

THE SAFE ENERGY

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What future for nuclear power?

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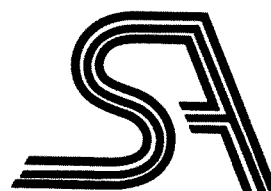
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What future for nuclear power?

THE shambles, scandal and embarrassment that has resulted from coal privatisation and the final phase of the National Power/PowerGen sell-off ("Electricity industry", p18) does not bode well for the government's plans for the nuclear industry ("Selling the family uranium", p4).

When the electricity industry was sold off in 1989/90, nuclear power was the privatisation too far. Under the inept Cecil Parkinson, the entire electricity sale was threatened by 'City' concerns over nuclear power. Even the removal of the magnox stations did not satisfy the money men. Only when Parkinson was replaced by John (now Lord) Wakeham and the whole nuclear sector removed was the privatisation salvaged.

The history of that sorry time for nuclear power, which led to a moratorium on construction, has now been rewritten, and most of the media are happy to report that it is different this time because the magnoxes are not included. The media may have short memories, but the City will surely not be fooled by this falsehood.

In reality, very little has changed since 1989:

- operating costs have been brought down, Scottish Nuclear now claims generating costs of 2.2p per unit ("Scottish Nuclear claims profit", p6), but this conveniently ignores the writing off of a £1.4 billion capital debt which in the case of Torness would add around 4.7p to the unit cost;
- estimates of decommissioning costs have been brought down, but there is little to justify such predictions for expenditure 135 years hence;

- Sizewell B has been completed, but six months to a year late and an estimated 40% over budget; and
- cheaper fuel services deals have been signed with BNFL ("Nuclear Electric/BNFL deal", p6) with most of the risk lying with BNFL and therefore the public purse, but it will take a lot of hidden subsidies to make shares in British Nuclear plc attractive to the City, subsidies which if revealed could be ruled by the European Commission to be a breach of the Treaty of Rome.

Those opposed to the privatisation, who range from electricity generators to environmental groups, nuclear power workers to opposition political parties, have around a year to convince one or more of the government, the City, the European Commission, and the Monopolies and Mergers Commission. The real issues for environmentalists are not about ownership: it can be argued that a nuclear industry in the private sector will suffer terminal decline, whereas in the public sector a change of government could see its revival. Environmental considerations focus on safety, waste management and the ending of nuclear power generation. This particular privatisation plan seems to be about raising £2.5 billion to £3.5 billion for tax cuts before the next general election, money which, if raised, ought to be earmarked for meeting decommissioning costs.

Whether or not the privatisation proceeds, it is important that the risks of nuclear power are understood, safety maximised, hidden subsidies uncovered, and the future costs of decommissioning paid for by this generation. If this happens, nuclear power has no long-term future in private or public hands. □

Nuclear proliferation threat

PERMANENT extension of the Nuclear Non-Proliferation Treaty ("NPT extended", p6) may at first sound like a good thing, but the reality of the 'agreement' reached at the UN in May could be the perpetuation and spread of nuclear weapons.

One of the original aims of the treaty was that those countries with nuclear weapons would pursue disarmament. However, the five declared nuclear weapons states — the USA, Russia, China, France and the UK — remain wedded to the bomb. And the influence they were able to exert at the conference and negotiations in New York could have done little to stifle the ambition of those countries which aspire to being nuclear weapons states.

With support of their Western allies, the nuclear powers bullied reluctant nations into

accepting a permanent extension of the treaty by "general acclamation." As the Malaysian delegation observed, a secret ballot might well have produced a different outcome. The next day, agreement could not be reached on the wording of a communiqué from the conference, the countries could not agree what they had agreed!

The big five may be satisfied with the outcome, but their heavy handed approach has alienated many nations whose support is vital to the consensus on which the treaty depends.

Unless the nuclear weapons states live up to their one concession at the conference — that they must now work towards "the complete elimination of nuclear weapons" — then the treaty may not even be worth the paper on which it is written. □

"Environmental considerations focus on safety, waste management and the ending of nuclear power generation."

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

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Government opts for selling the family uranium

THROWING caution and long-held policies to the wind, the government has announced plans to merge Scottish Nuclear (SN) and Nuclear Electric (NE) into one big 'City-friendly' nuclear utility in an attempt to grab between £2.5 and £3.5 billion before the next general election.

Following persistent and suspicious leaks, the Cabinet has announced plans to privatise the nuclear generating industry. A move which has raised the hackles of the trade unions, environment groups, Labour and the Liberal Democrats, caused a flurry of nationalism north of the Border and thoroughly annoyed James Hann, SN's chairman.

Curiously, the government opted to announce the privatisation before publishing the conclusions of the Department of Trade and Industry's (DTI) nuclear review in the white paper *The prospects for nuclear power in the UK*.¹ A Paper which firmly rejects the industry's pleas for special treatment and cash from the taxpayer to build Sizewell C. It concludes: "There is at present no evidence to support the view that new nuclear build is needed in the near future on emission abatement grounds." Nor is "there any case for the intervention in the market in support of additional nuclear capacity on diversity grounds." However, the government allows itself the caveat that both statements are subject to review.

Finally, it rejects the notion put forward in the industry's evidence to the review that public sector funding could be justified on the grounds that nuclear new build would have "wider economic benefits".

The prospects for new nuclear build were further dented in March with the publication of the DTI's *Energy Paper 65*, which forecast that the contribution nuclear power, along with coal, makes to energy supply will continue to decline. By 2020, predicts the DTI, renewable energy will have a larger market share than both nuclear and coal combined.

Meanwhile, nuclear power is to take its chances in the private sector, apparently free from government intervention and cash. However, only the potentially 'profitable' parts of the industry are to go forward. NE's seven ageing magnox reactors and SN's defunct magnox reactor and their £8.5 billion liabilities are to remain in the public sector, initially as a new company but over the long-term to be amalgamated into British Nuclear Fuels.

The nuclear levy — intended to provide for decommissioning — is to be



scrapped in July next year, allowing a reduction of £20 a year on the average household electricity bill. The premium price paid to SN for its power through the Nuclear Energy Agreement (NEA) will also be dumped, leaving a magnox decommissioning shortfall of £2.6 billion. This, claims Energy Minister Tim Eggar, is to be met by the proceeds of privatisation, which has been variously estimated to be worth between £2.5 and £3.5 billion by Whitehall. The liabilities of the privatised stations are also to be transferred to the private sector and "the government intends to safeguard financing of long-term liabilities passed to the private sector ... through the creation of segregated funds or similar arrangements."

Levy money

Welcoming the decision to privatise, the Confederation of British Industry voiced the opinion of many, urging the government to "put the money already raised [through the levy and NEA] into a special account for decommissioning." The government, however, rejects such arguments claiming that "while the nuclear generators remain publicly owned there is no practical benefit to be gained from setting up segregated funds to meet nuclear liabilities."

Fred Barker of the Consortium of Opposing Local Authorities (Cola), which made a major contribution to the nuclear review, observes that in the absence of a segregated fund "earning future investment income ... the cash sources will be treated as general government revenue, available for a variety of uses. This underpins the claims

that privatisation proceeds will be used to fund pre-election tax cuts." Barker further warns that "NE's cash balance could also be used in this way." Perhaps most importantly "it means that the funding of magnox liabilities will be off-loaded on to future taxpayers."

Rejecting claims that the government was rushing privatisation to raise money for tax cuts, Eggar commented: "What judgement the Chancellor reaches in his budget is for him. But this is not about tax cuts. It is about a viable resolution for the future of the nuclear industry." However, there is considerable doubt over whether the proposals promote a viable future.

Following early leaks that SN and NE were to be merged, considerable opposition to the move was voiced north of the border, not least by SN. To prevent a Scottish Tory rebellion, the government decided that the new nuclear company would be registered in Scotland and be based in Edinburgh. This has dampened opposition, but, there is still scepticism about how long the company would retain its Scottish headquarters and identity.

SN initially rejected the idea of a merger, instead it preferred a proposal put forward by the electricity industry regulator Professor Stephen Littlechild which would have seen the company take over two of NE's AGRs — the so-called four-four option which instead of creating another massive generating company would have promoted greater competition within the electricity supply industry — a long-held Conservative objective. Indeed, Littlechild warned the government in

his evidence to the review that a single nuclear company could exercise its muscle to skew the market against the best interests of the consumer.

There is little the regulator can now do except declare his "disappointment". While some commentators believe the single nuclear company plan could be referred to the Monopolies and Mergers Commission (MMC), as it would have 22% of the market, such a move is unlikely. Although the Trade and Industry Secretary Michael Heseltine is believed to be still only lukewarm about the sale, even after receiving strong arm tactics from the prime minister and Chancellor, he has the power to veto an MMC inquiry.

An MMC inquiry by default is still possible as the Regulator may refer PowerGen and National Power if they fail to shed some 6,000MW of capacity, in the interests of competition, by December. Should the MMC investigate the two non-nuclear generators, it would also have to investigate the nuclear company, cutting right across the sell-off date. According to *The Times* newspaper National Power is prepared to "force a referral to the MMC".

The most likely bar to privatisation — other than the City's refusal to buy the industry — comes from the possibility that the European

Commission will rule that the government's proposals are in violation of the Treaty of Rome. It may decide that competition within the European Union is being skewed because nuclear electricity prices in the private sector would be artificially low because public money, through the Nuclear Levy and NEA, has been invested in the AGRs and Sizewell B. This could well be construed as "state aid". Even if the Commission, which must be consulted, rules in favour of the merger and sale, the decision could be taken out of its hands, as environmental groups, local authorities or other generators may well take their case to the European Court.

Regulation

Another possible barrier to privatisation lies with the time it will take the regulatory authorities — the Nuclear Installations Inspectorate and HM Inspectorate of Pollution — to relicence the eight stations to be sold. The authorities say relicensing it will take between 12 and 14 months as they will have to re-examine all aspects of safety at the plant and decide whether personnel are "fit and proper" to run installations.

An Inspectorate of Pollution spokesman said that public consultation was a standard part of the process and warned that the process could be

delayed — possibly beyond the general election — if opponents opt to use relicensing to challenge the privatisation in the High Court.

The government's plans to restructure the nuclear industry ahead of the sell-off will be subjected to a wide-ranging review by the cross-party Commons Trade & Industry Select Committee starting this Autumn.

While most of the debate, so far, has concentrated on the financial implications of the sell-off, the plan has received a mixed welcome from environmentalists. Some are concerned that a privatised nuclear industry will inevitably cut safety corners in the interest of profits. Others, however, believe that moving the industry into the private sector would remove the risk of a future Labour government caving in to the trade unions and Jack Cunningham and ordering new plant.

■ The chairman of the new nuclear company will be John Robb, former Chief Executive and Chairman of Wellcome plc. "His strong links with Scotland will help to ensure that the holding company will exert real influence from its new base" said the Scottish Secretary Ian Lang. □

1 "The prospects for nuclear power in the UK: conclusions of the government's nuclear review." Cm2860, HMSO, May 1995.

Inconclusive nuclear waste review

K EY decisions on decommissioning and the construction of a repository for intermediate-level nuclear waste (ILW) will not be taken until after the nuclear privatisation, according to a statement issued by the Department of the Environment.

Pre-empting the summer publication of a white paper on the findings of the department's review of nuclear waste management, the Environment Secretary John Gummer told parliament, on the day the privatisation white paper was published, that he could announce "the conclusions that have been reached on two key issues — the timing of UK Nirex Ltd's proposed repository for ILW and the government's policy in respect of decommissioning nuclear plant."

Deep disposal rather than indefinite storage remains the government's preferred policy for tackling ILW. While believing "that the repository should be constructed as soon as reasonably practicable" it has decided to abandon the 2010 deadline for the repository becoming

operational. Instead, "the government recognises that time will be needed to establish a sound safety case and no precise deadline should be set for this process." It has further concluded that "given the length of time needed to develop the repository and the period over which it will remain operational, action now to pursue deep disposal leaves options open until at least the latter half of next century."

In essence it has decided to delay deciding.

Decommissioning should also "be undertaken as soon as it is reasonably practicable to do so." Nuclear operators are to be asked to "draw up strategies for decommissioning their redundant plant ... These will include justification of the timetables proposed and demonstration of the adequacy of the financial provisions being made to implement the strategies."

