THE SAFE ENERGY JOURNAL

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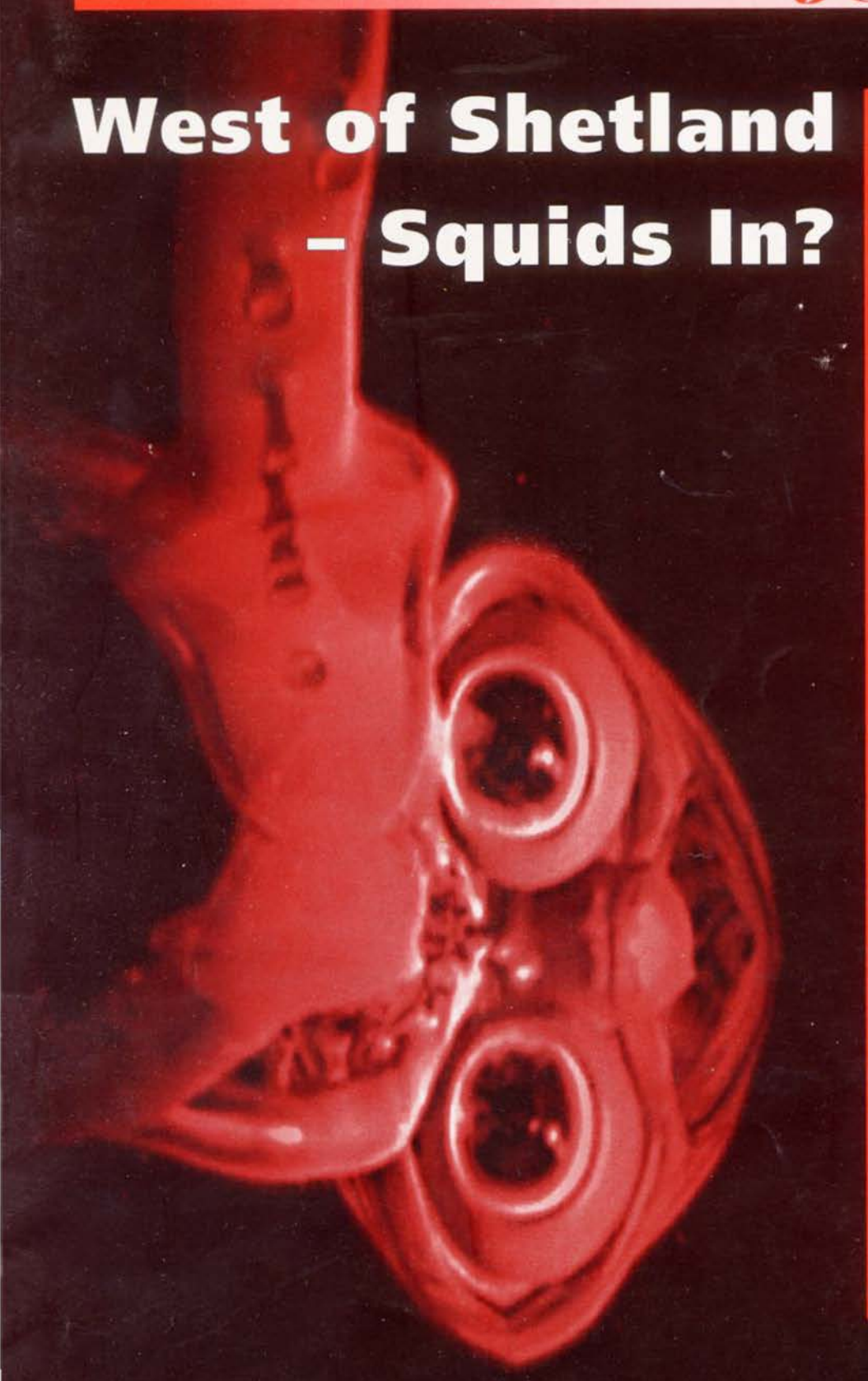

ISSUE 113

Nuclear News

Features

Safe Energy News

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Some things change

20 years old this year, *Safe Energy* is old enough to remember the last Labour government. An eight page bulletin spawned by the campaign against Torness nuclear power station has become the glossy journal you have before you today.

