be able to divert resources from the arms industry to agriculture and light industry."

Kang told the press conference that he had gained this information from a senior security official at Yongbyon.

His claims have been rejected as unlikely by the US State Department which said they were "not consistent with information within in our own intelligence community." The Central Intelligence Agency (CIA) believes that North Korea has reprocessed enough plutonium for only two weapons.

■ In a move that was clearly aimed at North Korea, the Japanese prime minister for the first time confirmed what international observers have known for a long time — that Japan could build nuclear weapons if it wanted.

In response to a 'fed' parliamentary question, Prime Minister Tsutomu Hata said: "It is certainly true that Japan has the capability to posses nuclear weapons, but has not made them."

Hata's carefully weighed statement has unsurprisingly caused a storm of protest within Japan. As the only nation to have felt the full atrocity of the power of the atom, Japan has staunchly rejected its use for military purposes.

Hata's statement would not have been made lightly and reflects the growing fear that if the Korean crisis is not solved soon it could well lead to an arms race in east Asia. ❑

US lax with exports

OVER the past five years some 1,500 US government permits have been issued to countries formally listed as of "special proliferation concern" according to the top congressional watchdog the General Accounting Office (GAO).

Despite a firm US policy against proliferation the GAO warned of a dangerous laxity in US controls on nuclear-related exports. Countries listed as benefiting from such exports were: Israel, Iraq, Iran, South Africa, India and Pakistan.

The licences approved the export of high-speed computers, specialised machine tools and lasers, metallic compounds and high temperature furnaces, worth over $350 million. The goods were all classed as dual-use equipment, which can be used for non-military purposes.

While each country was asked to state formally that the equipment wouldn't be used for a weapons programme, say the GAO, there was no serious checking of these assurances.

Senator John Glenn, chairman of the government affairs committee, welcomed the report, saying: "We have all heard stories about sneaky procurement operations. But the news today is that many of these goods did not have to be smuggled into secret nuclear weapons facilities. They were available over the counter — quality items, made in the US." ❑

UK-US bomb

REPROCESSED reactor-grade plutonium can and has been used to make a nuclear weapon according to revelations made by the US Department of Energy (DOE) which has published details of a test carried out using UK plutonium at its Nevada Test site in 1962.

The British government has repeatedly tried to mislead Parliament into believing that reactor-grade plutonium is not suitable for making nuclear bombs, even though it has known for over three decades that it is.

On 26 May last year, when asked to confirm that "reprocessed plutonium from commercially operated power stations is not suitable for nuclear weapons manufacture," the Foreign Office minister Baroness Chalker told the House of Lords: "That is so, to the best of my knowledge." (Heads have rolled for less).

By releasing the information, the US is stepping up its campaign to stop the international trade in weapons-grade material through reprocessing.

DOE head Hazel O'Leary said the information was released to "enhance public awareness of nuclear proliferation issues associated with reactor-grade plutonium that can be separated during reprocessing of spent commercial reactor fuel."

The release once and for all destroys the government myth that there are two kinds of plutonium — military and civil. ❑

Government plans for energy efficiency — a key part of its programme to meet carbon dioxide reduction targets — are in disarray. The refusal by the gas and electricity regulators to allow more than token expenditure on energy efficiency has left the Energy Saving Trust seriously underfunded and is preventing other energy efficiency measures, argues Pete Roche of Greenpeace.

Energy inefficiency

CLARE SPOTTISWOODE, the Director General (DG) of Gas Supply, has thrown a pretty large spanner into the Government's programme for reducing carbon dioxide emissions, but the controversy surrounding her reluctance to allow British Gas to fund energy efficiency projects is obscuring the pathetically small spending by electricity utilities who are missing the opportunity to reduce emissions by up to 50 million tonnes of carbon (MtC) per year and save up to £15bn over the next ten years.

Under the International Framework Convention on Climate Change the UK is committed to returning its carbon emissions to 1990 levels by 2000. This, according to government estimates, will require a reduction of 10MtC per year.

Only a few short months ago, the Energy Saving Trust (EST) published its strategic plan, which set out an ambitious energy efficiency programme to save 2.5MtC by the year 2000, at a cost of around £1.5bn. The EST hoped to spend around £125m next year, rising to around £400m per year by 1998. But now these laudable aims have been put in jeopardy by the Gas and Electricity Regulators — the very people charged with protecting consumers — and the EST appears very unlikely to meet its targets.

Wreckers

The government claims it "attach[es] great importance to energy efficiency". Not enough importance, however, to stop ten or so Tory MPs from wrecking Alan Beith MP's Energy Conservation Bill, with over 200 amendments drafted by the Parliamentary Counsel.[1] The Bill would have required local authorities to produce an energy saving plan for all the housing stock, both public and private, in their areas, providing the EST with the data it needs to use its resources most effectively. Such a bill would have imposed "additional and unnecessary burdens on local government and would hinder our efforts to control public expenditure," argued the government. Clearly, if we take the government on its word, it supports energy conservation provided the Treasury doesn't have to pay for it. This is why the EST is such an important part of government strategy. Funding for the EST was supposed to come from gas and electricity consumers via the utilities, rather than the taxpayer. The EST estimates that its strategic plan would cost the average consumer, who spends £700 per year on gas and electricity, an additional 2% — but only until energy efficiency work is carried out in their home. Eventually bills will go down — in stark contrast to the 10% nuclear levy on electricity bills.

Law breaker

The Office of Gas Supply (Ofgas), under the previous DG, Sir James McKinnon, had allowed British Gas to fund the condensing gas boiler scheme, which offered grants to those willing to install these efficient boilers, and a residential combined heat and power (CHP) scheme. With the arrival of Clare Spottiswoode at Ofgas, the government's plans began to go awry. The condensing boiler scheme has now ended, despite a successful pilot stage, and the CHP scheme will finish in May 1995. In March this year, Clare Spottiswoode told the House of Commons Environment Select Committee she thought her predecessor had acted illegally in supporting the two projects managed by the EST, and she would not fund any more unless they fitted into strict "least cost planning" criteria (Investment in energy efficiency as a cheaper alternative to investing in new supply capacity rather than funded by a levy on consumers' bills).

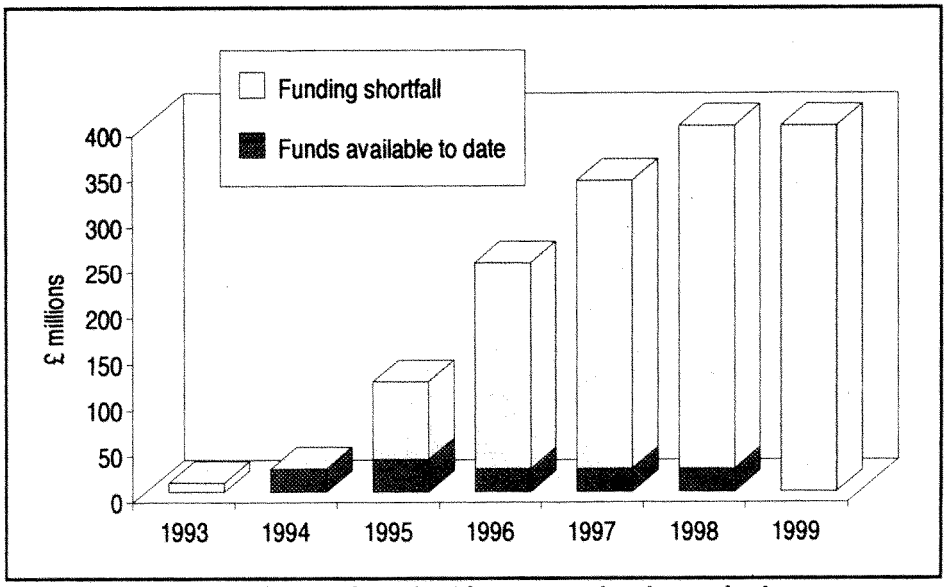
In April, she wrote to the committee saying that "on further consideration I believe the ... expenditure authorised by my predecessor falls within the Director General's powers of discretion and is therefore not unlawful." Although efficiency schemes may reduce consumers' overall bills, the legislation requires Ofgas to keep the price per therm as low as possible. Nevertheless the Regulator has the power to fund energy efficiency schemes as long as they do not have a 'significant' effect on the price of gas per unit. Unfortunately, this slight change of emphasis will make no difference to the EST because Clare Spottiswoode has decided to use her discretionary powers to define 'significant' as 'zero'. In May, at her latest appearance in front of the Environment Committee, she indicated that she was now prepared to allow slightly more flexibility. But it is clear there is no way the EST will get the £150m per year they were hoping for from British Gas.

The government has been hoist by its own petard. It set up independent regulators to regulate the gas and electricity industries, gave them discretionary powers to decide on how best to protect the interests of the consumer and promote the efficient use of energy, then proceeded to appoint free-market enthusiasts to the posts. So it can't really complain when the gas regulator uses those powers to drive a coach and horses through its climate change programme. The government has left itself with no powers to persuade Clare Spottiswoode to change her mind. In the words of John Mitchell, head of the oil and gas division at the Department of Trade and Industry (DTI) (and recipient of a now very famous bunch of roses after Spottiswoode's appointment), the government is now beginning to realise this is not a "robust mechanism" for funding energy efficiency.

Grilling

The government claims it is trying to solve the EST's problems "urgently". When senior civil servants from the DTI and Department of Environment (DoE) were grilled by the Environment Select Committee in April, they said they were looking at a number of other funding sources, including the Treasury or the utilities making payments out of their profits. Introducing a new clause in the Gas Act, which will have to be laid before Parliament in early 1995 to introduce competition into the Gas industry, seems to be its most practical option. But it also hinted at another, more ominous, option for solving the problem.

The DTI is in the process of revising *Energy Paper 59* — the document which projects the UK's carbon emissions up to the end of the century and beyond. The revised version will probably be published at the end of this year in time



Illustrative profile of EST investment levels required

for the first Conference of the Parties (COP1) to the International Climate Convention, due to take place in May 1995. COP1 will no doubt discuss the adequacy of the various commitments to reduce greenhouse gas emissions, and assess progress. Given that the UK's economy has been straining under a recession since 1990, and that much of our coal-fired electricity generating capacity has been replaced by gas, it wouldn't be too surprising to discover that we have already exceeded our rather unambitious carbon emissions reduction target. The EST's target could then be revised dramatically downwards.

Action needed

This gloomy scenario cannot be allowed to come to fruition. Given the increasing signs of Climate Change already becoming evident,[2] and the fact that we will need to reduce carbon emissions by around 60% of 1990 levels globally in order to stabilise atmospheric carbon at the present level, action now is imperative. Real reductions in carbon emissions are almost certain to be required by the Climate Convention after 2000. A target reduction of around 20% by 2005 for the developed world does not seem unreasonable given the scale of the problem. The EST and energy efficiency measures in general can make an important contribution to that cut. (The other important contribution being an end to the road building programme).

Meanwhile, over at Offer (the Office of Electricity Regulation) the situation is not much better. Professor Stephen Littlechild, the DG of Electricity Supply, has agreed to allow the 12 Regional Electricity Companies (RECs) in England and Wales and the two Scottish Companies to fund the EST's work to the tune of £25m per year for the next four years. But, he has made it pretty clear that is all they are going to get. The EST's strategic plan requires an expenditure of £150m per year by the electricity companies by 1998.

Littlechild has the opportunity at the end of July, when he announces a new price control mechanism for the distribution side of the industry, to introduce a further levy for energy saving measures. The distribution side of the business is, after all, where the supply companies make most of their profits. But given statements he has already made to the Environment Select Committee, the prospects are not looking too hopeful.

One of the organisations making representations to Offer is the Foundation for International Environmental Law and Development (FIELD). FIELD calculates that if the UK electricity industry invests in energy efficiency on a scale comparable with the leading US utilities over the next 10 years, not only would we reduce our carbon emissions by 30-50MtC, but we could also save £10-£15bn into the bargain, to say nothing of the jobs created and the assistance given to people on low incomes.

Profit motive

There have been some tentative moves towards investing in energy efficiency measures by a few of the electricity utilities. Manweb has been promoting energy efficient light bulbs on Anglesey to avoid having to upgrade the transmission system and Scottish Hydro has carried out an Integrated Resource Planning (IRP) exercise for the Shetland Islands, which compares the relative benefits of providing new electricity supplies with energy efficiency measures. But the main incentive for all the utilities is still to sell more electricity or gas. If they spend on energy efficiency, they reduce their sales and hence their profit. The two regulators could remove these incentives, and allow the utilities to make a profit from energy efficiency work.

Robert Jones MP, Conservative chair of the Environment Committee says "we have to change these industries into suppliers of energy services, not sellers of a commodity". He lays the blame for the lack of action firmly at the feet of the two regulatory bodies for their reluctance to follow the lead of their US counterparts.