Repeating the conclusions of the green paper published last year, Gummer says it would be "unwise" for operators to "foreclose technically or economically the option of

completing decommissioning on an earlier timescale should that be required." The current strategy for magnox and advanced gas cooled reactor decommissioning involves a three-stage process "defuelling immediately on shutdown, dismantling buildings external to the reactor shield 5-10 years later, and demolition of the reactor itself 100 years after shutdown."

However, he says, "there are a number of feasible and acceptable strategies for nuclear power stations ... including the safestore strategy proposed by Nuclear Electric and Scottish Nuclear." Safestore, as proposed by the two generators, would see much of stages two and three being delayed until 135 years after shutdown, to allow for radioactive decay and a saving of about one third.

To ensure that the strategies "remain soundly based" they are to be reviewed every five years by the Health and Safety Executive.

In short, as with Nirex, the DoE has decided to delay deciding. □

Nuclear Electric signs £14bn deal with BNFL

AFTER four years of stalemate, and just in time for the government's announcement that it intends to privatise parts of the nuclear industry, Nuclear Electric (NE) has signed a £14 billion fuel services deal with British Nuclear Fuels (BNFL). Scant details are publicly available on the deal as the two companies say much of the information is "commercially confidential".

NE claims that it represents a saving to it of over 10% on an earlier proposal from BNFL. While all of the spent fuel from its magnox reactors — soon to belong to BNFL — is to be reprocessed, the company has only committed half of the spent fuel arising from its advanced gas cooled reactors to be reprocessed at Thorp. No decision has taken about what to

do with the other half, according to BNFL. However, a similar deal signed with Scottish Nuclear earlier this year allowed for considerable amounts of spent fuel to be kept in Thorp's storage ponds.

The main sticking point with signing the previous contract lay with the question of liability for cost overruns, as the government withdrew its pledge to underwrite the deal. NE and BNFL will now share the regulatory risks, while BNFL admits that most of the risk lies with it.

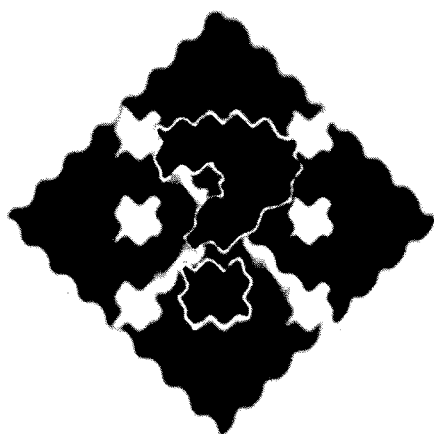
Considerable suspicion is mounting among industry analysts that the deal has been brokered by the government in an attempt to smooth the path to privatisation. The fact that BNFL has radically cut its prices on the basis of projected efficiency

improvements and that it is carrying the bulk of the risk means that ultimately the tax payer is underwriting the deal as BNFL will remain publicly owned, as will the Magnox stations.

■ Meanwhile, NE has been given the go-ahead to continue operating the Hinkley Point A magnox reactors beyond their 30-year design life, which expired on 31 March.

While the Nuclear Installations Inspectorate has given no final date for operating the plant, it said no safety factors had been identified which would limit the life of the two reactors to less than 40 years.

NE now hopes that other magnox reactors' lives can be similarly extended. □



Scottish Nuclear claims profit

RUSHING out an unaudited summary of its annual accounts at the end of April, in an attempt to avoid a merger with Nuclear Electric, Scottish Nuclear (SN) claims to have made an operating profit of £150 million for 1994/95. After subsidies, says SN, this figure falls to £31 million.

However, SN's post-subsidy calculation doesn't include the on-going benefit of a £1.4 debt write-off received when it was created from the old South of Scotland Electricity Board.

Using the Libor (London inter-bank offer rate) of around 6.75% to calculate the annual interest on such a loan — not including loan repayments — means the company would have had to pay some £94 million a year. This gives a subsidy-free loss of about £63 million.

SN further said its generating costs had fallen to 2.2p a unit from 2.9p last year and that it is well on the way to producing power at 2p a unit, which would be competitive with other generating forms. □

Nuclear Non-Proliferation Treaty extended

FOLLOWING a month-long conference and negotiations in April and May, the Nuclear Non-Proliferation Treaty (NPT) has been permanently extended, as was the wish of the five declared weapons states.

Despite significant opposition to making the treaty permanent from the so-called non-aligned movement (NAM) of independent states, led by Egypt, Mexico and Indonesia, the conference decided to avoid a potentially damaging vote and instead agreed to indefinite extension by "general acclamation".

There is considerable resentment at the way the weapons states — the US, Russia, China, France and Britain — and their western allies bulldozed through the issue of permanence. Indeed the Venezuelan Ambassador resigned after his country was forced to support the weapons states by a mixture of heavy

lobbying and economic pressure. Malaysia bluntly told the conference: "Let us state at the outset, that indefinite extension does not have the consensus of the conference. We would have preferred a secret ballot and believe that the outcome would have been very different if countries had voted with their hearts ... Indefinite extension is carte blanche for the nuclear weapons states and does not serve as an incentive to nuclear disarmament ... we are abandoning an historic [opportunity] to free ourselves from nuclear blackmail and to safeguard future generations."

The NAM had wanted a 25-year rolling extension with commitments to nuclear disarmament and specific objectives for each five-yearly review. However, the gulf between the desire of the NAM and the weapons states was clearly illustrated the day after the treaty

was made permanent, and the last day of the conference, when the sides clashed over the weapons states' failure to live up their commitment to move toward disarmament.

The only real concession made by the weapons states was a change of wording in the treaty: previously they were committed to pursue disarmament "negotiations in good faith" and now they must work towards "the complete elimination of nuclear weapons."

Only time will tell just how badly the treaty has been damaged by the conference. The first major test will come in 1997 when yearly review conferences begin on progress towards the elimination of nuclear arsenals. □

A full review of the conference and its implications will appear in the next issue of *The Safe Energy Journal*.

Chernobyl in the balance as safety fears grow

CHERNOBYL could be closed by the turn of the century according to the Ukrainian government, but only if the West foots the bill, while a suppressed European Commission safety report into the state of the site warns that a new disaster could occur at any time.

Despite the explosion, which released massive quantities of radioactivity into the atmosphere in 1986, Ukraine has continued to operate the site's remaining reactors. The Ukrainian government says it can only close the station if the Group of Seven leading industrialised countries provide some £2.5 billion for an alternative source of power and to upgrade the crumbling sarcophagus, which contains the deadly remnants of the stricken reactor four.

Only two of the site's reactors are still working, providing about 5% of Ukraine's energy. Under the closure plan, reactor 2, which has lain dormant since a rash of accidents and a fire rendered it inoperable in 1991, will be officially closed by 1996; reactor 1 will close in 1997; and the remaining reactor will be shutdown in 1999.

The ambassadors for the G7 countries will discuss the proposal when they meet in June. However, there is considerable doubt about their willingness to provide such large amounts of money.

"It is up to governments and countries which are worried about Chernobyl to pay for its closure. Ukraine does not have a problem about Chernobyl. It is a worry for the West," said the site director, Sergei Parashin.

Imminent disaster

Safety fears in the West over the site have been further fuelled by the leak of a European Commission report to *The Observer* newspaper which warns of an imminent new disaster.

A team of Western scientists, who were given unprecedented access to the site, found that concrete pillars supporting Block B, which houses ducts and pipes from reactors 3 and 4, are bearing loads of over five times their design limits.

The team says the pillars could give at any time, sending debris

crashing through the crumbling sarcophagus, or it could collapse into reactor 3 causing a core meltdown. Either way a radioactive cloud could once more make its way across Europe.

The report further warns that the sarcophagus holds some 740,000 m³ of lethally contaminated rubble, over ten times more than was previously thought.

■ Meanwhile, a team led by Keith Baverstock of the World Health Organisation has written to the *British Medical Journal* calling for international help in dealing with the huge increase in childhood thyroid cancer caused by Chernobyl.

Recent surveys of the Gomel region of Belarus — which bore the brunt of the fallout — show that the incidence of thyroid cancer in children has jumped by 200 times to 1 in 10,000, in some smaller areas the rise is ten times higher. In all some 2.3 million children have been exposed to Chernobyl fallout, warns Baverstock. □



Waste want not

AFTER a two month trip, the Pacific Pintail, a British ship taking 14 tonnes of nuclear waste home to Japan from France was allowed to dock in Mutsu Ogawara port only after the Japanese government put in writing a promise not to permanently abandon the material in the state of Aomori without the prior consent of the Governor.

Japan has yet to identify a final site or method of storing its radioactive waste, and the Aomori Governor, Mr Kimura, is concerned that the government will try to backtrack on the previous verbal promise to remove the waste after 50 years. □

US backs Dounreay reprocessing

IN a surprise move the US has finally published a draft Environmental Impact Assessment (EIA) on how best to deal with some 24,700 highly enriched uranium (HEU) fuel rods it supplied to the world's research reactors over the last 30 years, which includes the suggestion of having up to half of the rods reprocessed or stored at Dounreay.

In 1988, the US policy of taking back the weapons grade material, for non-proliferation reasons, lapsed and could not be restarted until an EIA was carried out. This has been a long and arduous process which left a number of operators in a difficult position. Many of the research reactors were built with US assistance and with minimum storage capacity, some may have to close if they can't get rid of their spent fuel.

Previously the US government had declared its absolute opposition to allowing the US-origin weapons-grade material to be reprocessed at Dounreay and in 1993 even offered a Belgian operator \$500,000 to break a contract with Dounreay.

Now, however, the EIA has identified three options: to take all the fuel back for storage or reprocessing;

"facilitate" the fuels management overseas; or a hybrid of the two.

Two powerful US lobby groups, the Nuclear Control Institute and the Natural Resources Defense Council, have written to the energy secretary, Hazel O'Leary, arguing: "We are vigorously opposed to this idea [of reprocessing research reactor fuel] for both non-proliferation and environmental reasons. It would seriously undermine the reduced enrichment for test reactors programme and break the US moratorium on reprocessing." The groups underlined their strength of feeling by having their attorneys sign the letters.

However, according to Department of Energy (DOE) insiders there is considerable doubt that the schedule of taking back 22,700 spent fuel elements over a 10 to 13 year period can be met by the US alone. A DOE memo, dated 9 February, leaked to the industry journal *Nuclear Fuel* says "We need Dounreay as a partner to accomplish the mission of minimising the civil use of HEU worldwide."

Dounreay has confirmed that: "the subject is a matter of discussion at government level." □

Nuclear dump inquiry

The latest stage in plans for an underground dump for nuclear waste at Sellafield is an inquiry into the construction of a 'rock characterisation facility'; Dr Patrick Green previews the inquiry.

AS part of its strategy for nuclear privatisation, the government now seems determined to push ahead with its policy of developing a nuclear waste dump at Sellafield.

With a clear nod in the direction of the 'City', the government has reaffirmed its commitment to the eventual disposal of intermediate-level nuclear waste. Despite widespread concern over spiralling waste management costs and government hints, in last year's consultation paper, that it might finally adopt interim storage, Nirex has instead been instructed to proceed "without any unnecessary delay" to develop an underground nuclear waste dump.

By reaffirming its existing policy, the government clearly hopes to calm any City nerves over the nuclear industry's failure to develop a disposal facility. The government clearly wants the City to think that nuclear waste management should not be a barrier to privatisation. If this sounds suspiciously like whitewash, be suspicious. The AGRs' liabilities are already costed at around £6 billion, and with no final destination for operational and

decommissioning wastes in sight this estimate is at best uncertain. However, now that the government has thoroughly reviewed its policy and concluded that a disposal facility will be built, can the City draw any comfort from the certainty that an end point is now in sight?

It should not, for the government is not sufficiently confident that its policy is right to allow it to be discussed at the forthcoming public inquiry into Nirex's so-called rock characterisation facility (RCF) at Sellafield. Further, the government's statement that a nuclear waste dump should be developed "subject to meeting the necessary planning and regulatory requirements" rings rather hollow alongside the narrow terms of reference it has set the RCF inquiry. The government has dismissed the widespread demands for a wide-ranging inquiry and has essentially restricted its scope to local planning issues with a clear presumption in favour of the development. Unusually for a local planning inquiry, the application will be determined by the Secretary of State, John Gummer. Confident that it is right?