According to plan, *Safe Energy* supporters are strategically placed throughout councils, universities, government offices, the consulting fraternity and the now suit-wearing environmentalists.

Lightyears away from the early days, new nuclear capacity in the UK is now a pipe dream for its supporters.

But our work here is not yet done — that is self-evident from a cursory glance at this issue.

It might be a different backdrop. Climate change (and nuclear's chosen role as saviour) wasn't an issue 20 years ago. Environmentalists certainly weren't invited to consult with government and industry 20 years ago, and sustainability wasn't even in the dictionary.

The mandate — to promote safe, clean energy — is as it always was.

Some stay the same

Safe Energy's 1987 ten year anniversary edition reported the government's abandonment of Nirex's shallow burial concept for low level waste. A Nirex official conceded the decision "could mean that a facility for LLW would not be developed as early as was originally hoped." A further ten years on, Nirex's plan B, to dump it with intermediate waste in the Sellafield deep repository, is also on the rocks following government refusal.

For 20 years *Safe Energy* and many others have said the first step for managing nuclear waste is to stop its production. After that, its pure damage limitation. To quote the 1987 Safe Energy edition: "There is no solution to existing nuclear waste. There are only measures which can be taken to isolate it from living things." It's a simple, powerful argument which makes the nuclear industry's carry on regardless attitude look a reckless, dangerous folly.

Now Greenpeace are saying the important first step in tackling climate change is to cease further fossil fuel exploration. Discovered reserves are more than enough, when burnt, to wreck the climate. And as greenhouse gasses already emitted have committed us to temperature rise, the next step is to limit the damage.

Yet fossil fuel companies cannot as yet translate the logic of this argument into action.

They say that action by one company in one area is chicken feed on the global scale. But until companies change the entrenched corporate psyche of projected fossil fuel production rising into the sky, they can't ask to be taken seriously on these kinds of details.

Another favourite, also used for human rights issues, is that a company cannot be expected to tackle what are essentially political problems. This argument shows no understanding of what they are being asked. Shifting corporate strategy from fossil fuels to renewables and conducting business with care and understanding is well within their means. To say it is solely up to government to shape energy strategy is an argument they themselves would laugh out of the door. The intense political lobbying undertaken on their behalf by groups like the global climate coalition is a testament to the political clout these companies expect to wield as a matter of course.

When vested interests are threatened, heads are buried in the sand. Except this time heads are not quite submerged. Most fossil fuel companies concede the reality of climate change and the inevitability of action — just not in their time horizon.

As world leaders meet at Earth Summit II, a fitting and sensible move for the fossil fuel industry would be to say just how they plan to contribute to the near-term greenhouse gas reduction targets currently being negotiated.

Accepting and planning for a downward trend in fossil fuel consumption, investing in renewables to compensate, would be a welcome next step and a prudent commercial strategy.

"Half lives after the RCF" p8; "Lobbying for lethargy" p10; "Oils not well on the Atlantic Frontintier" p12; "Corporate Affairs" p18.

"...a fitting move for the fossil fuel industry would be to say how they plan to contribute to greenhouse gas reduction targets currently being negotiated."

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

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Second beach particle

FOLLOWING the discovery of a radioactive particle on a public beach, Sandside Bay, 1.5km from the Dounreay nuclear research centre, the Scottish Environment Protection Agency (SEPA) has told the UK Atomic Energy Authority (UKAEA) "to take all practicable steps" to advise beach users of the risk they face.

The particle, a fragment of spent highly enriched uranium (HEU) fuel, was found on 29 May. It is the second HEU fragment to be found at Sandside; the first was discovered in 1984.

While Dounreay was keen to play down the level of radioactivity involved, Hugh Fearn of SEPA's northern office warned: "If it stuck in the gut, you would get an ulcer within four to six hours. There is potential for significant effects from particles like this."

The 1984 particle was dismissed by the regulatory authorities as an anomaly, this latest find, however, has set alarm bells ringing. Arguing that "at this stage the danger to the public is considered minimal", SEPA said: "This find has called into question previous estimates of the likelihood of coming into contact with such a particle."