Statutory duty

Clearly the electricity and gas companies will only invest in aggressive energy efficiency programmes if it is in their business interests to do so. But experience from the US suggests there is no real substitute for giving the utilities a statutory duty to carry out energy efficiency projects. The best way to achieve this would appear to be to amend the Gas and Electricity Acts.

There will be an opportunity to resolve this situation with respect to the gas industry with the introduction of a new Gas Act early next year, but there is no such prospect on the horizon for the electricity industry.

The government failed to introduce the necessary incentives and statutory duties to force the utilities to carry out energy efficiency measures when privatisation presented the opportunity. In 1989, it was Tony Blair who complained to Cecil Parkinson that his Electricity Privatisation Bill failed to impose any obligations on the Director General, but merely left it to the DG's discretion. When the government later realised it was going to have to introduce energy efficiency schemes to meet its international obligations to reduce carbon emissions, it kept its fingers crossed that the Regulators would play along. The 'wishful thinking' method has failed. It's now time to act before the climate change programme becomes thoroughly discredited. ❑

Notes

1. A list of the "wreckers" and those MPs who failed to support Alan Beith's Bill also available from Greenpeace. Since the bill will hopefully be reintroduced next year lobbying is required.

2. "The Climate Time Bomb" — summary and full catalogue of signs of climate change since 1990, available from Greenpeace, Canonbury Villas, London N1 2PN, and soon to be available on Internet.

With the government's long-awaited nuclear review now in progress, the industry is arguing for privatisation but with risks and liabilities retained in the public sector. MIKE TOWNSLEY summarises the submissions made by the nuclear industry.

Skewering our energy future

IT has been five years since the then Energy Secretary, John Wakeham, pulled nuclear power from the privatisation of the electricity industry, announcing that the government would conduct a fundamental review of nuclear power. That review is now upon us and the Department of Trade and Industry (DTI) — which assumed the now defunct Department of Energy's responsibilities — has finally announced the terms of reference.

In a parliamentary statement on 19 May Energy Minister Tim Eggar said: "The government believes that the future role of the nuclear power in the UK's electricity industry will depend upon it proving itself competitive while maintaining rigorous standards of safety and environmental protection." He laid out three principal questions which the review must answer:

- What are the future prospects for nuclear power, including the possibility — "without commitment" — of privatisation?
- Do new nuclear power stations offer particular diversity, security of supply and environmental benefits or disadvantages?
- Are current arrangements capable of meeting the full costs of nuclear power, including waste management liabilities?

(Answers on a postcard to President Heseltine, The DTI, 1 Palace Street, London SW1E 5HE)

The review process

After five years of planning, the government is calling for submissions on the future of the nuclear industry — an industry which will leave a deadly legacy endangering thousands of generations to come, an industry which is intrinsically linked to nuclear proliferation, an industry which spawned Windscale, Three Mile Island and Chernobyl ... to be made to the DTI by 30 September. And that's about it! What will happen after that is anybody's guess: the DTI certainly doesn't know.

Any suggestion that the process is vague is rejected by the DTI, which argues that since no submissions have been made then no decision on how to proceed is possible: "We will have to wait and see." However, it is extremely unlikely that there will be any motion until early next year.

While the ultimate responsibility for the industry rests with the self-styled President of the Board of Trade, Michael Heseltine, a parallel review of nuclear waste management policy will be conducted by John Gummer's Department of the Environment (DoE). The results of that review will be fed into the DTI review. The DoE intends to publish the results of its investigations sometime in the summer as the basis for public consultation — not exactly a concrete timetable but a little better than the DTI can manage.

The DoE process is to be further supplemented by a review of "the approach for site selection [for nuclear waste] disposal facilities and the criteria for ensuring the protection of human health," to be conducted by the government's Radioactive Waste Management Advisory Committee (RWMAC).

And finally, "HM Inspectorate of Pollution will also be issuing for consultation a revision of the Department's 1984 publication *Disposal facilities on land for low and intermediate level radioactive wastes: principles for the protection of the human environment.*"

Given the extremely tight timetables involved for submissions to the DTI it seems unlikely that the DoE's conclusions will go forward to the DTI before the public consultation.

Public consultation, according to Eggar, will be a key feature of the review. All substantive submissions will be made public, he said, except where issues of commercial confidentiality are concerned. This could mean that once again the reality of nuclear economics will be kept hidden from the public.

The three main industry bodies, Nuclear Electric (NE), Scottish Nuclear (SNL) and the Nuclear Utilities Chairmen's Group (NUCG), have now all published their submissions, which are available on request.

Areas of general concern are covered by the NUCG's submission: *The role of nuclear power in the UK.*[1] The report sets the tone of the industry's argument: "The external and environmental costs of nuclear power are significantly less than those for fossil fuels, and the cost for proper disposal of all wastes arising are included in the cost of nuclear generation."

The pitch is clearly aimed at both the 'City' and the DTI. "Nuclear generation costs are largely insensitive to increases in the cost of fuel. Further, the nuclear companies believe that over the longer term fossil fuel prices will increase and fossil generation will attract environmental penalties. Nuclear would then become the cheapest major form of generation and this, together with the environmental benefits, justifies maintaining the nuclear component of UK electricity generation by investing in new capacity." This statement, and others in the report, show that the industry is no longer trying to delude us that it produces the cheapest power, but that it has decided to revive an old promise in a new guise: nuclear power, sometime in the future, will offer cheap and limitless power.

Continuing with the environmental theme, it warns: "Nuclear power is the only non-fossil form of generation that will be available for limiting UK CO_2 emissions during the period 2000-2020. Even if energy efficiency measures, renewable energy sources and policies for controlling emissions form road vehicles are used to their fullest practicable extent, new build of nuclear generation will be required to restrain UK CO_2 emissions."

The government's plan to cut UK CO_2 emissions by 2.5 million tonnes, through the Energy Saving Trust, will cost about £1.5 billion, says the NUCG. This equates to an investment of £1,200 per tonne of carbon emission per annum. The twin PWR reactor Sizewell C would cost £3.5 billion and save 5Mt of carbon annually, it claims: "Even if the whole investment were attributed to the reduction in carbon emissions rather than to electricity production ... costs would only be £700 per tonne of carbon emission reduced per annum, when compared to generating the same amount of electricity from coal."

Despite a heavy reliance on so-called 'green arguments' the group can't resist

the temptation to make bold statements about the industry's economics. Sizewell C, according to the nuclear gang of four, could generate power at 2.9p/kWh. This involves some very favourable assumptions: that an 8% rate of return will be acceptable to investors and that the station will have a lifetime load factor of 85% — ie its output will be 85% of its design rating. Private investors require a rate of return typically between 12 and 15% and a lifetime load factor of 85% has never before been achieved by any UK nuclear station.

"The technology for safe management of radioactive wastes, and for decommissioning of nuclear stations and their fuel plants, is available today," claims the NUCG. It also suggests that the reason for isolating nuclear waste from the environment is because "Nuclear power generation produces quite small volumes of waste so the planned routes for its management involve packaging for storage and disposal rather than discharge to the environment." That should be enough to convince the DoE that there is no crisis in nuclear waste management and leave them feeling pretty silly for initiating a full review.

For PWR decommissioning, says the group, "the contribution to generating cost is very small (0.01-0.02p/kWh). This low cost ... arises because the engineering operations are easier and waste volumes lower and, most importantly, the high power density of PWRs reduces the cost per kWh."

Decommissioning cost estimates rely heavily on a concept the industry calls 'safestore'. This involves a three stage decommissioning process: first, spent fuel is removed from the reactor core, taking up to five years, and the station is then placed on a care and maintenance basis for 30 years; second, all non-radioactive plant (the toilets) are removed and a large concrete shield is built over a five-year period to house the remaining plant, the station then being abandoned for 95 years; and finally, over a fifteen year period the site will be returned to green field status.

Safestore gives decommissioning costs of 0.12p/kWh (Magnox), 0.07p/kWh (AGR) and 0.014p/kWh (PWR).

Claims that decommissioning costs carry a high degree of confidence are based on information gained during the decommissioning of the UK Atomic Energy Authority's 33MW AGR at Windscale, US experience of dismantling the 72MW PWR at Shippingport and preliminary work involving the removal of spent fuel from the reactor cores of the closed Berkeley and Hunterston reactors. However, the Windscale reactor is pitifully small compared to a commercial plant and has only just reached stage three of decommissioning; the Shippingport reactor was not so much decommissioned as removed intact and shipped down the river to the massive US Savannah River weapons complex. Further, removing fuel from a reactor core is a routine nuclear operation carried out throughout a reactor's lifetime and is the least novel aspect of decommissioning.

Safestore does not yet have government approval, nor does it have the approval of the nuclear regulatory bodies.

Of the areas which will most concern potential investors, the Chairmen comment that the fear of "retrospective regulatory changes and incidents overseas or accidents to the plant will affect costs, or the continued operation of the plant, will be the most difficult to dispel" despite the fact the industry itself is completely satisfied that "modern plants in the present strict regulatory framework will not be subject to similar uncertainties. It also believes that safe waste disposal options are available at acceptable costs."

Having read the general submission of the Chairmen's Group reviewers are expected to then turn to the independent submissions of the two nuclear power generating companies — Nuclear Electric and Scottish Nuclear. Each company has presented a case for privatisation and for the construction of future plant. They are, however, quite different.

Nuclear Electric

Things have changed since the dark days of 1989, argues NE: "The company can and should be privatised at the earliest opportunity ... the original obstacles to privatisation in 1989 have been largely overcome."[2]

NE claims that it "is set to become the lowest-cost producer of electricity in the UK ..." the company boasts that it has "increased output by 45% and doubled productivity ... [and] is on target to make an operating profit in 1995/96 before taking account of the levy." NE now accounts for 23.2% of the English and Welsh electricity market, a rise from 16.7% in 1989. However, if no new plant is ordered then nuclear power's contribution to the UK's electricity supply will fall from 27% to just 3% in 25 years.

NE operates six Magnox stations, five AGRs and is about to begin operating the UK's first PWR, at Sizewell. The fact that the AGRs are now amongst the world's top ranking nuclear stations along with the "successful completion of Sizewell B within the committed programme and below budget, provide assurance that Nuclear Electric has a sound commercial base on which to operate profitably and competitively in the market."

Such has been the change in the company's operations it now believes that the majority of the liabilities associated with its AGR and PWR operation could be transferred to the private sector. A new private company, it says, could take about £6bn worth of liabilities into the private sector. However, while the continued operation of the Magnox stations, according to NE, is justified on the grounds of their "low avoidable costs", the risks associated with their back-end costs, "resulting from decisions taken decades ago, would not be acceptable to private investors."

One option, says NE, would "involve NE divesting its operations to a new subsidiary, whose shares would be sold to the private investors and which would then take forward the electricity generating business of Nuclear Electric. The unprivatisable risks and liabilities would be retained by government."

"Would a privatised NE choose to build Sizewell C? Probably not," says the company's Dr Bob Hawley. However, "that's the wrong question. The question is, do you want to maintain nuclear power with all its benefits — environmental, security and diversity of supply, independence from volatile fuel supplies and prices?"

If so, how is this to be achieved? NE's preferred route involves a mixture of public and private risk: "Given government support, new plant based on the Sizewell B design could be financed, constructed and operated commercially by means of joint venture capital and risk-sharing between the public and private sectors."

To fund a future PWR government support will be required in three key areas:

- security for lenders during construction;
- income security in the form of a long-term electricity purchase contract to cover project borrowings; and
- sharing of regulatory risks.

In reality the company has admitted that this will mean government providing £1 billion of the estimated £3.5 billion cost of building Sizewell C.

⇨

Any delay in ordering and building a new PWR could seriously jeopardise the country's abilities to build indigenous reactors. Delays, warns NE, "will progressively erode UK industry's capability as the present skill levels start to reduce, increasing costs and risks and preclude possible export opportunities based on the Sizewell B design, despite its high international reputation."

NE concludes: "privatisation ... would be advantageous for government, electricity consumers, private investors and the company itself, securing its commercial freedom to meet customer needs and invest for the future to meet shareholders' expectations. It could be completed within an 18-month time-scale, without a need for new primary legislation."

Scottish Nuclear

Scotland is a very different nuclear prospect from England and Wales. According to SNL: "It was originally envisaged that the nuclear stations would form part of the privatisation of the SSEB and NoSHEB. Detailed plans were well advanced for this process and many of the issues that caused nuclear privatisation in E&W to be deferred had been satisfactorily resolved."[3]

The company operates two AGR stations and is decommissioning a Magnox station at Hunterston. Since 1989, it has turned an annual net loss of £33 million into a net profit of £72 million; output has increased by 16% and the cost of generating each unit of electricity has been reduced by 12% to 2.83p/kWh.

If given the go-ahead to dry-store spent fuel at both its stations — making an annual saving of £45 million — SNL believes that its generation costs will drop to below 2.5p/kWh, making it profitable without subsidies. Currently, Scotland's two privatised electricity companies, Scottish Power and Scottish Hydro, are bound by the government-imposed Nuclear Energy Agreement to take SNL's entire output and to pay a premium price until 1998. After 1998 the premium price obligation will lapse, however, the agreement to buy the entire nuclear output will not end until 2005.