The narrow terms of reference no doubt pleased Nirex, which currently seems to be doing its best to restrict any adverse debate over its plans. Most potential critics in the scientific community seem to be being silenced by being drawn into research contracts with Nirex earning large amounts

of much needed research money. Even the Planning Inspectorate is having problems finding an expert in geology and hydrogeology who is independent of Nirex, to act as an assessor at the forthcoming inquiry!

Despite all this, the government and Nirex's plans could yet go very, very wrong. While under local planning inquiry rules, the developer does not normally have to prove the need for the proposed development or discuss the merits of alternative sites, the inquiry Inspector has already stated that the "nature of the development [the RCF] and the national need may make the relative availability of suitable alternative sites material to the decision."

This view was challenged by Nirex at the first pre-inquiry meeting — Nirex argues that there is no alternative site for development of the RCF. In reply, the Inspector argued that any potential disposal site is a potential RCF site, given that Nirex says you can't build a nuclear waste dump unless you build an RCF first. Nirex may have to compare the hydrogeological environment at Sellafield with the, as yet unnamed, alternative sites it is supposed to have considered.

Further, while the Inspector stated that he would not force Nirex to disclose information relating to alternative sites, he noted that it may well be the Courts that ultimately decide on this issue. The inquiry could easily run for longer than the projected 50 days. Consequently, the road to development of a nuclear waste dump could therefore be a rather long one, even if Nirex succeeds in obtaining planning permission to construct the RCF. Any further delays in constructing the dump will mean that, by default, the industry will have to adopt interim storage.

Any prospective buyer for the odd AGR or two would be best advised to pay particular attention to the line of the government's announcement which stated: "The government therefore believes that a repository should be constructed as soon as reasonably practicable once a suitable site has been found ..."

Sellafield, as most observers predict, may still be found to be an unsuitable site and finding an alternative one, as the joint Radioactive Waste Management Advisory Committee (RWMAC)/Advisory Committee on the Safety of Nuclear Installations (ACSNI) study group recently recommended, could be a very time consuming and rather expensive process. □

□ Dr Patrick Green is senior energy, nuclear and climate campaigner at Friends of the Earth (England, Wales and Northern Ireland)

Home energy conservation bill

IT is unusual enough for a Private Member's Bill to succeed, but doubly so when that bill was the subject, only a few months ago, of a three-line government whip "condemning" it. But on 17 March the Home Energy Conservation Bill passed through the House of Commons, and is now progressing through the Lords, from where it is expected to emerge unscathed. The bill, proposed by Liberal Democrat MP Diana Maddock with all-party support, is now almost certain to become law by the summer.

Its success has much to do with the unprecedented number and range of organisations and individuals who have lent their support to the three-year campaign to promote the bill. This is the first time, though probably not the last, that groups as diverse as Help the Aged, the RSPB and Unison have joined the energy efficiency industry and the lobby to promote energy conservation. Add cross-party support, and lobbying by individuals and regional groups in Scotland, Northern Ireland and Wales, and the impact is huge.

The legislation will build on the existing energy conservation activities of local authorities by including private sector housing in their area and makes the following provisions:

- Local authorities will have to draw up strategic energy conservation plans, detailing which cost-effective measures are necessary to achieve "significant" energy savings in residential property in their area (the energy efficiency minister Robert Jones has guaranteed that the Guidance Notes will define "significant" as savings of at least 30%).
- The plans will assess the cost of the measures and the resulting carbon dioxide reductions, and are to include procedures for targeting the households most in need of energy conservation work, for reasons of health, fuel poverty, frailty etc. Importantly, the government has agreed to provide the extra funds needed for drawing up the plans.
- The plans may include estimates of the number of jobs which would be created, and the reduction in sulphur dioxide and nitrogen oxides which would be made.
- The Secretaries of State (for Environment, Scotland, Wales and Northern Ireland) also have duties under this bill. They must set a date or dates by which the strategic reports are to be sent to them. They must then ensure that the reports are acted upon. Finally, they

must report to Parliament themselves on how councils are doing, and on what steps they have taken to encourage them.

This legislation should provide much-needed data on the energy efficiency or otherwise of the entire UK housing stock, without adding unduly to local authority duties. This is because many authorities have already begun to compile energy efficiency 'profiles' of their own housing stock, and are increasingly required to do so.

English and Welsh local authorities carry out energy efficiency surveys of their housing stock as part of the Housing Improvement Grant bidding system, on the basis of which the Department of the Environment sets its housing budgets. They also look at private sector housing in stock condition surveys under Section 605 of the Housing Act 1985, which specifies that "at least once in each year [local authorities should] consider the housing conditions in their district." Energy efficiency, where not already considered, could easily be incorporated.

In Scotland, local authorities are encouraged to look at energy efficiency as part of a local housing condition survey, and action on "mould and damp" has been set as a priority by the Scottish Office for local authority council house spending plans. Northern Ireland's Housing Executive would be the Energy Conservation Authority under the bill, and is already responsible for a five-yearly House Condition Survey.

The Agenda 21 agreement signed by the prime minister at the 1992 Earth Summit in Rio also puts the onus on local authorities to draw up sustainable development plans for their areas, of which energy strategies are an integral part. So the basic tools are in place.

The Home Energy Conservation Bill fits very well with each of these activities, allowing them to contribute to a new approach to energy efficiency improvements. It is to be hoped that other agencies including housing associations — many of whom have very progressive energy conservation strategies — will contribute to the plans. The Energy Saving Trust, and the Home Energy Efficiency Scheme, in particular, are likely to find that the energy 'maps' which local authorities will be producing will enable them to target their activities more cost-effectively.

This bill, when it becomes law, will not magically solve the energy profligacy of UK housing, but it will provide the indispensable basis for sensible and cost-effective action for the foreseeable future. □

The revived home energy conservation bill — 'talked out' in the House of Commons last year — has now successfully passed through the Commons to the Lords and looks set to become law this summer;
Linda Taylor reports.

□ Linda Taylor is Deputy Director of the Association for the Conservation of Energy

The fight against Mochovce

Plans by the Slovak government to complete its Russian-designed nuclear power station at Mochovce are being strongly opposed; Hazel Dawe reports

COMPLETION of the controversial Mochovce nuclear power station in Slovakia is in doubt following the indefinite postponement of a decision by the European Bank for Reconstruction and Development (EBRD) on a loan to bring the reactors up to western safety standards.

The Bank had looked certain to authorise a DM412.5 million loan despite intense pressure from environmentalists and other groups opposed to completion of the project. However, the postponement, at the end of March, came at the request of the Slovakian government ostensibly as a result of an overwhelming vote in the European Parliament backing an Austrian resolution against EBRD funding unless and until it is firmly established that the safety standards of Euratom, the European atomic energy agency, will be met. The Slovaks are also reportedly looking at an alternative Russian and Czech proposal for project completion.

Construction at Mochovce, 120 kilometres east of the Austrian border, was abandoned by the Russian nuclear authority Minatom in 1990 with its two VVER reactors 85% and 90% complete.

On Wednesday 18 January a public inquiry into Project Mochovce, the first ever into a proposed loan by the EBRD, had to be cancelled when Electricité de France and Slovenske Elektrane (the two potential operating companies) withdrew their participation.

Energy saving

Mochovce is not necessary for domestic electricity supplies; Slovakia still has enormous potential for energy savings. For a minimum of 12 years, 50% of the electricity Mochovce generates will be exported — mainly to repay loans. For this purpose, a heavy duty cable must be laid through Austria — which has a clause in its constitution forbidding the use of nuclear power for commercial purposes. The first stretch of the 380kV cable is already under construction from Bisamberg (near Vienna) to the Stupave transformer station across the border in Slovakia. Although the Austrian government denies the purpose of the heavy duty cable, investigative work by Global 2000, Greenpeace and the Austrian Green Party has uncovered plans for the missing parts of the link inside Austria.

Contingency plans in case of accident and the environmental audit have both been criticised as inadequate and "unacceptable in Austrian law" by the Austrian Minister for the Environment

Maria Rauch-Kallat. The mixture of western and Russian technology is seen as problematic by Radko Pavlovec of the environmental organisation Global 2000.

One of the biggest safety problems is the lack of proper secondary containment. Mochovce has a 'bubbler condenser' to contain leaks from the coolant system; above ground, four sealed concrete vacuum towers are ready to absorb the pressure of an explosive accident in the reactor and contain the radioactive material. This method of containment has never been tested or tried on a VVER. Pavlovec says: "The Mochovce containment cannot compare with the solid containment which is compulsory in western countries. If this installation doesn't work faultlessly, or under certain circumstances, the containment will burst and all the radioactivity will be released."

An international commission of experts examined the existing installation at Mochovce in February on behalf of the Austrian government. Not only did they criticise the containment but they also found other safety problems. The turbines are in cramped conditions and too close to the pipes of the cooling system and the steam supply to the turbines. Any explosion here could easily result in damage to the pipes removing any hope of stabilising the fuel rods. The turbines are already concreted into place — moving them now is impossible. An unexpected danger was that all the safety valves and reduction valves which run parallel to the primary cooling system between the reactor and the turbines will automatically shut down if there are problems with any one of them.

Uneconomic

The commission came to the conclusion that Mochovce is unsafe and to make it safe would be so expensive as to be uneconomic. It was compared to Greifswald in the former east Germany, the only other reactor close in type to Mochovce. It too uses Russian VVER 440-213 reactors from the 1970s. In 1990, after the reunification of the two Germanies, the German government decided to decommission Greifswald because it would be uneconomic to bring it up to western safety standards!

The management of the EBRD has been accused of manipulating the figures in the mandatory 'least cost study' until the nuclear option was cheaper than conversion to a gas power station. Even so, it is still only 5% cheaper, a margin which may already have been eaten up by costs for changes during construction. In an interview with the Austrian magazine *Profil* Joseph Misak, manager of the Slovak Nuclear Power



authority, admits to the replacement of: faulty cabling, part of the concrete of the reactor core which was sub-standard and repairs to cracks in the soldering. Not very reassuring!

The original least cost study by consultants Putnam Hayes & Bartlett (PHB) disappeared for two months before a revised study was published on 28 November 1994. Among other things, the EBRD has arbitrarily changed the discount rate from 12% to 10%, and raised the projected future gas prices twice. PHB has included a disclaimer in its revised version of the report stating that the assumptions for the basic data came from the EBRD. A study by the German Öko-institute (Ecological Institute) comes to the conclusion that the PHB study is grossly inaccurate. The D Mark/US Dollar exchange rate used is unrealistic and increases the cost of alternative non-nuclear fuels by 8.4%. There is no provision for decommissioning costs and a useful life of 30-40 years is assumed. As very few of the pressurised water reactors built in the 60s are still working without expensive safety adaptations, this is an unrealistic assumption. It is also an assumption the German government was not prepared to make in the case of Greifswald.

For all technical questions, the Bank is making use of the expertise of the Electricité de France — the very people who will profit from the scheme with a contract for almost DM1 billion. Should the loan be authorised, it will be the first time a development bank has financed a nuclear power station.

French connection

The president of the bank is Jacques de Larosière, his vice president is Thierry Baudon. Personnel who are critical of nuclear power have been exchanged for French pro-nuclear bank employees until everyone concerned with authorising the loan is now French. British employee Martin Blaiklock who was in charge and did not 'play ball' was replaced by Allain Pilloux. The Austrian representative at the Bank, Heiner Luschin, who has been critical of the Mochovce Project is in danger of losing his job through intensive French lobbying of the Austrian government. It is critical for the project that the presidency of the European Union is in French hands until July, by which time all the decisions on Mochovce are supposed to have been made.

One of the conditions attached to the Mochovce loan is the closure of the nearby Bohunice reactor by the year 2000. Baudon, a staunch supporter of nuclear power, has described Bohunice as 'the most dangerous nuclear power reactor in the world'. Bohunice is even closer to Vienna than is Mochovce, and in the case of an accident at Bohunice, Vienna could not be evacuated in time. At the beginning of February, the Environment Committee of the Austrian Parliament sent letters to the EBRD and Euratom voicing

"serious doubts on the safety of the installation". At the EBRD meeting on 22 March, to the amazement of all present, the Slovak delegate, Tomas Parizek, asked for a postponement of the decision on the loan.

This unexpected reprieve was due, at least in part, to a new offer from the Russian nuclear authority Minatom which originally started building Mochovce, and the Czech Skoda Praha company. As this new offer is significantly cheaper than the French/Slovak joint venture, there is speculation that this cannot possibly meet safety requirements. The competence of the Czech company is questionable as they are able to complete their own nuclear reactor at Temelin only with help from Westinghouse. Two conditions of the EBRD loan are also politically problematic for the Slovak premier Vladimir Meciar: the insistence that Bohunice be closed by the year 2000 (Meciar had hoped to keep it generating cheap electricity until at least 2005); and the compulsory 25% rise in the price of domestic electricity. He has already had safety improvements made to Bohunice which indicates his wish to keep it open as long as possible.

The Euratom contribution of 25% of costs is now in question because of the project evaluation by the European Investment Bank (EIB), presented on 4 April. The EIB report comes to the conclusion that a gas fired power station would be cheaper than a nuclear reactor — it assumes a gas price of only half that quoted in the PHB report.

What happens at Mochovce will be an indicator of future development of the nuclear industry in eastern Europe. Mochovce is the thin end of the wedge. Now protesters have made it impossible for them to build new nuclear power stations in the West, the companies involved (Westinghouse, Siemens etc.) are pressurising an ecologically unschooled eastern Europe into accepting nuclear power as the answer to all their energy problems. It is vital that the institutions of the European Union are made to take an honest look at nuclear power and all its consequences. The potential of energy savings and renewable energy should be examined thoroughly as alternatives. Any precedent established at Mochovce will have future repercussions throughout eastern Europe. In the words of an Austrian MEP Reinhard Rack "We must not forget that Mochovce is still the pilot project for dozens of other eastern European nuclear power stations." □

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"We must not forget that Mochovce is still the pilot project for dozens of other eastern European nuclear power stations."

□ Hazel Dawe is a member of the Green Party (England and Wales) international working group and is the Green Party monitor for Austria, where she lived for 17 years.

Climate change for energy efficiency

David Crane
outlines
research
which
suggests that
energy
efficiency
measures can
lead to
increased
energy use,
and argues
that policies
to restrict
economic
growth will
also be
needed to
reduce total
energy use.

THE threat of global warming and climate change continues to hang over us, as our institutions grind slowly and sporadically towards some form of agreement on a solution. Many people and governments are looking towards technology to solve the problem, but can it?

Undoubtedly, technology has a role to play in any strategy for reducing carbon dioxide emissions — the principal global warming gas. However, to trust in technology alone to solve our problems is, at best, highly optimistic. Science is no magic box of tricks after all, and often has as much to say about what we cannot do as what we can.

The problem is a complex one, involving many interacting factors. Complex problems require complex solutions — in addition to the technological means at our disposal, such as non-fossil energy sources and energy efficiency, political and personal factors play a significant role, as demonstrated by Opec's understandable yet narrow stance at the Berlin conference on climate change in April ("Berlin mandate on climate change", p19).

In order to fully understand the effects of a technological solution, it is necessary to look beyond the technology itself, and see how we, and the economic system in general, interact with the technologies at our disposal.

This can be achieved in a formal way by using a computer to model the interactions between different sectors of the economy. ECCO, an integrated economic model, which has been developed at the Centre for Human Ecology in Edinburgh, is capable of addressing these issues. The model is unusual in establishing the links between the supply and demand of a number of commodities such as energy and human-made infrastructure, in both directions.

Supply is geared to meet demand, but demand is also influenced by growth, which in turn depends upon supply. Closing the loop in this way allows the model to determine how a policy affects the growth of the system, which in turn affects future demand.

(In most computer models, the rate of growth is externally determined, and hence does not interact with other aspects of the economic process.)

If we were to ignore this feedback between policy and growth, we would expect that introduction of energy efficient machinery in industry would reduce the economy's fuel bill, and therefore reduce the environmental consequences. True, some form of "rebound effect" might occur, for example where fuel-efficient cars, being cheaper to drive, are driven further, but these are generally thought to be minor, and restricted to particular activities. In all the "rebound effect" literature, the possibility that money saved on car fuel might be used to buy a bigger fridge, or use more hot water, for example, is never discussed.

Introducing energy efficiency to the industrial sector in an ECCO model of the UK, in which the supply-growth-demand feedback processes were present, and all sectors of the economy simulated simultaneously, quite a different picture emerges. Figure 1 shows the "expected" and actual energy savings (for the economy as a whole); in reality, introducing the technology leads to an increase in overall energy use.

Puzzling

At first, this outcome is puzzling. On reflection, though, the pattern is familiar. Ever since the industrial revolution, machinery has been getting more and more energy efficient, and our consumption of energy has gone up and up. The effect of technology on economic growth provides the missing link in the puzzle.

A considerable amount of our economic infrastructure is devoted to extracting and refining energy sources. In 1994 8.5% of the UK's infrastructure was directly involved in the energy supply lines, either in extracting the raw fuels, refining and transporting them, or generating electricity. The upkeep and expansion of this infrastructure is a considerable drain on the resources of the economy.

By making our machinery more energy efficient, we reduce the need to invest in these energy supply lines. Investment potential is freed to be used for other purposes. If this "dividend" is reinvested in industry, the system will grow faster. Faster growth means more energy use. The pattern of development of industrialised nations throughout this century has followed

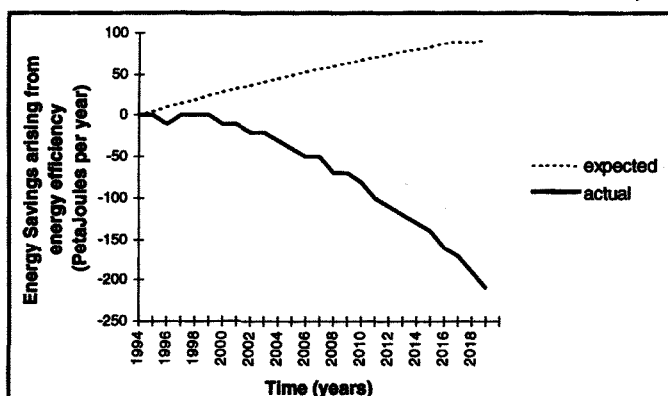


Figure 1: Expected and Actual Energy Savings by the UK as a result of Investing in Energy Efficient Technology, projected forward 25 years. Expected value is that expected by considering direct technological effects only.

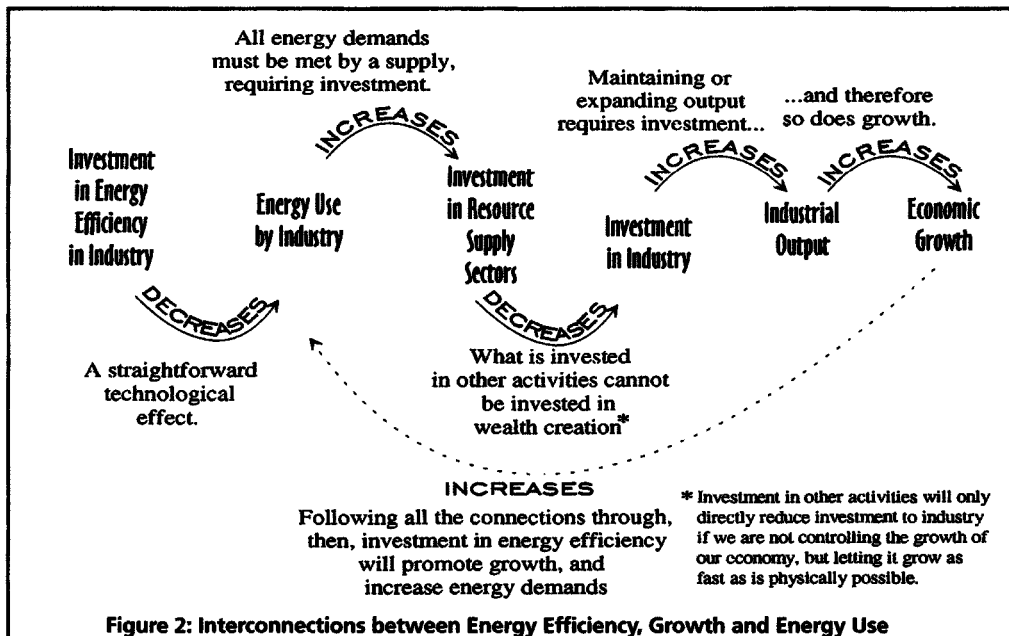


Figure 2: Interconnections between Energy Efficiency, Growth and Energy Use

variations on this theme, as illustrated in figure 2.

Is energy efficiency a bad thing for the environment, then? I would argue that it is not, provided that we recognise the choices available to us. As has been said before, many times, most technologies are neutral. Whether they generate "good" or "bad" effects is the responsibility and foresight with which they are used.

Look at the various connections making up the circle in figure 2. Some are technical, and essentially outside our control. Simply realising that use of energy is bad for the environment will not alter the amount of fuel required to power a blast furnace or a paper mill.

Other connections, though, are more flexible, and simply reflect our current patterns of behaviour. Notably, figure 2 asserts that, if we invest less in energy supply, we will have more to invest in industry. This is true, if we make that choice. Alternatively, we may choose to invest the 'spare' wealth in some other activity, such as environmental restoration work, or community development. If we make any of these choices, there will be unforeseen feedbacks and knock-on effects, for sure, but the environmentally vicious circle shown in figure 2 will be broken, and energy efficiency could represent a genuine part of the solution to global warming once more.

What would it take to make such a choice? To decide to grow only as fast as was prudent, rather than as fast as was possible? Are we capable of restraining our collective greed, and dissatisfaction with our present lot, no matter how much better than that of our forebears?

Such a decision would represent a major change, a unique historical event, even. And yet, to continue to scramble for growth, and invest our hopes for the future in technology alone, is blind, reductionist thinking, as is the assertion that economic growth must come before environmental clean-up. The sub-standard living conditions of large numbers of the world's population is a social, not a physical-economic one, and will not be solved by further growth.

Technology and society develop in response to one another, and a genuine solution to the major problems of our day requires the active participation of both players. Technological 'fixes' and human greed and neediness are poor mixers. □

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"Technology and society develop in response to one another, and a genuine solution to the major problems of our day requires the active participation of both players."

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Under-insurance: a hidden subsidy

In a submission to the recent government review of the nuclear industry, the Druridge Bay Campaign drew attention to the hidden subsidy of under-insurance; Graham Stacy summarises its findings.

THE UK nuclear industry is under-insured. In the event of a major nuclear accident, the bulk of the compensation payable would have to be found by the taxpayer. This means that the operators are receiving a hefty hidden subsidy from public funds in terms of their insurance costs. Moreover, the amount of compensation available is limited, and is far below what is now known to be required following experience of the Chernobyl disaster.

Compensation for nuclear damage in the UK is governed by the Paris Convention, supplemented by the Brussels Convention. The combined effect of these two pieces of international law creates a three-tier system of compensation. The first tier is provided by the insurance paid for by the operator; in the case of the UK, this is set at £140 million. The second tier is provided by the state in which the nuclear installation is situated (the 'installation state'); in the UK, this second tier amount is also £140 million. The third tier, £200 million, is provided by the contributions made by all the other states which are party to the conventions.

In the event of a serious nuclear accident in the UK, the total amount of compensation available would thus be £480 million, but this would also have to cover compensation claims arising outside the UK.

Chernobyl

Given what we know about the Chernobyl accident, for example, this amount seems grossly inadequate. The Soviet Economic Forecasting Agency's official calculation of the direct cost of the accident to the Soviet Union is £1,950 million to £3,100 million. Longer-term costs, including the treatment of radiation sickness, were estimated by the Head of the Soviet Fire Service at around £200,000 million. A 1982 US government study, examining the likely costs of worst-case accidents at selected US nuclear plants, estimates damage amounting to between £1,900 million and £3,100 million, at 1994 values. £480 million will not go very far towards costs like these.