While a public inquiry into the proposal for on-site dry fuel stores was concluded in January last year, the Scottish Secretary has postponed giving a final ruling until after the DoE's waste review. One of the questions the DoE is addressing is whether to pursue on-site or centralised fuel storage. The inquiry reporter concluded: "... the proposal represents a sound engineering solution, where spent fuel can be held safely, monitored, and recovered if necessary."

After much wavering, SNL has finally embraced privatisation: "Scottish Nuclear believes that to secure a long-term future, it has to be put on the same commercial footing as other generators. To continue with the process of commercialisation, the company needs to be restructured — this should then lead to privatisation. This will continue the transfer of risks from the public to the private sector and complete the government strategy for the electricity industry."

SNL wants its AGR business to be transferred to a new company — Scottish Nuclear plc — while a public company — Hold Co — would retain the Magnox and "certain" AGR liabilities, including all reprocessing liabilities up to the date of privatisation.

While the new private company would own and operate the AGRs, SNL also proposes that it would be responsible for front-end decommissioning work. It would also operate the dry-stores. However, long-term liability for this would remain in the public domain.

The time-scale for decommissioning under the 'safestore' plan is in excess of 135 years. SNL comments: "Few institutions other than government can embrace liabilities against such extended time-scales."

A number of proposals for dealing with this are put forward. However, the company clearly favours the establishment of a segregated decommissioning fund — Fund Co. SN plc would make payments to this fund during the operating life of its stations, geared towards the estimated costs of decommissioning, with the ownership and any subsequent liabilities passing to Hold Co upon closure.

Unlike NE, SNL is in no great hurry to order a new power station. It is the company's intention, however, to have a replacement — probably a PWR — ready for operation by the time Hunterston B closes around 2011. It is possible that market forces, with a little help from environmental legislation, may have created the correct climate for a purely private financed project, says SNL. If not, and "if government wishes to see further nuclear investment it will have to put in place the necessary market mechanisms."

Government support need not be in the form of cash, comments SNL. It could be a "supportive political and regulatory climate and the underwriting of certain risks." One of the main prerequisites for a private sector financed nuclear station would be a "power purchase agreement" for at least part of the output with a specified price for a certain period of time.

The risks which would be either completely or in part unacceptable to the private sector are given as:

- *waste fuel risk* – the project company will need a contract with a credit-worthy entity who will accept responsibility for disposal of the spent fuel. This may be a segregated fund or a government agency;
- de*commissioning risk* — these liabilities may need to be shared between the investors and the government. The project company would be responsible for defuelling and a segregated fund could be responsible for other activities;
- *legislative risk* — this is also a risk financiers will wish government to accept. It is the risk of future legislation increasing the costs or reducing the revenues of the project; and
- *regulatory risk* — this is the risk which the government directly or indirectly will have to accept. The concern is that the regulator requires some new investment or imposes certain operating restrictions on the plant. Given the sensitivity of the nuclear power industry, such regulatory interference is difficult to predict or even to define in advance.

SNL concludes: "Privatisation ... will transfer further risk from public to private sector. It will increase competition to the ultimate advantage to the consumer and help secure the benefits offered by a successful nuclear industry — long-term stable prices, security and diversity of supply, sustainability and less environmental impact than fossil generation."

While the industry's evidence is tired and unoriginal and there is a genuine feeling amongst environmentalists that we can win this one, this is not a time to relax. It is a time to step up the pressure: the 'City' must be made fully aware of exactly how uncertain the future of nuclear power is and the government must be reminded that it will be called upon to justify its actions. ❑

1."The role of nuclear power in the UK: a background paper to the nuclear review." Nuclear Utilities Chairmen's Group, June 1994. Available from The NUCG RSG Secretariat. Tel: 0565 68 2053, Fax: 0565 68 2514.

2."The Government's Review of Nuclear Energy: Submission from Nuclear Electric", "Vol 1: Further nuclear construction in the UK", "Vol 2: The Environmental and Strategic benefits of nuclear power.", "Vol 3: Privatisation of Nuclear Electric: benefits and feasibility." & "Vol 4: Supporting documents." NE June 1994. Available from NE. Tel: 0452 653839, Fax: 0452 653090.

3."Securing our energy future", Scottish Nuclear, July 1994. Available from SNL, Tel: 03552 62000, Fax: 03552 62626.

Public safety will be compromised if UK Nirex Ltd is allowed to proceed with its plans to develop an underground nuclear waste repository at Sellafield by 2010, according to a new Friends of the Earth report. Here, Dr PATRICK GREEN, FoE's Rad waste campaigner, summarises the report which highlights a number of serious deficiencies and contradictions in Nirex's research programme.

UK Nirex — out of its depth

NIREX — the government body responsible for finding a final resting place for the UK's growing mountain of intermediate-level nuclear waste — claims that the "technical ability to deal finally" with radioactive wastes "exists now" and that its underground 'repository' will be "safe for all time". However, *Out of their depth*, a new FoE report by Dr Rachel Western, demonstrates that Nirex lacks the scientific understanding to guarantee the long-term safety of the proposed method of radioactive waste disposal.

Before Nirex can be given approval to construct a repository at Sellafield, it will first have to produce a detailed safety case demonstrating that members of the public — for up to 1 million years into the future — will not face a risk of death from fatal cancer of more than one in a million each year as a result of release of radioactivity from the repository. Its Safety Assessment Research Programme is geared towards fulfilling this objective.

Consequently, Nirex must quantify how radioactivity will be released from the repository and how it will behave in the environment over hundreds of thousands of years. To achieve this it must obtain a comprehensive understanding of the processes and mechanisms that will act on the radionuclides and translate this into computer codes which accurately represent the real world so that quantitative, rather than qualitative predictions can be made. This is a task of phenomenal proportions.

Out of their depth highlights a number of key points.

First, Nirex is incapable of developing a computer code that realistically represents how radioactivity will be released from the repository and how it will behave in the environment. Indeed, it has acknowledged that any set of equations will be an imperfect representation of reality. Further, the government's Radioactive Waste Management Advisory Committee (RWMAC) has warned that it "seems impossible" that such a safety assessment system could be "fully quantitatively validated".

Second, even if a comprehensive set of fully validated equations were available for the calculation of the risk presented by the repository, Nirex lacks the data necessary to carry out the calculations. Nirex reports have admitted to both the "paucity of data" and the "major deficiencies" in the data which is available to use in the risk equations; some data has even been described as "virtually non-existent". Further, the methods available to Nirex to generate missing data are not adequate to provide reliable predictions of the radiation leakage from the repository or the resultant public exposure.

Third, consequently, Nirex has been forced to make enormous simplifications in an attempt to allow the complexities of the real world to be represented by computer code. For example: It has been forced to grossly simplify its chemical modelling, it uses only a single parameter, the "solubility of the element", for calculating how much of a particular radionuclide will dissolve in groundwater in the repository (a key determinant of its safety). However, in reality, the solubility of a particular radionuclide will depend on the precise chemical environment of the radionuclide. For instance, Nirex has reported experiments on uranium solubility observing a 100,000-fold variation between different chemical compounds. This produces particular problems for Nirex as it does not know the exact chemical form of the radionuclides in the waste.

These over-simplifications encompass a wide spectrum of phenomena and processes: redox (oxidation-reduction) assumptions are undermined by the neglecting of the radioactivity of the waste; solubility assumptions are further undermined by the neglecting of the role of colloids and ionic strength; engineering assumptions are undermined by the pressurisation effects of gas generation and the need to allow gases to escape — to prevent excessive pressure build-up — while needing to contain dissolved radionuclides; and water flow assumptions have been undermined by the impact of salinity and the complexities of fracture flow.

Fourth, the level of uncertainty introduced by such simplifications translates directly into large errors in Nirex's safety assessment calculations: in 1991, Nirex reported the results of a field test, carried out at the Pocos de Caldas uranium mine in Brazil, of uranium solubility calculations. In this test uranium solubility was underestimated by a factor of 200 million.

FoE is not alone in criticising Nirex over the gulf between its models and reality. RWMAC's 14th Annual Report said that Nirex's computer models for predicting water flow are "inconsistent" with observations from its boreholes. RWMAC concluded: "Important advances have been made by Nirex in the acquisition of the geological and hydrogeological data essential to the understanding of a complex site. Nevertheless, there is still a very significant amount of work to be done before the state of knowledge of the Sellafield area could be sufficient to provide a confident basis for the detailed assessment of the safety case for a deep repository."

The FoE report concludes: the inadequacies and inconsistencies of the current research programme indicate that no reliance can be placed on Nirex's evaluation of the quantity of radionuclides that will be released from the repository. It is inconceivable that these inadequacies and inconsistencies can be overcome within the current timetable for the development of a repository at Sellafield.

Many of these contradictions are generic to the problems of developing a safety case for deep waste disposal and are not site specific. The complex geology and hydrogeology at Sellafield only serve to complicate Nirex's task. Furthermore, Nirex's proposed Underground Rock Laboratory at Sellafield will not resolve these contradictions and will only serve to increase the level of uncertainty as its construction will destroy the base hydrogeology it seeks to measure.

This means that if Nirex does submit a planning application for its underground rock laboratory later this year, a very wide-ranging public inquiry must be held. Furthermore, given the difficulties that Nirex faces, it is quite absurd for the government to maintain that its disposal policy is credible.

If the current Department of the Environment review of radioactive waste management policy is going to be anything more than a cheap rubber-stamping operation, these issues, which lie at the heart of the deep disposal policy, must be central to the process. ❑

Some environmentalists have criticised the inclusion of waste incineration in the government's Non Fossil Fuel Obligation programme. MAX WALLIS and ALAN WATSON* look at the environmental impacts involved in different approaches to dealing with waste.

Waste — a burning issue

WASTE incineration is not new in the UK, a small percentage of rubbish has always been burned, especially in cities. Incinerators were operating before the turn of the century. A plant in Cheltenham was operating in 1895, one in Oldham in 1896 and one at Shoreditch in London in 1897. The Shoreditch plant operated until 1940. It was also common practice to burn rubbish on domestic fires.

By 1914 there were about 300 plants operating, many with energy recovery. These were even less efficient than modern energy from waste plant and were closed down primarily because of the availability of cheap homogeneous fuels such as gas, coal and oil.

While environmental problems were not envisaged with the earlier plants — they were generally quite small and particulate emissions from coal-fired plant probably obscured their emissions — incineration has had a chequered history in the UK.

In the 1960s and '70s the amount of domestic refuse increased, mainly because of an increase in packaging, disposable products and plastic items in general. Some local councils started to find a shortage of landfill sites. Incineration both directly and through the medium of 'refuse derived fuel' became the fashionable solution to this problem, superseding some recycling programmes which were already in existence or being started at this time.

The main aim of incineration was to reduce the volume of the rubbish so that landfill sites would last longer. The ash, it was hoped, would not give off gases, and would landfill tidily. The ash was not considered to be hazardous in any way. Burning was therefore crude, and stack gases were cleaned with simple electrostatic precipitators which trapped some of the larger dust particles and reduced obvious smoke.

Incinerator design in the 1960s was fairly crude, and many plants were essentially prototypes. Several were coal-burning furnaces which turned out to be unsuitable for domestic waste, having problems with melted ash solidifying and sticking to machinery, for instance. Malfunctions meant that plants were frequently out of use for repairs. Control of pollutant emissions, apart from particulates, was not an important factor and operations were generally not designed to minimise emissions. High capital costs finally meant that many manufacturers went out of business. The recession of 1981 was the final blow.

The UK was thus left with a wide variety of poorly designed incinerators,[1] all built between 1968 and 1978 with minimising cost and refuse volumes as their prime objectives. Incineration technologies have advanced considerably in some other European countries due to government support. Municipal incinerators in the UK have developed poorly in comparison. The result of this is that the current proposals for incinerators copy European combustion chambers and air pollution control devices.

Bluff

One of the great ironies of incinerator construction is the 'push me-pull you' relationship between the United States and Europe. In the early 1980s many US decision makers were persuaded that Europe had a long and trouble-free record of operating waste incinerators and that the process was popular with both officials and citizens. Incinerator developers reinforced the impression by offering expenses paid trips to carefully selected European plants (avoiding any contact with local pressure groups or activists).

The bluff worked — and the US experienced a rapid growth in incinerator building in the 1980's — until the mid-1980's when opposition groups educated themselves and networked effectively to stop the trend. Since 1985 over 137 incinerator projects in the US have either been cancelled outright or put on hold. In 1985 the state of California, for example, had plans to build 35 incinerators, to date they have built only three.

What was really happening in Europe was not that we had enthusiastically embraced incinerators but that, just as the Americans were starting their building programme, we were stopping building. This was not because of market saturation — since only 6 out of 15 European countries were incinerating more than 30% of their municipal solid waste.