This deficiency is well recognised by the international nuclear community. The Brussels Convention itself was a response to the realisation that the limits to

compensation set by the Paris Convention were far too low. Since Chernobyl, negotiations have been in progress at the International Atomic Energy Authority on this and other aspects of the nuclear liability regime. But the Chernobyl accident happened in 1986, and there is still no agreement on new compensation limits.

There is no doubt that the risks involved in nuclear power generation are enormous. Special arrangements, known as the 'pooling' system, have had to be put in place by insurers. There are 28 insurance pools around the world, including two in the United States, each consisting of a number of insurance companies declaring the amount of risk it is willing to accept. On this basis, each company is assigned a percentage of the pool, this figure being the percentage of the premiums it is entitled to collect, as well as the percentage of the expenses of the claims it would have to pay out. As previously stated, claims payable by the pool in the UK have an upper limit of £140 million. Each pool is able to re-insure its risks with other pools.

Uninsurable

Despite these complex arrangements, the potential costs of an accident are so large that, in practice, it is not possible to insure against them fully. Even if the operator's liability was raised to the limit of available insurance, as is thought to be the case in Germany and Switzerland, considerable complementary state funding would be required even to come close to covering the estimated costs. It is also debatable whether insurers would be prepared to cover the true estimated costs of compensation.

The proportion of the financial risk carried by the nuclear operators themselves, compared with the actual costs, is minuscule. In the UK, they are responsible for insuring themselves up to a limit of £140 million. That is 29% of the compensation required by the Paris and Brussels Conventions, whose limits are universally agreed to be too low, and 0.07% of the costs of an accident on the scale of Chernobyl. The UK nuclear industry has made much of the fact that it has a statutory obligation to insure itself, taking care to point out that this obligation does not apply to other power producers.

These generators would be able to cover the costs of an accident at one of their plants from their assets, clearly impossible for the nuclear industry.

A further condition imposed by the Paris Convention is that of strict liability. This means that in the event of a nuclear accident, the operator is held to be liable for compensation claims and negligence does not have to be proven. Remember, though, that the operator will not actually be paying most of the compensation, as its insurers will only have to meet the £140 million limit; the rest will be taxpayers' money. Although potential claimants would not have to go through the wearying process of establishing fault, they would, however, have to establish that the damage to themselves was a result of the nuclear accident, and do so within given time limits. Considering the length of time which cancers can take to develop, for example, claimants would no doubt experience great difficulty in establishing their right to compensation.

Cap in hand

The strict liability condition has been cited as a reason why it is legitimate to set a ceiling to the nuclear industry's responsibility for compensation. It is argued that having a statutory obligation to be insured is a commercial disadvantage, and that it is only fair to offset this by capping their liability.

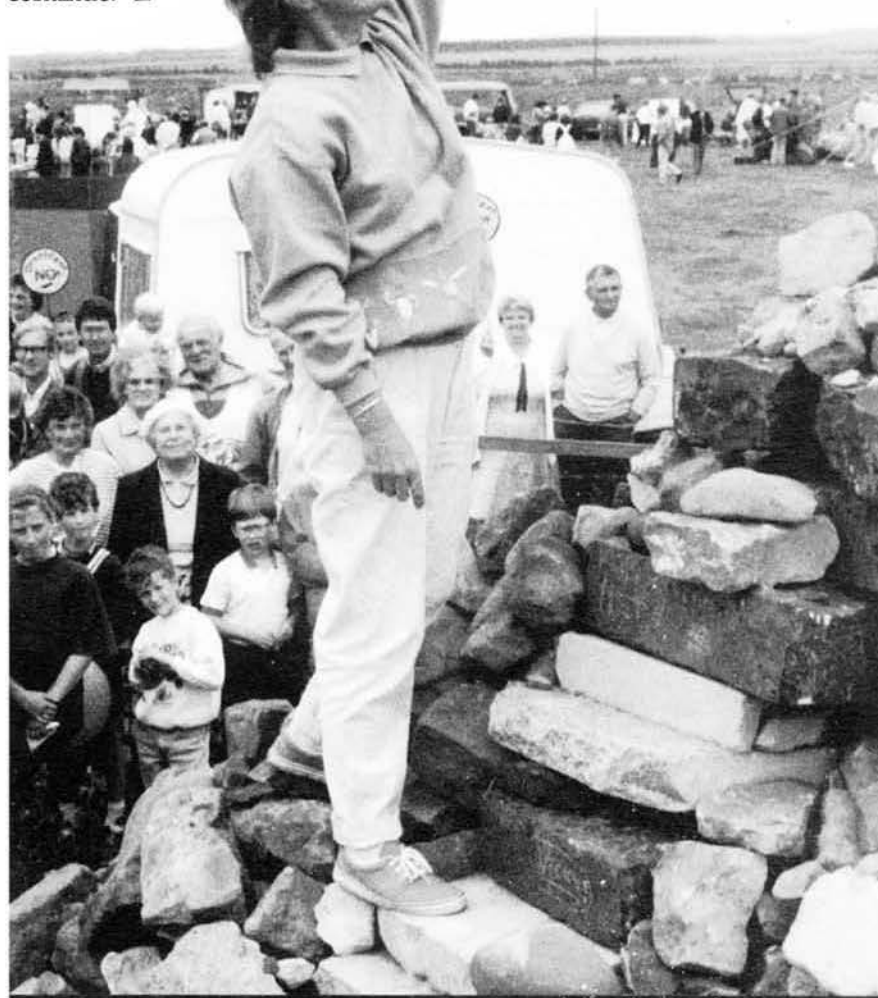
The real situation is that the potential consequences of a major accident resulting from the generation of nuclear power are huge in comparison to the alternatives; and the costs of insuring against this should be properly reflected in the nuclear industry's operating costs, as otherwise this represents an enormous implicit subsidy. Being sheltered from the financial burden of insuring against all but a small proportion of the compensation likely to be payable, it is the nuclear industry which gains a commercial advantage over its competitors and whose electricity is artificially cheap.

So what are the real costs of nuclear power generation, once the correct amount of insurance, required to cover the ever-present risk of a major nuclear accident, is included? On the assumption that a commercial insurance company would apply a premium rate percentage based on assessment of the risk (premiums ranging from 0.058% to 5.0% have been discussed in the US, compared with 0.4% for the current limited liability

in the UK), it is possible to calculate an additional unit cost for nuclear power generation, fully insured against risk of accident. Using an estimate of the lowest and highest costs for compensation following a nuclear accident, a minimum figure of 1.0 pence per kilowatt hour (kWh) is reached, rising to a maximum 293.5 pence per kWh!

The Druridge Bay Campaign, which has been working on the issue for many months, produced a full report in September 1994. The report recommends that the government should remove from a privatised nuclear industry all explicit and implicit subsidies, especially in the form of underwriting third-party liability compensation.

If the nuclear industry is unable to insure itself against the huge risks now demonstrated to be attendant upon a nuclear accident, perhaps nuclear power generation should not be permitted to continue. □



Using windpower

Energy from the wind is often portrayed as an unreliable energy source; Graham Stein looks at the practicalities of large-scale use of the technology.

THANKS to the Non Fossil Fuel and Scottish Renewables Obligations, windpower is now being developed throughout the UK, and costs have fallen dramatically. But is large-scale use of windpower technically possible?

The size of the accessible UK wind resource was assessed by the government, through its Energy Technology Support Unit, at 343TWh/yr onshore and 380TWh/yr offshore, compared to current UK electricity demand of around 310TWh/yr. Allowing for planning limitations, grid connection costs and the rate at which turbine construction could be undertaken, the maximum practicable resource is put at 54TWh/yr onshore and 140TWh/yr offshore.

So how much of this resource could actually be utilised? Critics of windpower often ask disparagingly 'What happens when the wind doesn't blow?' This is taken a stage further to suggest that all the existing conventional generating capacity is needed for when windpower isn't generating, and therefore that windpower does not replace any conventional capacity. It has even been suggested, by the Countryside Commission for Wales amongst others, that wind generation does not reduce carbon dioxide emissions as conventional fossil fuel plant is required on 'spinning reserve' — running (below optimum efficiency) at partial output — ready to take up any shortfall in supply caused by the intermittency of windpower.

While wind turbines will not generate at wind speeds outwith a designed operating band, they are sited in areas with suitable wind regimes, and can typically achieve outputs of around 40-50% of their installed capacity. This compares with around 75% for coal or the more reliable nuclear plant. Work carried out by the CEBG before electricity privatisation estimated that the first 1,000MW of wind would replace about 400MW of coal or nuclear plant. This 'capacity credit' of 40% will decrease as the amount of wind capacity

increases, but a European Commission funded study predicted a capacity credit of around 15% of installed capacity for wind energy with a penetration of 15%.

The argument about spinning reserve and carbon dioxide emissions was refuted by the Welsh Affairs Committee in its investigation of wind

energy last year. After consultation with the Parliamentary Office of Science and Technology, the committee stated: "each unit of electricity generated by wind may be considered to displace a unit of fossil fuel generation." It concluded that "routine variations in demand within the grid and the need to protect against the failure of conventional power sources together require a flexibility far greater than that demanded by wind energy either at present or in the foreseeable future. The CEBG estimated that additional reserve might be required only after intermittent sources supplied more than about 20% of peak demand in England and Wales. ETSU estimated that above 32TWh/yr (around 10% of average demand) there would be some increase in system operating costs.

The position in Scotland, which has possibly the best wind resource in Europe, is even more amenable to windpower. The high level of hydro power (1,189MW), together with 699MW of pumped storage (more than 10% of system maximum demand) would suggest that, in terms of system operation, even higher penetration could be achieved north of the border.

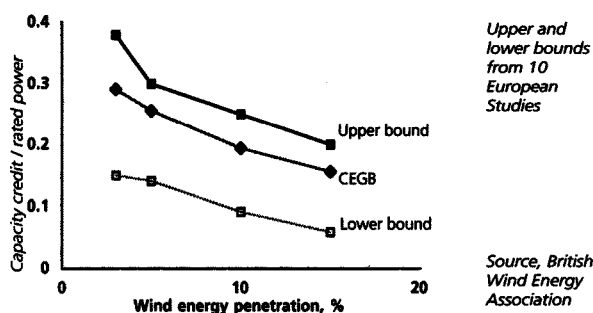
Another factor cited as limiting the potential for windpower is the grid. Although called 'national', the grid in Britain has a number of weak links restricting the quantities of electricity which can be moved around. Transmission over long distances does, in any case, incur high losses.

Transmission

Windpower is often seen as generating away from centres of population, and therefore requiring long-distance transmission; and in Scotland Scottish Power and Scottish Hydro-Electric charge renewables developers for supposed transmission costs. However, in reality, windpower is supplying the needs of local consumers, avoiding both transmission and transformer losses. Some wind farms in England and Wales, including Llandinam which is 50%-owned by Scottish Power, are actually paid a premium price for supplying 'embedded' electricity.

With increased penetration of windpower, there may be some problems with transmission, but these should be no worse than those under the present system of large centralised generating plant. A recent report by the government and the Scottish electricity utilities on the prospects for renewables in Scotland suggested that grid constraints meant there was "very little" spare capacity north of Dundee/Pitlochry, and a total

Capacity credits



capacity for just 300MW. Though many experts doubt this constraint, especially with the closure of Dounreay, the report in any case admits that an additional 1,500MW of renewables could be incorporated for an expenditure of £40-45 million (equivalent to one-third the annual subsidy through 'premium' pricing given to Scottish Nuclear).

One final 'problem' for the electricity system in large-scale use of windpower results from the turbines using induction rather than synchronous generators. This can cause problems with power factors (where current and voltage are out of phase) and with magnetic current in-rush during start up.

The power factor difficulty is not insoluble as correction equipment could be fitted into the system. In any case, the more modern variable-speed turbines are able to control the power factor, and could in fact be used to correct power factor problems from other equipment on the grid.

Effects of start-up can be reduced by electrical interface controls, but it is still necessary to have predominantly synchronous generating plant on the system. There are a number of factors which determine how much inductive generating capacity can be added at any point on that system, but at present levels of penetration it is not, in general terms a significant problem. However, it would need to be taken into consideration if large-scale use of wind power was planned, particularly at locations on the periphery of the grid.