We are now facing a role reversal where incinerator developers are pointing to the developments in the US to support their claims that incineration is a solution to our waste management problems.

Readers may be familiar with the tactics and recognise similarities in the approach used by the nuclear industry. This may not be surprising given that many of the major players in the incineration industry are those companies who would otherwise be engaged in building nuclear power stations.

Although energy recovery was the exception on the older plants it has become an essential for any new scheme. This is partly to promote incineration as an environmentally friendly technology but mainly because of the big subsidy available under the Non Fossil Fuel Obligation (NFFO) for electricity generation.

Is incineration primarily a process to dispose of waste or to generate electricity?

The question is an important one. The newly-formed Energy from Waste group claims that the main purpose is energy reclamation, but others at the recent Winchester conference ("Waste debate", page 23) argued that incineration is really for waste disposal. Gerald Atkins, the

Chairman of South East London Combined Heat and Power (SELCHP), the only municipal waste incinerator built on mainland Britain in the last 16 years, said this outright. Professor Pearce has admitted that his analysis of incineration applies to waste disposal alone.[2] For electricity generation, the economics don't stack up. It's pretty inefficient in reclaiming energy as electricity — 1.5-2GJ/tonne out of the 10-12GJ/t average calorific value of municipal waste. So use of the renewable energy order to subsidise waste disposal can be viewed as a scam — electricity consumers subsidising the inefficient disposal of other people's waste.

NFFO and waste

A single project by Cory Environmental won a contract to supply 103 MW of electricity from their proposed Belvedere Station (since refused planning permission but a revised application is being submitted) under the 1991 tranche of the NFFO. The Belvedere output represented 22.5% of this tranche and 39.4% of the waste band.[3&4] Incineration proposals constituted 53% of the total 1991 tranche.

Winning a NFFO contract is crucial to the financial viability of a new incineration plant. Without this subsidy, direct sales of electricity through the pooling and settlement scheme would be uneconomic.

For example, W S Atkins have costed a 200,000t/yr waste facility with mass burn incineration and metal reclaim[5] — 17.5% is diverted to landfill ahead of the incinerator, 29% is bottom ash and 4.5% fly-ash, also to be landfilled. Estimating net electricity production of 450 kWh/t at a pool price of 2.5p, they find a 'gate fee' of £39/t (no profit). At the NFFO premium price of 6.55p/kWh, the gate fee comes down to £21/t, which is barely competitive with the most expensive landfills (range £7-20/t) Even if modern gas and leachate controls will make landfills more expensive — and a larger incinerator could have lower unit costs — the NFFO subsidy (available for only a limited number of years) is clearly crucial.

Does incineration solve the landfill problem?

The UK waste disposal authorities deal with about 35 million tonnes (Mt) of household and commercial wastes each year. There is at least another 60Mt of other industrial waste, much being inert building and industrial wastes, but including up to 20Mt animal and food processing wastes landfilled by the private sector. Only a relatively small proportion of industrial wastes are designated 'hazardous' amounting to about 2.5Mt per annum. Even incinerating as much as 10Mt/yr. would hardly change the landfill problem but would require an investment of £4bn, with an annual subsidy of £150 million.

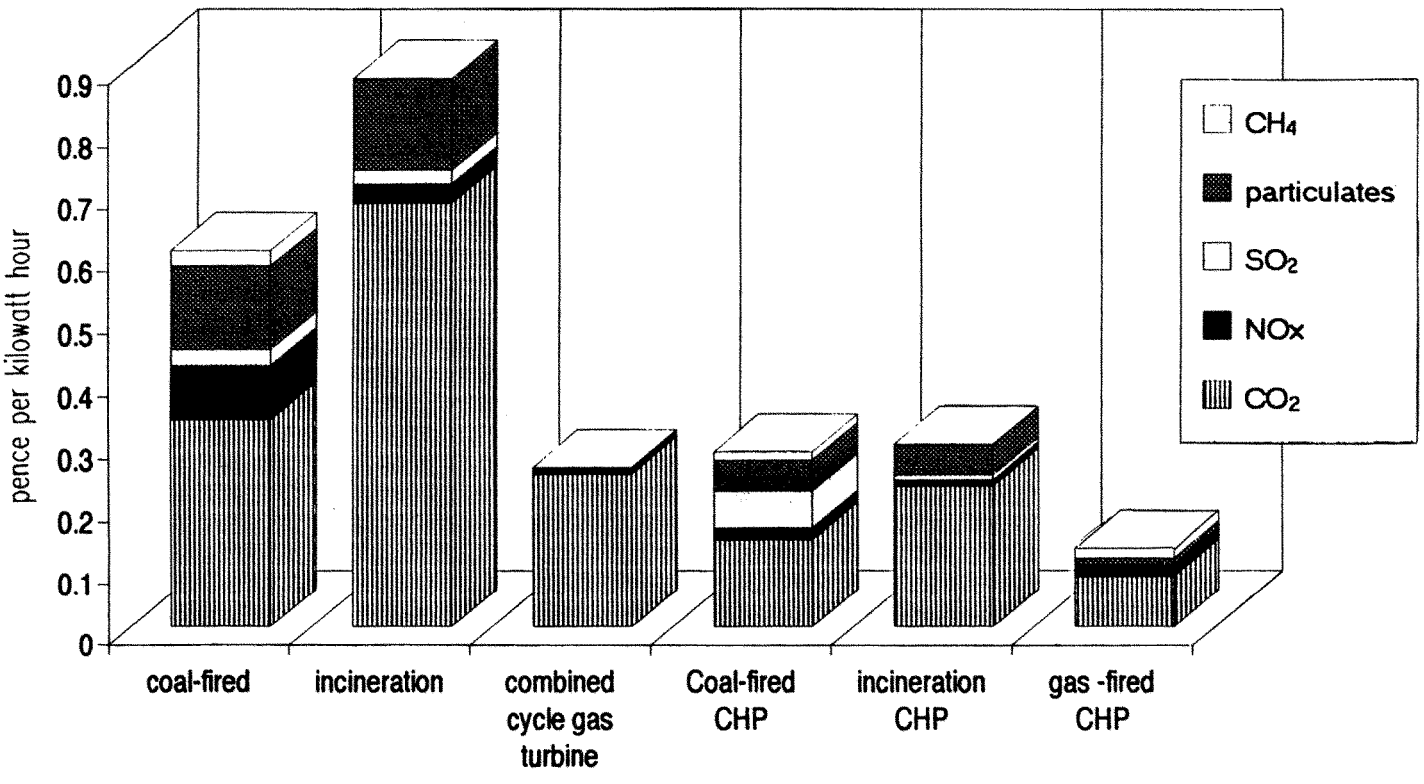
So what are the claimed advantages of incineration?

Environmental benefits are claimed to accrue from utilising the energy value of waste as compared to other, mainstream, waste disposal routes. These benefits lie in reducing the volume of landfill, with ash residues easier to handle, in avoiding the methane and smells from landfills, in reducing transport costs in the big conurbations and in offsetting the costs via energy reclaim.

Plastics, because of their variety and relatively high calorific value, appear to be the main justification for incineration, but they comprise only 7% of the waste stream.

But there are strong arguments against incineration.

Incinerators are extremely expensive to build, £3000/kW being quoted for SELCHP. The 1991 tranche NFFO ⇨



External costs of emissions from different types of generating plant

subsidy for such an incinerator is equivalent to a discounted sum of about £1,000/kW — which is more than the full costs of small-scale CHP or CCGT plant.

Just as for nuclear power plants, relatively few continuing jobs are created per unit of capital investment; most jobs are in the construction phase. There is little economic spin-off for the host community.

Opposition to new incinerators from the public and environmentalists is intense as nearly all the promoters of new schemes have found. Many local authorities have found that the thin green veneer of 'energy from waste' is unlikely to convince the public that new incinerators are any more acceptable as neighbours than the smoking dioxin factories of the 1970s.

Energy Implications

Overall more energy can be obtained by an alternative strategy of recycling and composting (including anaerobic digestion) than can be obtained by burning the same waste.

When an object or material is burned, that object or material has to be replaced. Replacement involves society bearing the full energy cost of extraction and production from virgin materials. Several studies in the US and by Warren Springs Lab[6] in the UK have shown that three to five times more energy can be saved by reusing and recycling materials compared to burning them.

The chimney of an incinerator at Raikes Lane, Bolton

Paper and board

Manufacturing recycled paper uses only between 10% and 20% of the energy required for virgin paper. Taking into account the full life-cycle gives various estimates of 30% to 70% saved by recycling. Incineration for electricity could recover about 25% of the calorific energy, some ten times less energy than recycling.

Plastics

There is a large net gain in the recycling of any polymer but PET is the most favourable case with over 58MJ recoverable for every kg of material recycled, compared with 16.5MJ via incineration. In general recycling could recover several times more than an energy-from-waste plant.

Recycling is much better than incineration in energy terms for all of these wastes. Another important consideration is the conservation of limited resources such as oil and the reduction in demand for ecologically damaging forestry. Paper production requires large areas of single species which reduce biodiversity.

Greenhouse gases

The Royal Commission on Environmental Pollution (RCEP) in its 1993 Report[7] favoured incineration on the grounds that the greenhouse gases arising from it are likely to be three times less than the greenhouse gases from landfill. Their calculation included the CO_2 emitted in combustion or decay, less than that saved by using the waste or landfill gas to fuel electricity generators. RCEP calculates that landfills make the greater contribution to global warming because of methane emissions which far outweigh the CO_2 from combustion — methane being many times more potent a greenhouse gas. However the RCEP figures are badly wrong,[8] principally because landfills generate much less methane than the theoretical estimate taken by RCEP. The industry claims too, that far less than 50% of the methane leaks to the atmosphere from properly engineered landfills. The RCEP conclusion thus appears invalid: incineration with energy recovery is no better and perhaps worse in greenhouse gas terms than is landfill with gas recovery.

All combustion is recognised to emit gases and dusts that are harmful to health and to crops, and cause corrosion of buildings. So it was astonishing that the Department of

the Environment sponsored study by Pearce et al[2] which concluded that incineration has a positive social benefit of around £4/tonne. However this benefit is calculated by the simplistic analysis of taking an old, polluting, coal-fired station, ascribing it a zero social cost and replacing it with a brand new waste incinerator with all its costly anti-pollution technology. The coal-fired station could, indeed, be retro-fitted with anti-pollution technology at a fraction of the cost of the new incinerator. If one follows the Pearce methodology in setting a price on each pollutant, it's only fair to compare an incinerator for energy generation purposes with alternative modern technology. The Figure shows calculations of the social costs for electricity generation or for CHP (combined heat-and-power) generation, including mini-CHP systems for industry, hospital or office complexes. The 'costs' of the individual pollutants are taken from Pearce's book[9]; though scepticism over such costs is justified, the method indicates that incineration for energy supply is a very poor option, with high social costs.

Ash

It is logical that as air pollution control devices become more effective at filtering the small particles from incinerator waste gasses the ash will become more toxic. Incinerator fly ash has already been described as "a significant occupational hazard" to exposed workers at incinerators (the authors are aware of at least one UK. incinerator where staff are expected to sweep out ducts with a broom!).

On 2 May 1994 after a hard-fought court battle between the Environmental Defence Fund and the incineration industry — supported by the US Environmental Protection Agency (EPA) — the US Supreme Court ruled in a seven to two decision that ash from municipal solid waste incinerators has to be regulated as hazardous waste. The implications of this ruling are that ash will henceforth be treated as hazardous unless it passes the EPA Toxicity Characteristic Leaching Procedure (TCLP) tests i.e. guilty until proven innocent.

Test results for 23 facilities show that for fly ash 97% of samples fail for cadmium and 91% for lead whilst 36% of bottom ash samples fail for lead. The Supreme Court ruling is estimated to increase the operating costs for a 1,600 tonne per day incinerator by an extra $4-$5 M/year, say $8 or £5/t.

Incineration does not reduce dependence on landfill to the extent claimed by its promoters. In the W S Atkins study,[5] half the initial mass is still landfilled. But incineration may indeed worsen the landfill problem. Most heavy metals in domestic waste, for example, are bound into the stable plastic matrix. However, heavy metals in incinerator ash are present as soluble metal chlorides and may be easily leached.

Dioxin

If any single word can strike terror into the heart of incinerator operators and developers it is 'dioxin'. In spite of recent attempts by industry and their apologists to talk down the dangers of dioxin (linguistic detoxification!) the problem is not going away. The final draft of the EPA dioxin reassessment, recently leaked to the press, has shown that dioxin is actually more potent than previously suspected.

The EPA verdicts about the hormone disrupting effects and risks to the foetus will dramatically increase public concern. The report also indicates that we are already exposed to levels of dioxin in our normal diet that are 600 times higher than a 'tolerable daily intake'. In other words the chances of getting cancer from dioxin are greater than those of being dealt four of a kind in poker. The obvious conclusions must be a strong presumption against any new source of dioxin, including incinerators.

Alternative waste strategy

Incinerators are expensive and therefore their financial backers require contracts to guarantee a constant diet of high calorific value material over a long period of time (15-25 years). Local authorities are therefore presented with a choice between incinerators and a recycling/waste-reduction strategy.

A better environmental option would be to concentrate on taking steps for reduction and reuse. Recycling can then be considered e.g. Dr Barry Commoner with 84% recycling rates in trial schemes or the SORT scheme at Leeds which is serving about 80,000 households and diverting about 50% of their waste from landfill.

Waste strategies for the residual municipal waste could then be oriented to processing putrescibles — which serve poorly as fuel and generate the major landfill leachate and methane problems. Composting and anaerobic digestion reduce by about half the amount of raw organic waste, and if contamination can be kept down, the remainder can be used as soil conditioner rather than going to landfill. Some paper and products can be composted too, to meet the limit on re-recycling of paper fibres.

This is a flexible 'resource management' strategy which creates jobs, is relatively cheap to finance, quick to build, easy to extend and, compared to incinerators, materials recycling facilities (MRFs) and bio-digestors should have an easier passage through planning. ❑

1. "Review of solid waste incineration in the UK", WSL LR 776(PA).

2. "Externalities from landfill and incineration", CSERGE, WSL & EFTEC, HMSO 1994.

3. "Subsidising the dash to burn trash", ENDS 211 August 1992.

4. Greenpeace Toxics Campaign evidence to "The Energy Committee Fourth report Renewable Energy Vol II", March 1992, HMSO.

5. "An assessment of mass burn incineration costs", ETSU Report B/RI/00341, by M R Fox et al of W S Atkins.

6. "A review of the environmental impact of recycling", Warren Springs Laboratory LR511, 1992.

7. "Incineration of waste", Royal Commission on Environmental Pollution, 17th Report, HMSO 1993.

8. "Waste incineration reassessed", Warmer Bulletin no.41, May 1994.

9. "Blueprint 3: measuring sustainable development" (Table 10,4), D Pearce et al, Earthscan, 1993.

Further reading:"Municipal waste incineration. Wrong question, wrong answer", P & M Connett, The Ecologist, p14-20, January 1994.

For help in campaigning against incineration projects: Campaign Against Toxics (CATs), Ralph Ryder, 31 Station Road, Little Sutton, Wirral L66 1NU, 051-339 5473; Greenpeace, Canonbury Villas, London N1 2PN, 071-354 5100; or the present authors, at FoE Cymru, 33 The Balcony, Castle Arcade, Cardiff CF1 2BY, Fax 0222 228775.

*** Max Wallis is a researcher in atmospheric science and energy systems at the School of Mathematics, University of Wales, Cardiff; Alan Watson works for Friends of the Earth Cymru.**

The UK's maximum practicable renewable energy resource is sufficient to meet all the country's electricity needs by 2025, according to a recent report by the government's Energy Technology Support Unit, reviewed here by GRAHAM STEIN.

Renewable energy potential

THE latest assessment of renewable energy in the UK* by the Energy Technology Support Unit (ETSU) has been overshadowed by the disappointing, anodyne accompanying DTI document *Energy Paper 62* ("Eggar's renewables plans", *Safe Energy 100*), but it is a much better publication.

While not without faults, it provides a useful overview of renewable energy technology and most importantly assesses the size of the renewable resource.

The headline figure of an 'accessible resource' for electricity generation of 1,100TWh/year (1TWh = 1 billion kWh) is three and a half times present UK electricity supply (based on a maximum cost of electricity of 10p/kWh at an 8% discount rate). While constraints on deployment of technologies reduces the resource to a 'maximum practicable resource' of 400TWh/year by 2025, this is still greater than the country's current 310TWh annual electricity consumption.

These figures will not be particularly surprising to those involved in renewable energy, however, what is greatly encouraging is that they have been produced by a government agency and provide a useful counter to critics of renewables who say that there is not a large enough resource.

The total resource is achieved despite a derisory contribution from wave power. ETSU has stuck to the woeful costings of the 1992 Wave Energy Review ("Wave costings", *Safe Energy 93*) leaving a shoreline accessible resource of 0.4TWh/year and just 0.03TWh/year from offshore. The offshore figure is particularly hard to understand: it could be met by just five 2MW devices like the nearshore Osprey currently being developed by Applied Research and Technology ("EC boost for wave", *Safe Energy 97*), which it was predicted by the 1992 review could generate at 7p/kWh (8% discount rate).

Discount rates

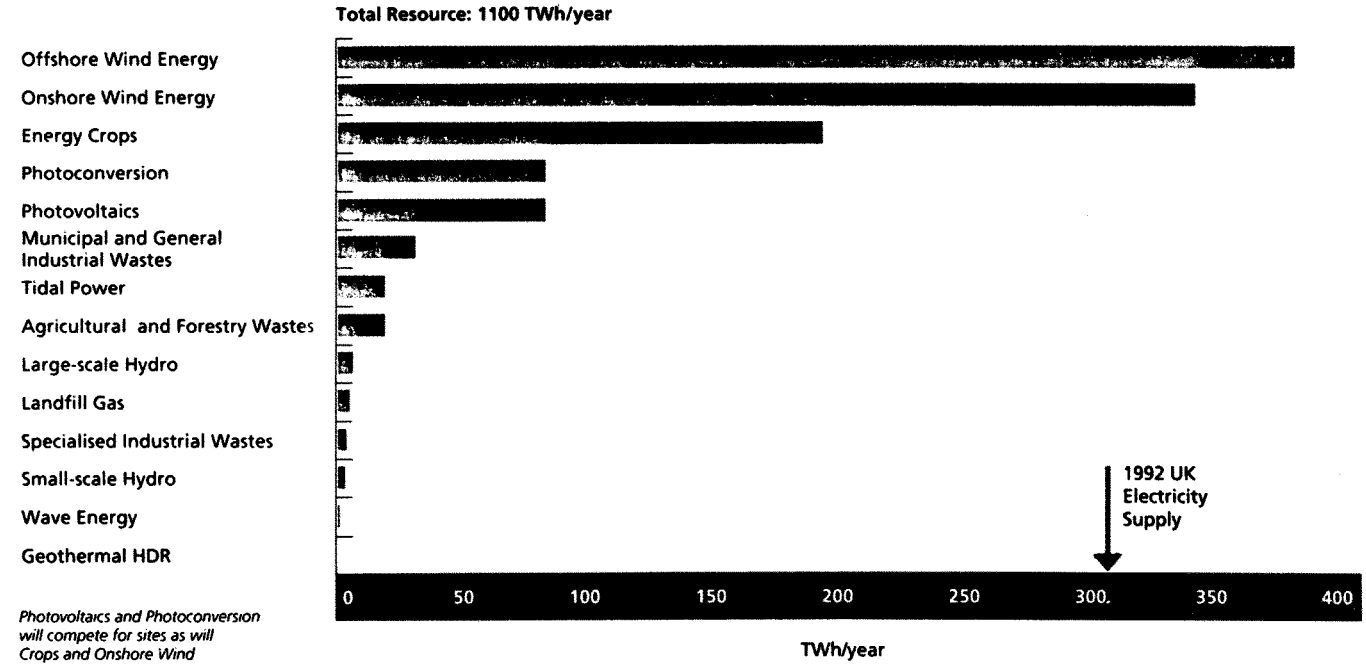
Tidal and hydro power also appear to suffer to some extent from the high discount rates (in historic terms) of 8% and 15% used in the analysis. In addition, hydro schemes with heads of less than 3m (2m for existing civil engineering schemes) were not considered in the report.

Wind power is assessed as the largest accessible resource, with both offshore and onshore potential quoted as being greater than present UK electricity supply at 380TWh/year and 343TWh/year respectively. Their maximum practicable resources (MPR) are put at 140TWh/year and 54TWh/year.

Another major contributor could be energy crops which has the same MPR as wind at 194TWh/year; this assumes that all the accessible resource could be used, though this is subject to the vagaries of European Union agriculture policy on set-aside and subsidies.

Solar power also rates highly in the report: photovoltaics have an 84TWh/year accessible resource with other photoconversion technologies (biological, chemistry and electrochemistry) at between 50 and 100TWH/year. The MPR for photovoltaics is put at just 8TWH/year by 2025 and other photoconversion technologies are considered insufficiently developed for any forecast to be made.

Solar could contribute further with active and passive heating systems, and natural lighting reducing demand for electricity, oil and gas. In total an accessible resource equivalent to over 40TWh/year.



Accessible Resource for electricity producing renewable energy technologies at a cost of 10p/kWh or less (1992) 8% discount rate.

Despite the continued antipathy to wave power at ETSU, the report makes a valuable contribution to the energy debate (some of the numbers are buried deeply in the midst of the text and colourful graphs of the 308-page report).

Some important general points are made in the conclusions:

"If renewable energy technologies are to be readily deployed in the UK an infrastructure appropriate to the particular needs of renewable energy will need to develop. In particular, a skills base of experienced equipment manufacturers, installers and operators, planners and financiers — together with financial, planning and regulatory systems responsive to the needs of renewables — will be required.

"The worldwide market for renewable energy products and services is potentially enormous ... If this potential is to be realised it will require the development of a renewable energy industry far greater than that currently existing. The disparity between the potential world market and the current world industry offers the opportunity for the development of a significant UK industry for domestic and export sales."

These fine words are perhaps an indication that ETSU appreciates that its paymaster is no longer the (defunct) Department of Energy but the Department of Trade and Industry (DTI).

The report also recognises that: "From a global viewpoint the renewable energy technologies are environmentally benign and can provide a major contribution to sustainable development," sensibly adding: "Planning procedures sensitive to the needs of local communities are required if the renewable energy technologies are to fulfil their potential to improve the global environment."

Intervention

To judge by *Energy Paper 62*, however, ETSU's conclusions have yet to sink home at the DTI. Michael Heseltine — a man who told his party conference that he would intervene before breakfast, before lunch and before dinner to make British industry successful — shows little sign of doing so for renewables.

The government's major mechanism for supporting renewables comes in the form of the Non Fossil Fuel Obligation (NFFO) in England and Wales and renewables obligations in Scotland and Northern Ireland.

The first two rounds (of five) under the NFFO have seen over twenty wind farms built in England and Wales but less than 20% of these 400 turbines are UK machines.

Not only have the NFFO and its belated Scottish and Northern Irish equivalents done little so far to develop UK industry, they are due to make their final orders in 1998.

Unless there is a commitment from government to support new projects into the next century, UK companies will not develop the infrastructure for a domestic-based industry.

The UK does not need a Californian-style wind rush any more than it needs the dash to gas. It does need a steady planned build-up of indigenous renewable energy technology in a secure home market providing UK companies with the opportunity to compete in a growing world market. ❑

*** "An assessment of renewable energy for the UK", ETSU; HMSO, 1994.**

The nuclear industry claims that it wants a partnership with renewable energy as part of a balanced energy programme. GRAHAM STEIN looks at information on renewables supplied by the nuclear industry and finds it economical with the truth.

Some partnership

SINCE draping itself in the green cloak of environmentalism in the eighties, the nuclear industry has often claimed it wants a partnership with other energy source, especially renewables. The information it puts out often covers renewable energy as well as nuclear power. But, what does it actually have to say about its prospective "partners"?

The reality is that the information it supplies on renewables — much of it sent to schools — attempts to rubbish them. Their line is that, except for the noise and visual intrusion of wind power, renewables are nice and generally environmentally friendly (like nuclear power) but that they cannot hope to make a major contribution to our energy needs.

One internal briefing for BNFL employees states: "Even the most ardent supporters of renewable energy agree that, if the necessary investment was made, then renewables could only support a maximum of 15% of energy needs."[1]

Sadly, such lies are not limited to internal literature; by far the most worrying trend is the increasing quantities of nuclear propaganda being sent to our schools which purport to give a balanced view of renewable energy.

Activate, a magazine produced by AEA Technology at Harwell, is apparently sent to every school in Britain. The publication is financed by the British Nuclear Industry Forum, while editorial control curiously remains with AEA.

In the summer 1994 issue, as well as pro-nuclear items, two pages are given over to renewables, with a promise (threat?) of further coverage in future issues.

In an inauspicious introduction, mention is made of "splitting or fusing (sic) uranium atoms in a nuclear reactor". A simple error — though not one you would expect from the Atomic Energy Authority.

The basic descriptions of different renewable technologies are innocuous enough, if lacking in clarity. However, on solar power the article states: "If we knew the sun would shine regularly, we could make lots of electricity using solar cells". This is presumably meant to suggest a corollary 'because we know the sun won't shine regularly we can't make lots of electricity using solar cells'. Solar panels are described as expensive and are only credited with being able to reduce energy bills in the summer.