Just as no form of electricity generation is

without environmental impact, none is without its technical and operating difficulties. While there would be technical constraints on the level and location of windpower capacity, it is realistic to consider penetration of around 20% as being technically achievable.

Windpower as part of a balanced mix with other renewables like hydro power and biomass offers a much better option than the expansion of nuclear power which, at commercial scale, is incapable of varying output to match demand and where a single fault can result in a loss of over 1,000MW of generating capacity, or worse ... □

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"Windpower as part of a balanced mix with other renewables like hydro power and biomass offers a much better option than the expansion of nuclear power"

+ ENERGY STORAGE -

The development and greater use of energy storage could allow increased use of intermittent sources of energy. There are a number of ways of storing energy for non-electrical use, such as thermal storage to provide heat, or hydrogen storage to be used like natural gas. Below are some options for storing electrical energy which can then be reconverted back to electricity.

Flywheels Electricity can be converted to kinetic energy in the form of rotating discs. By minimising friction, these discs can rotate with little loss of energy for long periods of time. The kinetic energy can then be converted back into electricity.

Compressed gas It is possible to store electricity by using it to compress a gas which can later be expanded over turbines to generate electricity.

Pumped storage hydro-electric stations These stations use electricity to pump water from a lower to a higher reservoir. This water can then be released to generate electricity at peak times, up to 75% of the electricity used to charge the reservoir can be recovered. Pumped storage is by far the most widely used electric storage system used for grid systems. The UK has 2,787MW of pumped storage capacity, other sites have been identified for possible use, but the total potential will be restricted.

Fuel cells Electricity is used in a fuel cell to split water into its constituent elements, hydrogen and oxygen. The hydrogen can be stored and then recombined in the fuel cell with atmospheric oxygen to produce electricity. The fuel cell concept is not new, but it has received a lot of interest recently. It has been identified as a key area by the government's Technology Foresight programme and has received research, development and demonstration funding from both the UK government and the European Union.

Batteries Electrical energy can be stored chemically in batteries and lead-acid batteries are often used in conjunction with non-grid wind turbines, and work is being done on a number of other batteries, such as sodium-sulphur and zinc-chloride, which can offer higher efficiency. Batteries have the advantage of modular design and rapid start-up but are expensive for large-scale applications.

Electricity industry deals under scrutiny

THE UK electricity industry is going through an unparalleled period of turmoil. The gentlemanly consensus which existed prior to privatisation has gone, the central power of the old CEBG is no more and the government is all at sea.

Utility bosses are never out of the news: with massive profits from share options, huge salaries, golden handshakes, golden hellos, and moonlighting ("Value added", Little Black Rabbit, p24); the electricity regulator, Prof Stephen Littlechild is frequently vilified on all sides; and the government seems unable to take any sensible decisions related to the electricity industry.

Concern over the government's handling of the sale of the country's final 40% stake in National Power and PowerGen rumbles on. The prime minister, John Major, has admitted that the government knew of the electricity regulator's plans for new curbs on power prices which were not announced until the day after the shares sell-off. The announcement saw the value of the two companies shares drop by millions of pounds and has left the government accused of insider dealing.

The £1 billion coal sell-off is proving a major embarrassment for the government too. The National Audit Office (NAO) is looking into both the appointment of merchant bank NM Rothschild as the government's adviser on the sale and the decision to sell the English pits to RJB Mining.

Contracts

Rothschild, which is still working on coal issues for the government, may not have been the lowest tender when it was awarded the contract in May 1991 by Lord Wakeham, then energy secretary. Lord Wakeham, on leaving government, took up a £25,000-a-year boardroom post with Rothschild. The contract has been worth an estimated £5.5 million to Rothschild plus, it has emerged, a 'bonus' payment of £2 million.

RJB Mining is reported to have received an unsecured loan of £116 million from the government when "it could not have got one out of the City," according to Malcolm Edwards, head of defeated rival bidder Coal Investments. RJB was also able to improve its price by £34 million through the use of unused capital allowances, an option not

available to Edwards' company.

It has also been disclosed that, after RJB had been awarded the English pits but before the sale had gone through, accountants Coopers & Lybrand reported to the Department of Trade and Industry (DTI) that RJB's owner, Richard Budge was "unfit to be concerned in the

ELECTRICITY INDUSTRY

management of a company." It is alleged that had Budge been disqualified as a company director the coal privatisation would have been threatened as the government did not have a reserve bidder.

Electricity pricing has had little to do with the free market that the government claimed privatisation would bring. All but the largest of consumers (over 100kW) still have no choice in their supplier — and won't until 1998 — and some 2,000 of the 100kW customers are reported to be returning to their 'first-tier' suppliers as a result of chaos caused by problems with meter reading and billing, which does not bode well for 1998.

Fuel taxing is another area which has entered the twilight zone. The government said it was necessary to impose VAT at 17.5% on fuel and power so we could meet commitments on climate change abatement. Public outrage (and a Tory backbench revolt) after the first 8% step forced the Chancellor to peg VAT at that level, saving his own skin presumably being more important than saving the planet. Now, as a result of plans to privatise nuclear power, the Fossil Fuel Levy and its Scottish equivalent are to be axed two years early, in 1996, cutting bills by about 8% to 10%.

■ **HIGH TENSION:** Scottish Power (SP) is forecasting a doubling of its coal burn by the end of the century. With plans for a £52 million project to upgrade the east-coast interconnector between Scotland and England from 1,600MW to 2,200MW, the company hopes to export electricity from its coal-fired plants at Longannet and Cockerhills. The proposal, however, is dependent on the

controversial upgrading of power lines in North Yorkshire. Environmental groups have been joined in opposing the upgrade by PowerGen, Eastern Group and RJB Mining.

SP already uses 2.2 million tonnes of coal per year, buying 60% of Scottish Coal's output, and if the upgrades are completed, it expects to be using five million tonnes a year by 2000.

The upgrading of the west-coast interconnector in 1993 has already allowed SP to increase exports, boosting its wholesale electricity sales outside Scotland by £41 million in 1994/5. Increased exports, along with a cut in the workforce of 500, saw pre-tax profits rise 7% to £375 million.

■ **CONSUMER POWER:** Electricity customers have not yet benefited sufficiently from privatisation, according to the Electricity Consumers' Committees' Chairmen's Group. Yvonne Constance, Chairman of the Chairmen's Group, called for a better deal for customers, arguing that since privatisation "the benefits to shareholders have been far greater ... share prices have risen dramatically and dividends have grown each year."

Amongst those shareholders benefiting are of course the utilities' own directors.

■ **ORIMULSION:** Legal action is being taken against PowerGen over emissions from the burning of Orimulsion fuel at its Richborough plant. Prudential, the UK's largest life assurance company, which owns farmland close to the Kent plant, alleges crop damage and is demanding millions of pounds in compensation. The company is also seeking an injunction to prevent further use of the bitumen-based emulsion at the power station. Defending the action, PowerGen maintains that the plant meets all relevant European Union environmental limits and government guidelines.

National Power plans to use the fuel at its plant at Pembroke in South Wales, and is rumoured to be considering burning it at Drax, Western Europe's largest coal-fired power station ("Industry and the monopoly effect", SEJ 104).

Bitor Europe, distributor of the Venezuelan imported fuel anticipates a sevenfold increase in sales by the year 2000, with most of this growth expected in the UK. □

Berlin mandate on climate change

A gathering in April of representatives from 130 countries has done little to progress action towards tackling climate change.

This first Conference of the Parties (COP) in Berlin, brought together the signatories of the 1992 Earth Summit First Framework Convention on Climate Change to review progress towards stabilising greenhouse gases at concentrations "that would avoid dangerous anthropogenic interference with the climate system" and consider future action.

A proposal from the 32-country Alliance of Small Island States for a 20% cut in carbon dioxide (CO₂) emissions from developed countries by 2005 was rejected, and there were no real commitments from the conference.

The little that was agreed has been imaginatively named the Berlin Mandate: the COP will meet again next year, and has agreed that in 1997 it will start the process of deciding a post-2000 strategy which the Convention stated should be in place by 1998. The mandate does talk of reductions in greenhouse gases, targets needing to be considered and timetables worked out, but there are no numbers or deadlines, and even mention in the abstract of such things was strongly resisted by some countries.

The lack of progress at the political level is despite growing scientific evidence of the urgent need not just for stabilisation of greenhouse gas emissions but for actual reductions. Though science still can't say precisely what damage will be caused by specific levels of greenhouse gases, the Inter-governmental Panel on Climate Change argues that there are now clear risks of damage and that the precautionary principle, enshrined in the Convention, should apply. The Convention requires

signatories to "take precautionary measures" and that "where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures." Few of the developing countries are thought to be on course to

A proposal from the 32-country Alliance of Small Island States for a 20% cut in carbon dioxide emissions from developed countries by 2005 was rejected, and there were no real commitments from the conference.

meet their target of stabilising CO₂ emissions at 1990 levels by the end of the century. The UK government believes it is one of the few. Despite its programme being in tatters, the government looks likely to be saved by the switch from coal to gas for electricity generation and the slow recovery from recession. Indeed the latest Department of Trade and Industry (DTI) Energy Paper, EP65,¹ forecasts that by 2000 UK annual emissions will be 7 to 14 million tonnes of carbon (MtC) below the 1990 level of 158MtC. This led the environment secretary John Gummer to call bullishly for developed countries to make CO₂ cuts of 5-10% below 1990 levels by 2010. Many observers believe that the assumptions in the Energy Paper are over-optimistic, especially on the extended life of magnox nuclear power stations, the level of increase in gas-fired generation and the contribution of the Energy Saving Trust (EST) which EP65 recognises has only secured a fraction of its required budget for making a planned

2.5MtC saving. (Lord Moore, chairman of the EST, has called for a 2% levy on all domestic electricity bills because the quango is so chronically underfunded.) Furthermore, many environmental groups believe that cuts of 20% to 40% or more are necessary by 2010.

The forecasts in EP65 assume that no more coal-fired or nuclear power stations will be built; this, according to Gummer, was not meant to pre-empt the nuclear review but represents the honestly held beliefs of the authors. Renewables output is forecast to exceed that of coal and nuclear combined by 2020. The paper predicts that in the long term carbon emissions will start to rise again, unless further measures for CO₂ abatement are introduced.

■ European Commission (EC) plans for a carbon/energy tax took a major step forward in May. A Directive adopted by the EC will allow Member States, that so wish, to apply the tax within a harmonised structure. This transitional framework, which will run from 1 January 1996 to 1 January 2000, allows countries a certain freedom for determining national rates.

Mario Monti, the EC Commissioner for taxation, believes that "the implementation of this tax by several Member States will certainly have the effect of pulling the others along, thus leading in the medium-term to the adoption of a uniform tax within the Union." The tax, jointly and equally on energy and carbon, will apply to all sources of energy except renewables.

The EC hopes that the tax will be fiscally neutral, with countries making equivalent reductions on other taxes, such as those weighing on work, so that there will be no loss of competitiveness. □

1. "Energy Paper 65: Energy Projections for the UK", March 1995, HMSO.

Efficiency

SCOTTISH electricity companies Scottish Power (SP) and Scottish Hydro Electric (SHE) are to invest £7.25 million over the next three years on energy efficiency projects. The money will come from a levy of £1 per customer each year, and was set by electricity regulator Prof. Stephen Littlechild in last year's price review.

Littlechild is looking for electricity savings of 428GWh over the next three years, 102GWh by SHE, 326GWh by SP.

This move will bring the Scottish utilities in line with those in England and Wales which have been operating a similar scheme since last year. □

Combined heat and power

THERE has been mixed news for combined heat and power (CHP) in the UK. Electricity regulator Prof. Stephen Littlechild has agreed an assessment method with the Energy Saving Trust for supporting CHP.

David Green of the CHP Association (CHPA) welcomed the move to allow funding for CHP under the regional electricity companies' Standards of Performance.

The Association was, however, not pleased by the government's plans to drop the nuclear levy in England and Wales in 1996. On-site

generation is exempt from the 10% levy, and its removal from other fossil-fuel generators "will enhance the problems CHP developers already face," according to Green. The CHPA believes that without the levy, or some other mechanism, the government's target of 5,000MW of CHP by the end of the century will not be met.