Further criticism of solar power comes in a section insincerely titled "power

⇨

partnership". "We don't have enough sunshine to make good use of solar power", it claims. This is followed by the absurd assertion that we do not "have vast areas of land with the right wind speeds to develop huge wind farms." Leaving aside the question of whether we should develop "huge" wind farms, rather than smaller schemes, does AEA not realise that it is talking about the country with the best wind resource in Europe, much of it in the sparsely populated Scottish Highlands.

Interestingly energy crops are not included in the article — is this because they are too difficult to attack?

On power prices nuclear power is not mentioned, but it says: "the price of renewable sources is still higher than from fossil-fuelled power stations because building the equipment is expensive but it produces only a small amount of electricity." Tell that to Scottish Hydro-Electric whose hydro stations produce electricity at less than 1 pence per kilowatt hour — the cheapest power in the country.

Having been invited by *Safe Energy* to justify its coverage of renewables, the editor, Meriel Lewis of AEA, dealt only with solar power. Interestingly, with the government's renewables agency ETSU next door, AEA's sources of information were a fact card from the Science Museum and Friends of the Earth's 1991 publication *Energy without end*. While it is true that *Energy without end* produced a scenario where solar played a minor role compared to other renewables, it did not justify AEA's assertions.

It is conceivable, though, that the nuclear industry is collecting material produced by environmental groups in order to take the least optimistic assessment for each technology, collate them and present it as the environmentalists' scenario.

power prices

The price of electricity from renewable sources is still higher than from fossil-fuelled power stations because building the equipment is expensive but it produces only a small amount of electricity.

Had AEA been honest in its coverage and consulted properly with ETSU it would have been able to tell school pupils that the accessible renewables resource (at below 10p/kWh, 8% discount rate) is three times our current electricity supply, including sizeable contributions from wind and solar.[2] Instead it makes the unsubstantiated and vague comment: "Renewables are expected to provide about 10% of the UK's electricity in the future." Is this intended to be seen as an upper limit?

Market share

The nuclear industry's main argument both for the current government review of nuclear power and in the wider debate is that they want a "balanced" energy policy which includes an entrenched place for nuclear power.

When James Hann, the Chair of Scottish Nuclear, began touting this line he talked of around 20% nuclear generation. This figure has slowly crept up to the point where he is arguing for 25-30% nuclear.

Considered alongside its literature on renewables, the suggestion that the nuclear industry wants an energy mix which includes renewables can be seen as a cynical attempt to appear reasonable and environmentally enlightened.

In reality, the industry has always starved renewables of research and development funding, remains prime suspect in the killing off of the wave energy research programme in the early eighties, and is linked, at least indirectly, to the nationwide anti-windfarm group Country Guardian.

While pro-renewables groups exist on shoestring budgets, pro-nuclear propaganda is churned out by BNFL, Scottish Nuclear, Nuclear Electric, AEA Technology, Nirex, British Nuclear Industry Forum, the National Campaign for the Nuclear Industry and others. As these companies reside entirely in the public sector, this material is produced with taxpayers' money and distributed to schools which, starved of resources, have little choice but to use it.

The idea that nuclear power is the friend of renewable energy is absurd. That so much of the information being disseminated on renewables comes from the nuclear industry is worrying — that much of this is funded by the taxpayer an outrage. ❑

1. "Energy options: plans for the 21st century", Employee communications, Risley, 1992.

2. "An assessment of renewable energy for the UK", ETSU, HMSO 1994.

power partnership

Recently, there has been a strong environmental lobby in favour of renewable sources of power. But, although they are generally less harmful to the environment, renewables simply cannot produce enough energy to meet the demand in industrialised nations, nor the needs of developing countries as their demand grows.

Renewables are expected to provide about 10% of the UK's electricity in the future. We don't have enough sunshine to make good use of solar power, nor do we have vast areas of land with the right wind speeds to develop huge wind farms. Hydroelectricity has been operating for many years, yet it produces only 2% of our electricity.

A balanced energy programme is required where renewables are used alongside other energy sources.

Energy policy, but no plan

UK government energy policy has been endorsed by the International Energy Agency (IEA) in a report published in June.*

Aware of the common criticism that the UK has no energy policy, the authors felt it necessary to state: "If a policy is an approach based on a clearly articulated principle of reliance on market forces the United Kingdom does have an energy policy." A big if.

While the Agency's findings were welcomed by an "absolutely delighted" energy minister Tim Eggar, there was considerable criticism of the government in the text of the report: the confused state of the regulatory system; the National Power PowerGen duopoly; insufficient pressure on utilities to pursue energy efficiency; uncertainty over the economic framework for nuclear power; and inadequate monitoring procedures.

Supply/demand forecasts would be useful, particularly for analysing trends in greenhouse gas emissions, argues the IEA, whose membership is drawn from all the OECD countries except Iceland and Mexico.

The report has been strongly criticised by the Association for the Conservation of Energy (ACE) for failing to criticise the worsening energy efficiency in the UK. "We are now using more fuel to produce fewer goods," commented ACE. "How can the IEA square these figures with its applause?"

The report had to be approved by the UK government before publication, and ACE says "it seems quite obvious [the report] has been subjected to major editorial changes before being issued."

Eggar felt sufficiently enthused by the supportive aspects of the report to fully articulate the government's approach to energy: "People confuse a plan with a policy, the government doesn't have a plan, but does have a policy."

The IEA has called on the government to:

- ensure that nuclear power can support itself by 1988;
- clarify the issue of decommissioning nuclear plant;
- consider extending the CO_2 commitment beyond the year 2000; and
- ensure that there is a clear link between the government's energy and environmental policies and its R&D priorities. ❑

*** "Energy policies - the United Kingdom 1994", IEA, June 1994.**

Nothing to report

THE government published its first annual energy report in June, a self-congratulatory document designed to show that the policy of leaving the energy markets to themselves is being successfully implemented.

Only where strong environmental, social or economic reasons remain will the government intervene, according to the report.

There are no categorical statements of intent to be found in the document, and it stresses that it is not up to government to produce a plan about how much energy, and what kind of energy, should be produced and consumed.

It would appear that the only reason for the report's existence is that it was part of the package of measures drawn (dreamt?) up in the coal review which followed the public outcry over pit closure plans announced in 1992 ("Little help for coal", *Safe Energy 94*). ❑

Son of Thermie

THE European Union's (EU) Thermie programme — which provides funding for demonstration projects and promotional activities in the areas of energy efficiency, renewables, and clean use of coal and other hydrocarbons — expires at the end of this year having allocated a total of Ecu700m.

Although Ecu1bn will be available for R&D on non-nuclear energy under the EU's Fourth Framework Programme, the European Commission hopes to establish Thermie-II to continue the full range of Thermie activities. ❑

Energy sell-offs

INCREASED profits produced by both National Power and PowerGen, job cuts, and the decision by the electricity regulator, Prof Stephen Littlechild, in February not to refer the duopoly to the Monopolies and Mergers Commission have paved the way for the sale of the government's 40% stake in the generators. The sale is expected to take place in the current financial year, probably next February.

It was announced in May that Littlechild will be re-appointed for a second five-year term.

■ With the National Grid Company (NGC) having made healthy profits in the last financial year, its owners, the 12 regional electricity companies in England and Wales, have appointed Kleinwort Benson to advise on a possible sell-off. NGC plans a further 400 redundancies by March, and a £4bn-plus flotation is likely in the spring.

■ Government plans to privatise British Coal (BC) progressed with the decision in June that liabilities for all health-related claims with respect to past service with BC will be retained in the public sector, and the passing of the coal industry bill by Parliament on 5 July. ❑

Labour plans efficiency

LABOUR'S plans on the environment were published in July, with the main proposal being a moratorium on all new road building — signalling a rejection of the Conservative's "great car economy" — and a strong commitment to energy efficiency.

The document calls for a shift in energy policy away from selling more electricity and gas to energy saving. Chris Smith, Labour's shadow secretary for environmental protection, said: "We have got to get away from the old assumptions that concern about the environment costs jobs. In fact the reverse is true — it creates employment."

Labour proposes a "self-financing programme of energy efficiency." The rules under which the privatised electricity and gas industries operate would be changed to allow profits to be made from energy conservation measures. Homes would be made more energy efficient with the cost being recouped through small increases in the unit price of fuel. Labour believes that this would create up to 50,000 jobs.

Targets for renewables have been set at 10% of UK electricity demand by 2010 and 20% by 2025, to be achieved through a number of measures including: a specific renewables obligation; an improved R&D effort; and a greater share of the fossil fuel levy.

The 20% by 2025 target is the level the government's Renewable Energy Advisory Group considered could be achieved in its 1992 report.

Labour's 1990 plan for a Renewable Energy Agency has been replaced with the intention of strengthening the renewables role of the Department of Trade and Industry and a managerial, at least, separation of the Energy Technology Support Unit from its nuclear landlord and paymaster AEA Technology.

There is little change in policy on nuclear power from the last general election: "The Labour Party has resolved not to build any new nuclear power stations" but there is no commitment to phase out existing stations or close the Thorp reprocessing plant at Sellafield.

Clarifying the policy for the possibility of a privatised industry, Smith told *Safe Energy*: "Labour will not allow any new nuclear power stations to be built."

Energy will be covered in more detail in a forthcoming review by the party's energy policy working group, which will take its lead from the overall environmental programme. ❑

DoE climate conference

THE government "has always recognised the need for post-2000 action" on carbon dioxide emissions, according to Derek Osborn, Head of Environmental Protection at the Department of the Environment (DoE), *writes Pete Roche.*

Osborn was speaking at the government's Climate Change Conference on 14 July, which was billed as a participatory process to address future options. The ultimate aim of the government's climate change programme is to stabilise atmospheric concentrations.

Sir Crispin Tickell, of Green College Oxford and the Convenor of the government's Panel on Sustainable Development, told the conference "we must look for reductions [in greenhouse gas emissions] to much lower levels. We must change the nature of the economy." He warned that the usual energy efficiency measures may be insufficient post 2000.

A series of myths about climate change which have arisen recently were rebutted by Sir John Houghton, former director of the Met Office and co-chair of the Intergovernmental Panel on Climate Change: it is untrue that the computer models are now predicting smaller temperature rises; it is untrue that satellites don't confirm surface temperature measurements; and although sulphate aerosols may be having a cooling effect over the northern hemisphere, it cannot be expected to balance the warming effect of greenhouse gases. Houghton warned that next century's rate of temperature change will be way out of scale with anything we have seen so far.

Sean O'Dell, chief economist at the International Energy Agency, highlighted the rapidly rising energy consumption in South-East Asia, particularly of coal rather than nuclear. OECD countries should be concentrating on reducing emissions from the power generation and transport sectors, he said.

For the government, the Secretary of State for the Environment John Gummer emphasised voluntarism: "No government diktat will solve the challenge ... I urge all delegates to explore within your own organisations the possibilities for action beyond 2000."

There was considerable discussion of increasing emissions from the transport sector, but the only mention of the failure to secure funding for the Energy Saving Trust ("Energy inefficiency", p8) came from Dieter Helm, director Oxford Economic Research Associates, when discussing the failure of energy industry regulation.

Dr David Fisk, the DoE's chief scientist, proposed both fiscal and regulatory measures to reduce emissions, and suggested that renewable energy sources could contribute 5-20% of our electricity by 2005, while energy efficiency could produce a 25% saving.

The presentations on transport were perhaps the most remarkable. *The Guardian*, the following day, gave a flavour of the DoE's view of the UK road building programme: "Many in the DoE, off the record, would love to see the DoT [Department of Transport] get a bloody nose over air pollution." And one official was quoted as saying that the DoT's "long espoused car culture/road building line is self evidently unsustainable."

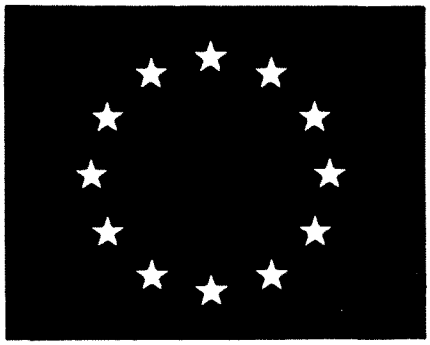
It will be interesting to see over the coming months whether the DoE manages to win the support of the rest of the cabinet for its ideas. With the funding problems of the Energy Saving Trust and the £18bn roads programme, they are not having much success so far. ❑

Carbon worries

THE European Union (EU) is in danger of exceeding agreed future CO_2 emission targets, the European Commission (EC) has warned. Figures for the past three years have shown a 3.2% reduction in CO_2 emissions from fossil-fuel combustion, but the EC fears that as Europe comes out of recession this trend will not continue.

The EC's Environment Commissioner, Yannis Paleocrassas, has called on Germany — which currently holds the EU's presidency — to take the lead in persuading the 12 member states to adopt the carbon/energy tax proposal, which has been making extremely slow progress over the past two years.