■ In contrast to the UK, CHP in the Netherlands continues to grow. This is despite the Dutch government scrapping CHP subsidies because of a generating overcapacity. □

Irish renewables programme

THE results of Ireland's alternative energy requirement (AER) were announced by energy minister Emmet Stagg in March. Thirty-four of the 100 projects to apply were selected for power purchase contracts. The Irish government was surprised by the low price of bids, with all successful projects at or below 4p/kWh, and none of them required the capital grant subsidy which was on offer.

Stagg stated that it was planned to "have 8% of our total energy requirement from renewable sources by the year 2005, and this is just the start of developments in this direction."

The largest category is wind power with ten projects selected with a total capacity of 73.5MW. There are also eight combined heat and power projects (22MWe), six landfill gas/waste schemes (12MW) and ten small-scale hydro projects totalling 4MW.

Although no biomass projects were awarded contracts, Stagg expressed his confidence that biomass can make a significant contribution in future and promised continued encouragement and support for this energy source in particular.

The Irish Wind Energy Association has expressed concern that most of the wind contracts have gone to overseas companies, failing to encourage Irish jobs and investment; a sentiment familiar to the Scots and Welsh.

Amongst the successful companies under the AER was Scottish Power, with one of the two largest schemes, a 15MW wind farm in County Donegal. The Scottish utility is already joint owner of Europe's largest wind farm at Llandinam, North Wales, but failed to gain any contracts on its own patch in the recent Scottish Renewables Order. □

Energy funds

WITH the development of renewable energy schemes in the UK have come two new funds specifically for people wishing to invest in renewable energy schemes.

The Wind Fund, with a minimum investment of £300, has set itself a target of raising £10 million, and got off to a promising start by comfortably raising the minimum aggregate subscription of £500,000 during the initial offer period. The scheme, backed by the Dutch bank Tridos, will buy shares only in small wind farms which comply with the guidelines of the British Wind Energy Association and Friends of the Earth and other renewable energy projects.

The Impax Renewable Energy Fund is looking for around 2,500 individual investors to raise £20 million for financing small renewables projects. Impax believes that, with tax breaks, investors could get a return of 30-35%. □

Energy technology

A report on developing profitable energy services and products in the UK has identified nine areas of action including clean coal, improved efficiency combined-cycle gas power plants, thin-film photovoltaics and nuclear decommissioning. The report was produced for the government's Technology Foresight programme.

Based on consultations with over 400 energy professionals in industry, academia and institutions, the energy report is one of 15 studies identifying strategic priorities in different sectors of industry which between them will get £67 million from science minister David Hunt's budget.

■ The European Parliament's energy committee chairman Umberto Scapagnini has had to nag the Council of Ministers about meeting its obligation to spend the 30 million Ecu allocated by parliament to the Thermie II non-nuclear energy programme, according to the European Greens, who have called for an annual doubling of the Thermie II budget.

■ Research and development on power generation technology has suffered a "major decline" since electricity privatisation, according to a report from the Institute of Materials. The report calls for collaboration between UK generators, materials suppliers and the government "if UK industry is to compete in ... a rapidly growing international market." □

Windpower round-up

Highland planning

LOCAL communities should benefit from the development of wind farms and other renewable energy projects, according to Highland Regional Council in a draft policy strategy document published in March.

The council, in anticipation of a "rush of interest in wind farm sites," is seeking to encourage renewable energy companies to explore the possibilities for linked community trust funds, tourism-related initiatives and environmental improvements.

The document also proposes three indicative policy zones for wind farms: primary and secondary areas of search, and sensitive areas. The primary areas are concentrated in Caithness, the east of Sutherland, the north-east of Ross and Cromarty and parts of Skye.

To avoid any risk of failed wind turbines remaining an unwanted legacy in the landscape, planning permission would be likely to be linked to a financial bond for removal and reinstatement.

Scottish manufacture

ENGINEERING company ESL is to manufacture Danish Micon turbines at its Inverness plant, primarily for the UK and Irish markets. ESL, which has the relevant experience through work for the oil industry, will make the towers and nacelles for Micon 600kW machines. ESL expects the deal eventually to create up to 100 jobs.

Russian wind farms

AMBITIOUS plans for 2,400MW of wind power in Russia have been delayed while assurances are sought from turbine manufacturers on the performance of their machines in extreme cold.

Orders were due to be placed at the beginning of March for 36MW of wind capacity at four sites, but there is concern over the below minus 30°C temperatures that the turbines could face.

The Wind Energy Conversion System programme will initially rely on imported turbines, but hopes eventually to use machines 80% manufactured in Russia.

Spanish plans

BILLED as the most ambitious scheme of its kind in Europe, if not the world, authorities in the Navarra, Spain, hope to provide almost half the region's electricity from wind power by 2010.

The power-poor region of 10,500 square kilometres plans to erect a total of 1,000 turbines at 16 wind farms to provide 600MW of capacity. This is a scaled-up version of an original proposal for a 100MW scheme, and will require an initial investment of ESP100,000 million. The project is being promoted by a consortium headed by Energía Hidroeléctrica de Navarra, with the support of the regional government. □

Energy from biomass and waste

Shell biomass

ROYAL Dutch Shell is developing a biomass gas turbine in Brazil which will be the first commercial pilot of the biomass integrated gasification gas turbine. Shell estimates that only 8,000 hectares of land are needed to grow the wood to fuel the 30MW plant and provide electricity for 50,000 people.

Anaerobic digester

BRITISH local authorities are showing keen interest in anaerobic digestion as an alternative to landfill or incineration of household waste. After completion in May of the first year of trials with a demonstration plant at Irvine near Glasgow, a consortium including Motherwell Bridge Envirotec has reported "intense" interest from local authorities and waste disposal companies in its system which is said to be "simpler and potentially cheaper" than other existing digestors, of which there are around 30 for household waste worldwide.

Bacteria in the digester turn organic waste — typically 35% to 50% of the total by weight — into methane gas for electricity generation and a compost-like material.

German olive oil

A Spanish affiliate of German utility RWE is looking at the possibility of generating electricity from olive waste left after the olive oil is extracted.

Japanese algae

JAPANESE scientists are working on ways of harvesting an algae which consumes sewage and carbon dioxide to produce hydrocarbons. They are developing a chemical and heat process to extract the oil, which can be upgraded to high octane fuel, from the algae.

Dioxin worries

SURPRISING findings on dioxin emissions from incineration were made in a study by the Energy Technology Support Unit of the Department of Trade and Industry. The study found that similar amounts of dioxins were emitted under low and high temperatures, though current thinking is that temperatures above 850°C can eliminate dioxins.

The researchers added further confusion by their inability to explain variations in measurements at the same site and apparent conditions.

These findings will cast further

doubt on the benefits of waste incineration either for disposal or for power generation and add to worries over dioxins, which are probable human carcinogens and may affect development, reproduction and the immune system.

Other sources of dioxins include diesel combustion, coal burning and steelmaking.

Fibro fumes

CHICKEN litter power stations are coming under fire from local residents over flue gas emissions. Opposition to a development by Fibrowatt at Thetford Forest, Norfolk, is growing as a result of complaints by residents living near the company's first chicken litter plant at Eye, Suffolk.

While the Eye plant has been approved by HM Inspectorate of Pollution for its dioxin emissions, it is concerned about the equipment used for monitoring sulphur dioxide levels.

Local residents have complained about smoke from the plant which causes coughing. Paul Read, a local parish councillor and chemical engineer has undertaken research which he believes shows dangerous levels of sulphur dioxide and hydrogen chloride. □

Hydro-electricity round-up

Indian dam concern

THE campaign against the massive Narmada dams project ("Hydro dams controversy", SEJ104) has been strengthened by a World Bank study which found that many of India's existing dams could be wrecked by floodwaters.

The information, based on a review by engineers of 25 dams requiring repair, is contained in a World Bank memo leaked to the Save the Narmada Movement which is campaigning against a massive project for two large, 135 medium-sized and 3,000 small dams on the Narmada river intended for flood control, irrigation and electricity generation.

The problem identified by the World Bank, which withdrew from funding of the Narmada dams project in 1993, is that all the 25 dams checked could be expected to receive floodwaters greater than those calculated by the dams' designers (in two cases seven times greater). This could result in floodwaters causing structural damage and possibly complete failure of the dams, in some cases with "beyond disastrous" consequences.

Norweb hydro plans

NORWEB subsidiary Norgen Hydro Power has bought a 660kW hydro-electric station in Balgonie, Fife. It is the North West of England electricity company's second hydro foray into Scotland, another subsidiary, Norweb Hydro Power, having recently won a contract for a 3.2MW scheme at Inverbroom, Ross & Cromarty, under the Scottish Renewables Obligation.

The Balgonie station, on the River Leven, which originally produce power for mining operations and a local factory will be overhauled before being used to supply electricity direct to the grid.

Norweb also has three hydro projects in England.

Swedish investment

SWEDISH utility Vattenfall is to receive a 42.8 million ecu loan from the European Investment Bank to modernise six hydro-electric stations in northern Sweden and help construct a new hydro project at Klippen. The loan from the Luxembourg-based bank

follows an earlier 85 million ecu loan for renewable energy in Sweden and 108 million ecu lent last year for the world's longest undersea power transmission cable, between Sweden and Germany.

These capital investments in the Swedish electricity industry are designed to strengthen Western Europe's overall energy security. □

Wave update

A full-scale prototype of the ART Osprey near-shore wave power device has been built at the UIE Scotland offshore construction yard, Clydebank, and is due to be operational in the Pentland Firth by late summer.

Overall cost of the prototype, including research and development, is put at £3.5 million, with £400,000 coming from the EU Joule programme ("Wave boost", SEJ103), backing from Highlands and Islands Enterprise, and support in kind from, amongst others, GEC Alsthom, British Steel and Scottish Hydro-Electric. □

Germany: a de facto nuclear state

Bonn and the Bomb: German politics and the nuclear option;

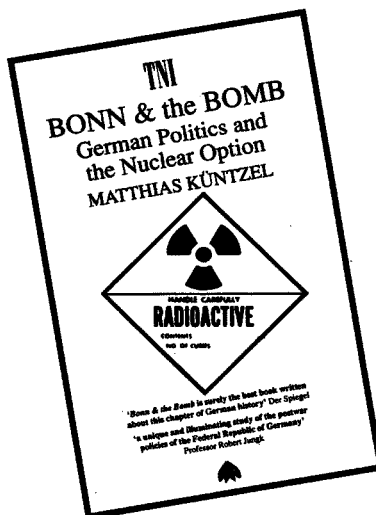
by Mathais Kuntzel

Pluto Press; 1995, 210 pp, £14.95pb.

IN 1954 the German Chancellor, Konrad Adenauer, pledged that the Federal Republic would not acquire any of the so-called ABC weapons — atomic, biological and chemical.

While the FRG still does not have an ABC arsenal, Mathais Kuntzel contends that it has done everything in its power to keep its options open.

A political consultant and journalist based in Hamburg, Kuntzel was for four years the advisor on proliferation issues to the powerful parliamentary Green Party. As a result of his relationship with the Greens — of which he is not a member — he managed to gain access to government archives and a great many classified documents. In doing so he has produced a fascinating insight into what lies behind the public propaganda of the Nuclear Non-



Proliferation Treaty (NPT) and Germany's role in limiting its effectiveness.

During the 1960s, he argues, the Federal government realised that there was little mileage in trying to block the treaty, instead it concentrated its efforts on subverting the wording of the treaty, allowing it to keep the nuclear door open.

In that respect it has been very successful. To all intents and purposes Germany is a nuclear power, a *de facto*

weapons state. It has a large stockpile of weapons usable plutonium and highly enriched uranium, it has the technical sophistication to manufacture nuclear weapons with ease and it has the money.

Kuntzel debunks the idea central to the NPT that there is a clear borderline between "the military and non-military use of nuclear energy." In reality, he says, that borderline "does not exist."

What emerges is a picture of nations seemingly working together to produce a treaty geared towards making the world a safer place but at the same time Kuntzel makes it clear that the NPT is not about world security but about the delicate balance of world power.

"Throughout the atomic age, status rather than security has been the driving force behind the creation of new nuclear-weapons powers," says Kuntzel, and as the world realigns in the post-Cold war era, the threat of proliferation is increasing rather than diminishing.