Speaking to government and industry leaders in Hamburg on June 28, Paleocrassas warned "it is unacceptable to continue with the present system of subsidising environmental destruction by not charging the true environmental costs [of energy] to the consumer."



Countering claims that the tax would damage competitiveness, he argued that "energy costs in industry represent only 2.5-4% of production costs and the average burden is thus 0.17% after exemptions."

■ A proposal for integrated resource planning to reduce CO_2 emissions has been made by the EC . The draft directive would force national governments to ensure that their industries take up the most rational solutions for their energy plans, thereby promoting development of the most efficient energy technologies and services. ❑

Global Warming

CLIMATE change is already here according to a Greenpeace report* which cites a series of environmental catastrophes over the past four years.

Greenpeace believes that "while no one event, or sequence, or sector of events, is necessarily related to the enhanced greenhouse effect," in total its catalogue of climatic experiences shows "the first signs of human-induced climate change are emerging."

This view is shared by some of the world's biggest reinsurance companies, including the Swiss Reinsurance Company which endorsed the report. Many reinsurance companies have gone out of business due to the sequence of disasters, and the trend has contributed to the huge losses at Lloyd's of London.

■ Further evidence of climate change has come from the British Antarctic Survey. Analysis of figures from its Faraday research station show a 2.5°C warming over the past forty years. ❑

*** "The climate time bomb", Greenpeace, Canonbury Villas, London N1 2PN; £5.**

UN sulphur protocol

OVER 30 countries, including the UK, have signed a new UN protocol on sulphur emissions, designed to reduce acid rain. It replaces the 1985 protocol for a cut of 30% from 1980 levels by the end of 1993, which the UK refused to sign.

The new agreement sets individual national targets on the basis of 'critical loads' which assess the tolerable level of pollutants which can be borne by plant and animal life. The UK will have to cut its sulphur dioxide emissions by 80% of 1980 levels by 2010, with interim targets of 50% by 2000 and 70% by 2005. ❑

Waste not?

THE Waste to Energy '94 conference at Winchester, 19-20 May, was designed to promote incineration, though some critical voices came from the audience, *writes Max Wallis.*

The Department of the Environment's Henry Cleary gave the keynote address, arguing for incineration to meet the waste disposal problem and the forthcoming packaging Directive. Government is still undecided on a landfill levy, he said, and also undecided on the claims of the Royal Commission (and *Blueprint for a Green Economy* author Prof. Pearce) that incineration gives net environmental benefit, complaining that the public perceives the opposite.

A financial presentation by Andrew Brandler of Schroders pointed out that the Non Fossil Fuel Obligation (NFFO) support for incineration is huge — amounting to about £1000/kW, exceeding the capital cost of new power stations — and asked why electricity consumers should bear the costs of waste disposal.

The electrical output generated via incineration was optimistically given as 500kWh per tonne of municipal waste, amounting to 15% of the calorific value (after deduction of power used in the works). CHP generation, as planned for the Isle of Man and already common in Denmark, may boost efficiency to a nominal 70%, but the heat is generally under-used.

The one new incinerator built in recent years, the south-east London CHP plant, is a success in public acceptance and environmental protection terms, said SELCHP Chairman, Gerald Atkins. Handed over only last February, the plant is operating in a power-only mode. This was said, unconvincingly, to be forced until 1998 by the high NFFO premium for electricity. The hot water connections for the steam generator are already in place; however, heating Milwall football ground and local high-rise blocks (7,500 units) as proposed, will take only part of the heat and rather little in the warmer half of the year.

Anaerobic digestion can complement incineration, argued Kit Strange of the 'World Resource Foundation' (previously Warmer). Extracting the wet organic fraction for digestion improves the combustion quality of the remainder. The digestor gas generation given for Netherlands projects is low at 100-150m³/tonne, lower than from landfilling the organics, so does not add a lot to the energy reclaim. A scheme reported as planned in Kent by WMC Resource Recovery Ltd would use much of the energy for sorting the waste and for heat-sterilisation of the residual organics.

Pyrolysis got a mention as a future low-temperature technology for reclaiming oils and gases from wastes, and may be first introduced for used car tyres.

The conference culminated with formation of a trade association; 'recycling' was dropped from the first proposed title Recycling Waste to Energy Group. One critic pointed out that given the small amount of power that could be secured — 1GW or one power station — it is better conceived as waste disposal. A large minority agreed, voting for the title Energy from Waste. No doubt people who favour recycling and avoidance will soon dub WEG the 'Waste of Energy Group'.

■ Plans for the world's largest waste-fuelled power station, at Belvedere on the banks of the Thames, have been rejected by Michael Heseltine, President of the Board of Trade.

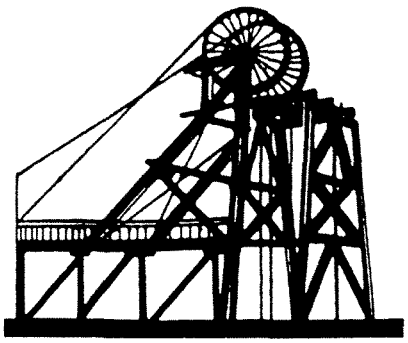
Cory Environmental, the company behind the project, says it is likely to reapply for planning permission. The 103-112MW plant — which was included in the 1991 NFFO order — was rejected by Bexley Council in 1991. The decision by Michael Heseltine followed an appeal to the Department of Trade and industry and a public inquiry in 1992. ❑

Clean coal moves

TIM EGGAR, the energy minister, has announced Department of Trade and Industry (DTI) funding for 26 clean coal research projects. The DTI is to put £8m towards the total cost of £29m. This, together with 78 previously announced projects, brings the total value of the clean coal technology programme to £188m.

Two-thirds of the new projects will go to Coal Research Establishment, currently part of British Coal. Some of its activities have been incorporated in a new subsidiary, CRE Group, with plans for a sell-off later this year.

Large-scale R&D projects will remain with British Coal, as the Coal Technology Development Division, with the hope of they will be developed to the point where other parties could progress to the pilot plant stage. A bit by bit transfer to the private sector over the next three years is envisaged. ❑



Solar progress

EUROPE'S largest photovoltaic centre, near Toledo, Spain, went on stream in June. With 8,000 photovoltaic (PV) panels covering 16,700m², the 1MW Toledo PV park is expected to supply 1.5GWh/year to the Spanish national grid.

The European Union's (EU) Thermie programme provided 25% of the Ecu10m funding for the park, with the Spanish and German governments providing 18% and 9% respectively.

Spain now has a total of 5.4MW of installed solar energy capacity.

■ A major building on the campus of Northumbria University, Newcastle, is to be clad with PV panels. The £1.5m project is to get 40% of its funding from the EU Thermie programme and hopes to get another 9% from the UK government. The panels will provide 10% of the building's winter energy demand and 50% in the summer. ❑

CHP NFFO off

ARGUMENTS that Combined heat and power (CHP) should be included in the Non Fossil Fuel Obligation (NFFO) because its high efficiency reduces fossil fuel use have been rejected by Tim Eggar, energy minister.

Eggar says that there are legal problems with incorporating CHP in the NFFO but has said "I'm quite keen to identify ways that we can bring CHP into the NFFO process, but not in a way that excludes other schemes."

There are now over 1,000 CHP plants in the UK with a combined output of 2,900MWe (million watts of electricity). This is almost 60 per cent of the 5,000MWe target set by the government for the end of the century as part of its environmental commitment to reducing CO_2 emissions.

However, little over a third of this total has been contracted since privatisation of the electricity supply industry in the early 1990s and there are doubts over whether the 5,000MW target will be met without further government support.

■ Sixteen CHP schemes, benefiting over 3,000 people, have been announced under the Residential CHP Programme launched in June 1993 by the Energy Saving Trust (EST).

The projects — the first under the scheme devised by EST and the CHP Association — will almost treble the take-up of CHP by housing providers in the UK.

Grants totalling £360,000 have so far been committed to the programme, with another £1.5m available for further schemes. ❑

Wind plans

WITH Scotland's first wind farms due to get the go-ahead at the end of this year, the British Wind Energy Association (BWEA) gathered north of the border for its annual conference in July. In recent years there has been a noticeable shift towards delegates from industry rather than academia as wind power has moved from theory to reality.

As well as discussion of some of the more technical aspects of wind turbines, there were sessions on standards, safety and planning; wind energy in Scotland; public attitudes; and reducing noise emissions.

The so-called wind backlash was an issue high on the agenda. While there were criticisms of "the press" and of organisations opposing wind power, many developers are taking the problem very seriously. BWEA produced a briefing for journalists in March and is currently updating its fact sheets.(1)

Most importantly, it has decided to produce 'best practice' guidelines for wind farms and has invited a wide range of organisations to help in drafting drawing them (including anti-wind group Country Guardian which has refused to take part). "The objective is to produce a set of guidelines which will act as a working document for developers to ensure they address all the issues that may be relevant to the local community," explained BWEA chairperson Ian Mays, adding: "there are other audiences, most notably planning officers who can use them as a yardstick when considering applications."

By involving environmentalists, planners and government bodies in the process, the BWEA hopes the guidelines, expected to be published in October, will give people outside the industry confidence that wind farms are being developed responsibly.

In the session on public attitudes to wind power, Fiona Weightman of Friends of the Earth (England, Wales and Northern Ireland), outlined details of FoE's recently published *Planning for wind power*(2) which includes a call for a ban on siting wind farms within Sites of Special Scientific Interest and Nature Reserves, and the exclusion of larger (ten or more turbine) wind farms in National Parks and Areas of Outstanding Natural Beauty. It also proposes that developers of larger projects undertake Environmental Impact Assessments and for smaller projects environmental impact reports be produced.

"There are no easy choices in energy supply," Weightman told delegates, "but we need to focus on the environmental imperative for renewable energy." And she stressed that developers must realise the importance of public acceptability.

In a session looking at wind energy in Scotland, several speakers stressed the importance for developers from outwith Scotland to understand the different legal and planning procedures north of the border. Phillip Roberts of Ascurry Engineering — an "Englishman living in Scotland" — warned developers "if you go it alone and do not take Scottish partners you will not be successful."

William Craig, a lecturer in law at Aberdeen University, explained some of the many differences between English and Scots law, highlighting Section 50 planning agreements, which have no equivalent in England and Wales. These agreements, between a developer and local authority, do not bypass planning procedures, but bring the authority 'on side' allowing them to share the burden of the planning process. It later emerged that at least one such agreement has already been made, for a wind farm in Shetland ("Shetland wind first", below)

■ The Council for the Protection of Rural England has said that the "rising anxieties about onshore wind generation require the issuing of new planning guidance to local authorities and a rethinking of government subsidies for renewables." Its Welsh counterpart has already called for a moratorium on wind farms until "substantial results have been achieved through conservation measures and wind power generation is proved to be cost-effective". ❑

(1) Further information from BWEA, 42 Kingsway, London WC2B 6EX (071-404 3433).

(2) "Planning for wind power" by Fiona Weightman; Friends of the Earth, May 1994, £3.50.

Shetland wind first

AMONGST the many wind farm projects bidding for a place in the first round of the Scottish Renewables Obligation, due to be announced in October, is a five-turbine proposal from Shetland Aerogenerators Ltd. It may well be the first renewable energy development to have obtained a Section 50 planning agreement ("Wind plans", above).

The local authority, Shetland Islands Council, gave the project its support in obtaining planning permission in exchange for agreements on various aspects of the scheme, including the siting of overhead cables and, if necessary, installation of a booster to prevent radio signal interference.

An earlier proposal for three turbines was made before Shetland Islands Council had a planning policy for such developments and the matter had to be referred to the Secretary of State for Scotland who granted full planning permission.

Interestingly, when the developer amended the scheme to five turbines, requiring new planning permission, the council received no objections.

The site, at Burradale Hill, Tingwall is three miles north-west of Lerwick, the Island's capital.

Shetland, which is not connected to the Scottish grid, relies on expensive diesel generators and would seem an ideal candidate for wind power. ❑

Wind down

WINDHARVESTER, one of Britain's few wind turbine manufacturers, was forced into receivership in June after poor sales of its 300kW machine. The turbine was a development of the Howden machine designed by Glasgow-based James Howden. Howden pulled out of wind power in 1989, in part because of the lack of a home market.

Though sales of WindHarvester's 100kW turbine to farmers and landowners had been reasonably successful, the company found the structure of the Non Fossil Fuel Obligation (NFFO) unhelpful in providing a steady market for the larger machine.

One ex-employee told *Windpower Monthly* "We had potential orders for 15 machines, but they were dependent on NFFO which produces endless delays. A cash-rich company can ride out the troughs but smaller businesses are penalised by the process. In our opinion, while NFFO may be good at stimulating the market for some, it does very little to stimulate any indigenous industry. In fact it has the opposite effect."

It may be possible for the company to be restarted in the near future if firm orders can be obtained. ❑

Dutch go offshore

WORK has started on the first off-shore wind farm in Dutch waters with four 500kW turbines being sited 800m from the coast in the Ijsselmeer, the country's largest inland sea. If successful, the developer PEN hopes to build more offshore wind farms in the deeper waters of the North Sea.

Denmark has been operating a 3MW 11-turbine offshore scheme since 1991, and Sweden has plans to site 98 turbines off-shore. ❑

Welsh wind report

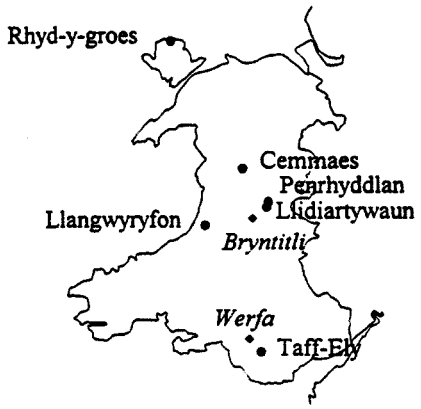
A report generally sympathetic to wind power development has been produced by the House of Commons Welsh Affairs Committee. With one-third of the UK's wind farms sited in Wales, including the 103 turbines at Llandinum, there has been considerable opposition to wind power, most notably from the Campaign for the Protection of Rural Wales ("English and Welsh wind", *Safe Energy 98*)

The committee felt that the "debate over the place of wind generated electricity in the generation mix of the future had been hijacked by exaggerated and emotional claims."

While identifying a number of problems with wind turbines, chiefly visual impact, the committee concluded that "wind energy has the potential to make a significant contribution to national energy needs. That is not to say that wind farms should sprout up on every hill, but rather to argue that there are locations where they can be developed without causing unacceptable visual intrusion, without undue annoyance to local communities and without destroying valued landscapes."

Problems with some aspects of wind farm development to date have been due in part to the constraints of the Non Fossil Fuel Obligation, but the committee criticised the approach of developers as "not always sensitive to local concerns and on some occasions [giving] the impression of riding roughshod over them. This is surprising and short-sighted."

The acceptance of wind farms in the countryside would depend on "the sensitivity with which they are sited and on their being seen as a genuine contribution to clean, renewable and economically viable electricity generation, rather than as evidence of the greed of developers for a generous subsidy," and "permission for their development should be as far as possible in the hands of the local community"



"We anticipate that wind energy's contribution to total generation will remain modest for the foreseeable future, but, despite that, it will be a valuable element in the totality of renewable energy capacity ... in which a wide range of different technologies are employed to complement and support each other."

Friends of the Earth welcomed many of the committee's proposals as "a significant step forward in the debate on wind power, cutting through many inaccuracies and myths." Fiona Weightman, its renewable energy campaigner, commented: "the select committee has clarified that many of the potential problems and genuine concerns surrounding wind farms can be satisfactorily dealt with in well sited and developed wind farms." ❑

*** "Wind energy", Welsh Affairs Committee; HMSO, 1994.**

Dam good news?

CONTRARY to early indications ("Gabcicovo dam problems", *Safe Energy 97*), the Slovakian Gabcicovo hydro-electric scheme on the Danube does not seem to be causing the widely predicted ecological catastrophe.

The troubled scheme — originally a joint project between Czechoslovakia and Hungary — was expected to lower groundwater levels along the Danube affecting wildlife, crops, forests and drinking supplies in the surrounding wetlands. Indeed, when diversion of the bulk of the Danube along a 40km canal began last year the water table dropped by ten metres.

However, the Slovakians now regularly feed part of the diverted water back into the wetlands, reviving 'arms' of the Danube which had been drying out for 30 years because of "dams built in Austria which changed the hydrology of the Danube," according to Miroslav Liska, spokesperson for VV Bratislava, the state-owned company which designed the project.

News is not so good in Hungary where expensive efforts are to be made to try to revive their wetlands using pumps to shift water from the depleted Danube. Liska says: "The Hungarian part of the wetland could be improved just as ours has, but they refuse to join the project."

Hungary pulled out of the original project following extensive environmental campaigning against the scheme and the two countries are still trying to the resolve the resultant dispute at the International Court of Justice in The Hague. ❑

Duddon barrage study

A study into the feasibility of a tidal barrage on the of the Duddon estuary in Cumbria has concluded that it would not be economically viable as an energy project financed in the private sector, or when identified regional and environmental benefits are taken into account.

The study, sponsored by the Department of Trade and Industry, was undertaken and part funded by Balfour Beatty and Robert McAlpine with Shawater Ltd. The scheme considered was of 100MW capacity and would produce around 200 million kWh/year.

Using an 8% discount rate it was calculated that electricity could be generated at 11.8p/kWh; including regional and environmental benefits brought this down to 8.7p/kWh. Only if non-energy benefits in excess of £160m could be identified would the scheme become viable for the private sector.

A smaller scheme, producing half the electricity, was also considered, but this would still require over £80m from the public sector to be viable.

With operating and maintenance costs of just 0.95p/kWh, this project is another example of a renewable energy being stifled by high discount rates. ❑

Irish renewables

TWENTY renewable energy projects have been selected for the first round of Northern Ireland's Non Fossil Fuel Obligation from a total of 45 applications.

Wind power gets 12.7MW of the 15.6MW total with six wind farms having been chosen, all of around 2MW declared net capacity (5MW installed capacity). Nine hydro schemes with a combined capacity of 2.37MW and five sewage gas projects totalling 0.56MW were also selected.

The projects will receive an annual subsidy of around £2.5m for 15 years, funded through an increase in electricity bills of around 0.5%.

The government aims to have 45MW of new renewables capacity installed in Northern Ireland by 2005 as part of its 1,500MW UK target.

■ The Republic of Ireland has introduced a scheme for 75MW of new renewables, waste and combined heat and power (CHP) which it hopes to allocate in one round of bidding this summer.

The Alternative Energy Requirement will provide one-off grants totalling IR£15m. In addition, renewables projects will get IR£0.04/kWh and combined heat and power IR£0.03/kWh for their electricity. Further funding through the European Union's Thermie programme may also be available.

The plan is for 30MW of wind power, 20MW of CHP and 15MW from waste and other sources including biomass. ❑

REVIEWS

Power from plants; by Walt Patterson.

The Royal Institute of International Affairs/Earthscan; 1994, 102pp, £9.95.

From this formidable trio of author and joint publishers there were two things you could safely predict before opening the book: first it would be thoroughly researched, and second it wouldn't have an index.

The lack of an index is actually far less annoying than in some lengthier RIIA publications, especially as the chapters are comprehensively subdivided by topic.

Patterson considers the possibilities for electricity generation, rather than biodiesel and other liquid fuels, believing that it "may offer more immediate promise". He looks at how modern technology could be used for efficient electricity generation from biomass.

Different technologies are considered at: direct firing, co-firing with coal, gasification and pyrolysis. The last two of these to produce fuel for either gas turbines or diesel engines.

Improved gasification and gas turbine systems are already being used with biomass, and a number of pilot and demonstration projects in Scandinavia, the US, Brazil and the European Union are now under development.

Patterson concludes that in many parts of the world biomass power could prove to be a valuable, high-quality energy resource — especially for generating electricity. But success will depend on its many potential beneficiaries promoting the measures necessary to foster it.

There is a lot of useful information crammed between the introduction and conclusions, painfully entitled "growing interest" and "growing importance". Bad pun headlines aside (and who are we to criticise) this is a useful publication, furthering the argument that renewables offer real potential for making a major contribution to world energy needs.

GRAHAM STEIN

REVIEWS

Domestic Energy and Affordable Warmth; Prof Tom Markus (Ed).

E&FN Spon; 1994, 160pp, £39.95.

This report, edited by Prof Markus of Strathclyde University, marks a big step in defining the severe problems of poor housing, fuel poverty and resultant ill-health in Britain. For 8 million households, two thirds rented and one third mainly elderly owner- occupiers, the homes are badly insulated and heating costs are high but income too low to keep temperatures above the 16°C comfort level.

Health problems come directly because of the cold and indirectly via condensation and fungal growth, explained Dr Sonja Hunt for the working group that drew up the report for the Watt Committee on Energy. This means increased mortality and illness, with the latter estimated to cost 800-1000M/yr.

'Affordable' is defined as no more than 10% of household income to be spent on heating; the average spent by the poorest 30% of families is 9% and by the other 70% only 4%. Homes in the north and windier parts require higher heating (or thermal standard), 69% higher for Lerwick compared with Kew, they calculate. Thermal conditions in the eight million homes of the 'fuel poor' and the value achieved for their fuel expenditure are amongst the lowest in western Europe and north America.

The report recommends energy-rating of all 'at risk' households, to guide an upgrading programme over, say, 16 years, which would be well justified in cost-benefit terms. Pending the upgrading, income support and other benefits would be scaled to allow adequate heating. 'Heatability' should be part of the minimum fitness standard for dwellings.

The working group recommended the National Home Energy Rating (NHER) scheme, as taking local climate into account. They propose NHER grade 8 as the minimum upgrade target. The programme would cost an estimated £1,250m/yr, comparable to the uprating of benefits to compensate for VAT on fuel, but targeted to need, resulting in energy saving rather than subsidising continuing waste.

The primary target should not be CO_2 savings, but improved welfare and living conditions, the group argues. The study group drew much of its impetus from Heatwise Glasgow and Energy Action Scotland, but Brenda Boardman from Oxford and Marcus Newborough from Cranfield as well as representatives of the utilities and Housing Associations made significant contributions. The study will surely be an influential reference book.

MAX WALLIS

LITTLE BLACK RABBIT

Moving story

With the recent closure of its prototype fast reactor and the mothballing of the reprocessing plant, AEA Technology at Dounreay is having a hard time.

If new director John Baxter hadn't already realised how bad things were, he could have been left in no doubt when he found his new office. It had been stripped bare of every last item of furniture.

A memo has now been sent to all senior staff requesting that furniture be left behind when they move office.

Long road from Rio

Maurice Strong was the man behind the Earth Summit in Rio two years ago — an event he billed as "our last chance to save the planet". The conference was far from a complete success, but at least Western countries accepted the need for them to cut their carbon dioxide emissions.

LBR wondered what Strong is up to these days, and discovered that as head of Ontario Hydropower, he is busily trying to defend his company's plan to buy 12,500 hectares of Costa Rican rainforest. A move designed to build up international CO_2 credits and avoid having to persuade its customers to use less electricity.

MPs for hire

It is usual these days for big businesses to have a friendly Tory MP on the payroll, and the privatised electricity companies are no exception.

Phil Gallie, the MP for Ayr, is the only Ayrshire MP not opposed to Scottish Power's plan run 65km of pylons through the countryside. He is also, purely coincidentally, a paid adviser to the utility.

Old Etonians are a popular choice with the English electricity companies. Andrew Hargreaves is paid by Midland Electric and Tim Rathbone by Seeboard.

LBR would love to know why, apart from not being Eton educated, Ian Bruce, Tory MP for Dorset South, appears to have been dropped by Southern Electric.

Hobson's choice

The World Energy Conference is a serious event, and next year's gathering is already in preparation. Submitted papers are vetted by a panel of experts, and one casualty of this process was James Hobson, director-general of the UK government's Energy Efficiency Office. Hobson sent a furious letter to the organisers who replied that the paper was ill-prepared and poorly written, but most important was Hobson's contention that the UK had a pretty successful energy efficiency policy. The referees felt there was no place at their prestigious international conference for works of fiction.

Wind from waste

A novel variation to energy from waste is set to be implemented in Minnesota, USA. As a trade-off for being allowed to store casks of nuclear waste at its Prairie Island nuclear power station, Northern States Power must install wind turbines in the state.

In a bill signed by Governor Arne Carlson this May, permission for up to 17 waste casks is conditional on the company operating or contracting for 425MW of wind power and 125MW of biomass by 2002. A further 400MW of wind will have to be added if it is the least-cost fuel alternative.

In addition, if Prairie Island's output drops below 55% of capacity for three consecutive years it must shut down and no more nuclear power stations will be built in the state.

Ham strung

Martin O'Neill, Labour's energy spokesperson, chose the influential *House Magazine* to pen an article on the government's nuclear review. O'Neill criticised the dash for gas; the absence of a national energy policy; and the tendency for short-term contracts. But there was no attack on the economic, environmental and safety failings of nuclear power.

LBR suspects the influence of Adrian Ham, one-time political adviser to Denis Healey and now chief economist at Nuclear Electric, who managed to worm his way into the party's energy policy working group.

Nuclear revue

As the nuclear review gets under way, Nuclear Electric and Scottish Nuclear are arguing for their industry's future. In helping to put their economic cases, both companies have employed the services of Lazard Brothers to show that they have a viable future. This includes an assessment by Lazard that "Sizewell C is a low risk project".

It is only four years since Lazard reported to the Central Electricity Generating Board that nuclear power was "a uniquely high risk industry" with most of the financial problems generic to all reactor types".