This is not an easy read, but anyone wishing to understand the dynamics which shape the nuclear world we live in would be well advised to make the effort.

Mike Townsley

A mixed bag on sustainability

CONFERENCES and workshops always produce a mixed bag of papers. *Sustainable development and the energy industries* is the proceedings of the Royal Institute of International Affairs Energy and Environment Programme held in November 1993, and it shows.

This conference had delegates from environmentalists, the many sectors of the international energy supply industry, academics and users. This, of course, means that a wide range of views are on show. For example, there is Marcello Colitti, whose premise is that sustainable development equals sustained traditional

Sustainable development and the energy industries — implementation and impacts of environmental legislation;

Nicola Steen (Ed)

Earthscan; 1995, 329pp, £15.95

economic growth. A view that I thought that had been discredited. His paper is valuable therefore to remind us that people like him still haunt the world.

There are papers on the economics of energy, the experiences and problems of different parts of the energy industry

(e.g. the oil industry, the potential for coal in the light of the need to reduce carbon dioxide, the California electricity utilities experiences in least cost planning) and the need for institutional and political restructuring in order to take advantage of technological change.

In general this book is useful in that it provides an overview of the issues that need to be addressed. Not only because of the strategies that are identified, but also for the range of views expressed, from traditional conservative to the visionary.

Chris Revie

Wavepower R&D

THE outrageous treatment of wave power research and development should be familiar to regular *Safe Energy Journal* readers, and Dave Elliott has pulled together the sorry history in a useful paper.

In producing this account, Elliott does a service to those involved in research and development, past, present and future. The way the wave energy programme was axed shows both the inadequacies of

The UK wavepower R&D programme; by Dr DA Elliott

The Open University Technology Policy Group; 1995, 21pp, £4

the short-term approach to R&D funding, and the way vested interests (in this case the nuclear establishment) can manipulate apparently impartial studies to produce the conclusions they want.

As an academic, Elliott looks more

at the methodology of technical assessment than the conspiracy theory, but he does make mention of the work done by journalist David Ross.

If Elliott's paper whets your appetite, Ross's latest book, *Power from the waves*, is due to be published in the autumn by Oxford University Press.

Graham Stein

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On the verge of an energy revolution

Power Surge;

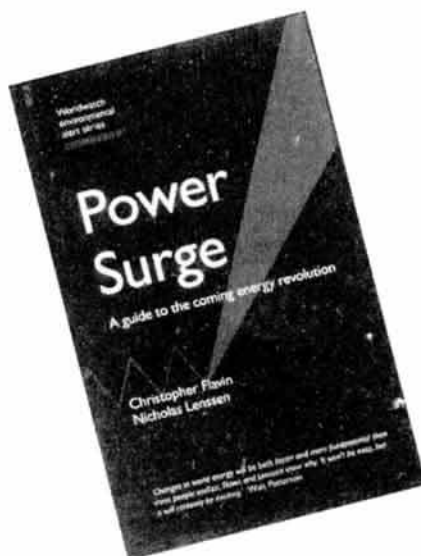
by C Flavin and N Lenssen

Earthscan 1995, 382pp, £10.95

THIS is part of the Worldwatch Institute's Alert series. Previous books have dealt with water and food issues.

The book divides into four sections and the overall tone is one of optimism and enthusiasm (which is a point against the Richard Norths of the world who would have us believe that environmentalists are all doom sayers). The overall theme of the book is that we are on the verge of a revolution in the energy business, akin to the introduction of electricity. The use of renewables they argue, is about to expand considerably. The first section "Pressures for change" covers the recent history of energy use and the resulting environmental consequences. Most of this is fairly well trodden ground.

The second section "The New Power Brokers" looks at four energy sources which have potential for expansion in the future. Gas, wind, solar power (two chapters solar power as a heat source and as an electricity source), biofuels and the 'fifth fuel' - energy efficiency. The development of each is covered, current patterns of use are analysed and the potential for each in the future is described. All this is liberally sprinkled with anecdotes and examples of good practice designed to inspire and educate.



For example, modern solar water heating can be traced to a woman in the 1930s living in what is now Israel, who wanted to make sure that her son had adequate hot water to take baths in, rather than to some high tech institute.

The authors state that they have not covered hydro or geothermal power because the potential for expansion is limited by either environmental or geographical concerns. Neither tidal or wave power they argue are viable for the foreseeable future. Others may disagree.

The third section is "Energy In Society", which looks at the end use technology and structures that currently exist. Chapter 10 on transport betrays the

American origins of its writers by concentrating on technical improvements that could be made to cars (20 pages), rather than reducing the demand for transport or shifting it to alternatives (4 pages). Although this is slightly rectified in the next chapter "Building Our Future" which looks at building and planning.

Chapter 12 covers the Electricity industry. It argues for decentralisation with a regulatory structure that increases competition and provides incentives to invest in efficiency and renewables.

Section four outlines a possible future energy scenario and then looks at how this may come about, via the reduction of subsidies to inappropriate fuels and the implementation of fuel taxes.

However as a UK reader I cannot but feel unease with which the authors enthusiastically point to the reduction of coal consumption in the UK in the early 1990s because of the reduction in subsidy. The devastating social affects that were brought about because of this reduction are not mentioned. While we may seek to further reduce coal consumption because of pollution concerns we should also address the social impacts of such change. This book does not sufficiently acknowledge this.

On the whole, the book covers a broad subject in detail, yet is easy to read and is well researched and extensively annotated (50 pages of notes) for those who want explore further.

Chris Revie

More energy questions

Iremember as an undergraduate in the early eighties making do with Gerald Foley's *The energy question* and a rag-bag of aged text books to concoct essays on alternative energy systems. Nowadays, it seems there's a new book on this subject published every other month.

The low cost planet, follows a well-charted path through the environmental and resource problems of energy use, and looks at the possible solutions. It provides a useful introduction to the issues for people wishing to find out about energy and the environment.

Amongst the many useful facts in Toke's book is one from the *Wall Street Journal*: US utilities have put aside just £4 billion of the £33 billion they should

The low cost planet;

by Dave Toke

Pluto Press; 1995, 216pp, £12.95

The future of energy use;

by R Hill, P O'Keefe & C Snape

Earthscan; 1995, 197pp, £14.95

have for nuclear decommissioning.

One of the main messages of Toke's book will be familiar to long-time *Safe Energy Journal* readers: he argues that environmentalists "will look unrealistic if they oppose practical near-term efforts to develop and deploy renewable energy technologies."

The future of energy use has an almost identical contents list to *The low cost*

planet, but takes a more technical approach and is aimed at the student market. The book does not get off to a good start: the first paragraph tells us that "on Orkney, among other places, a new generation of wind machines is being built."

However, things rapidly improve, and for anyone not put off by a few mathematical equations, this book provides a valuable guide to different methods of energy production and their costs, economic and environmental.

Like so many other books, both of these ignore Scotland when dealing with the structure of the "UK" nuclear industry, a mistake the government recently made too!

Graham Stein



Value added

The vast sums being 'earned' by power industry chiefs continue to amaze and annoy the general public and embarrass the government. Ed Wallis, chief executive of PowerGen, admitted to a Commons Committee to having "three little jobs" which brought in £36,000 a year on top of his £300,000 annual salary, share options worth £876,194 last year, £53,000 pensions payments and an expected bonus of £100,000. When challenged by MPs to defend the gap between his salary and the £10,000 a year received by PowerGen's lowest-paid employees, Wallis commented: "You can't compare the lower paid worker with the people who create the value." Seems like the sort of chap you'd enjoy working for.



Tactless remarks from power chiefs II

On being asked to comment on the shedding of a quarter of his workforce in four years, John Devaney, chief executive of Eastern Electricity remarked: "Job creation is someone else's responsibility." Seems like the sort of chap you'd enjoy having worked for.



Where's the point?

Little Black Rabbit has heard that the ground on which Dungeness A and B are built is being slowly eroded by the tide. It appears that ever since the first of these two power stations was built, movers have been employed to dig up shingle on the eastern side of the peninsula and fill lorries which then trundle round to the western side where the shingle is dumped. Like the painting of the Forth Bridge, this has been a never-ending task, 365 days a year, every year since completion. The shingle movers are however slowly losing the fight as every year the sea moves that little bit closer. Confirmation, if ever it was needed, that there is no watertight case for nuclear power.



Cable puzzle

While burrowing through Austria recently, a country whose constitution expressly forbids the use of nuclear power for commercial purposes, LBR was surprised to discover that work had begun on an underground cable which is reportedly designed to carry power into the country from a yet to be completed nuclear power plant at Mochovce in Slovakia. This is puzzling, not only in terms of Austria's constitution but because the government

has been opposing plans for a European Bank for Reconstruction and Development loan to complete the plant.



No dogs allowed

Anyone who has seen the TV adverts showing a collie dog, Meg, leading the entire population of a small Scottish village to visit Torness nuclear power station, will perhaps be surprised to find that a canine friend of Little Black Rabbit was recently refused aboard Scottish Nuclear's 'Come & see' bus to Torness. The dog in question was an off-duty guide dog, but the pleading of a human friend was unsuccessful. First she reminded Scottish Nuclear of their advert, no joy. Then she tried: "He's a guide dog", which elicited the confusing response: "But you're not deaf."



Budge & fudge

It has recently come to light that Richard Budge, whose company RJB Mining was awarded all the English coal mines in the government's privatisation, was considered by leading accountants Coopers & Lybrand in a submission to the government to be "unfit to be concerned in the management of a company". AF Budge, the family firm which collapsed in 1992 owing £90 million, had made payments to Richard Budge which breached the Companies Act, and a loan to Budge from RJB Mining "did not comply with the provisions of the Companies Act.". Although three of the former directors of AF Budge were subsequently disqualified, strangely Richard Budge was left untouched.

Meanwhile, the National Audit Office has launched an inquiry into the appointment of merchant bank NM Rothschild as adviser to the government over coal privatisation. John, now Lord, Wakeham, who was responsible for appointing Rothschild, got a £25,000-a-year seat on the bank's board six months after leaving government. Rothschild's fees and bonuses for their work on the coal sell-off now exceed £7.5 million.



Phantom department

There appears to be a concerted campaign to revive the Department of Energy, which was killed off in 1992. LBR reported in the last *Safe Energy Journal* that the Department of Environment press office was referring journalists enquiring about nuclear waste storage to the Department of Energy. It now emerges that the Electricity Licence Exemption Order (whatever that is), due to be published

before Easter, was delayed while the order was pulped and reprinted. It now refers to the "President of the Board of Trade" rather than the phantom "Secretary of State for Energy".



Hypothecation

LBR has always thought that the money which went to Nuclear Electric from the Fossil Fuel Levy was for decommissioning, even though it was used to pay for Sizewell B — a nice safe investment after all. And the government did say, didn't it, that the levy could be ended two years early in 1996 as there would be sufficient funds for decommissioning of the magnox stations?

LBR was therefore surprised to read a parliamentary answer from energy minister Tim Eggar which stated: "Payments to Nuclear Electric from the fossil fuel levy are not hypothecated to any particular purpose."



Chernobyl chief

Worrying enough are the latest revelations that supporting pillars for Block B at Chernobyl are bearing loads five times their design limit and could collapse causing a release of radiation from the reactor 4 sarcophagus or a core meltdown of the still operating reactor 3 ("Chernobyl in the balance", p7). But Greenpeace has released details of an interview with the man in charge at Chernobyl, which give further reason for concern. Sergei Parashin calls those suffering from post-Chernobyl illnesses as pessimists who are "susceptible" to being ill. "When a healthy person is passing through medical rooms, all with physicians, at the end he leaves the hospital and he is ill."

Under Parashin, Chernobyl is now run by optimists who "cannot be frightened, and live under any conditions". Thins includes people Parashin claims have received doses of 400 rems, (a level which would kill half the people exposed within weeks.)



Pru sue

Prudential, the UK's largest life assurance company, is suing PowerGen for burning Orimulsion at Richborough power station in Kent. The Pru is seeking an injunction to prevent the plant burning the notoriously dirty bitumen-based emulsion imported from Venezuela and is demanding millions of pounds in compensation for damage to crops on a nearby farm which it owns. PowerGen is believed to be burning 1.3 million tonnes a year of Orimulsion. Far from prudential. Or rather not.

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