The Agency is becoming increasingly impatient with the UKAEA's sloppy waste management practices. In the 'final proof' of its "Decision on the application by the UKAEA to dispose of radioactive waste from Dounreay Caithness", it expresses "disappointment that the UKAEA, despite considerable technical knowledge and expertise required for the operation of their nuclear plant, has not yet, after 14 years, managed to trace the source of this contamination." One hundred and seventy particles were found on the foreshore at the Dounreay plant between 1984 and 1996, according to SEPA.

Dewar

The controversial decision document has now been passed to the Scottish Secretary, Donald Dewar, who has the authority to accept, reject or amend the proposed authorisation.

Dewar has been coming under increasing pressure from a number of nuclear industry organisations to reject one of SEPA's key recommendations, which states that while the Agency finds the practice of overseas reprocessing to be justified it would only be so if the resultant nuclear waste was returned to the country of origin not later than ten years after "that waste has arisen".

The Dounreay site director, Dr Roy Nelson, has warned: "This could make some of our customers think twice about using us. It would affect the number of people we employ at Dounreay."

Nelson has also confirmed that Dounreay no longer expects to win contracts for the bulk of Australia's 1,100 spent HEU elements from the Lucas Heights research reactor: "We are now talking about a relatively small number of shipments over a period of two years."

The Health and Safety Executive (HSE) has written to Dewar explicitly questioning SEPA's authority in demanding early waste return. While the Scottish Office admits it has received a letter, it refuses to make it public, saying only that it raised "procedural questions".

However, industry sources say that the HSE, acting on behalf of the Nuclear Installation Inspectorate (NII) — a subdivision of the HSE — is said to be angry about the early return clause because waste storage on site is its responsibility. Sources also say the HSE's position is backed by the Department of Trade and Industry, which fears the decision would set a precedent applicable to the Sellafield's Thermal Oxide Reprocessing Plant (Thorp).

SEPA has also approved continued reprocessing of spent fuel from Dounreay's now defunct Prototype Fast Reactor. However, following last September's breakdown at the fast reactor reprocessing plant, Dounreay says: "We have to revisit the whole question of whether reprocessing ... is the most sensible option." Around 200 of the people employed at Dounreay work on fast reactor reprocessing.

According to Nelson, the cost of repair would be "significantly more" than the £10 million reported in the press.

German contract

In another battle with Dounreay, SEPA issued a prohibition notice preventing AEA Technology, a recently privatised off-shoot of the UKAEA, from processing radioactive sodium coolant from Germany's scrapped FZK reactor, Karlsruhe.

SEPA said it "believes that AEA Technology are inadequately monitoring discharges from the plant and that there is doubt over the amount of radioactivity in the waste being processed at the plant."

The Agency is also querying the legality of the importation of the sodium. Over fifty tonnes of the slightly radioactive sodium coolant arrived in five shipments which lacked so-called 'transfrontier shipment authorisations', according to SEPA. A scheduled sixth and final shipment already has the permit.

AEA Technology concedes it didn't have authorisation for the shipments but said it had clearance from the German authorities, the Scottish Office and HM Industrial Pollution Inspectorate (SEPA's predecessor).

Welcoming SEPA's apparently tough stance, environment groups are asking how radioactive waste managed to get past Customs and Excise with incomplete paper work.

■ The NII has told Dounreay to phase out use of its 'silo' for radioactive waste disposal by the end of the century.

Management had wanted to continue using the silo for dumping radioactive sludges from the site's new discharge filtration system. However, the NII said the silo contravened government policy opposing wet storage of intermediate-level nuclear waste.

With the exception of a concrete lining, the silo is frighteningly similar to the site's notorious waste shaft, which exploded in 1977. It houses the same deadly blend of highly radioactive elements, and contains the explosive mixture of sodium and water.

The NII has also ordered a full review of nuclear waste storage at the site, following the collapse of Nirex's plans to establish a waste repository at Sellafield. According to Roy Nelson: "Much of our planning at Dounreay in terms of a long-term waste management strategy has assumed that their will be a Nirex repository sometime in the first half or quarter of the next century.

"It is now quite clear [it] ... is further away and we are now going to consider what that means in terms of our strategy for all wastes at Dounreay, especially intermediate level waste." ❑

Cunningham relinquishes rad brief

FOLLOWING accusations by Friends of the Earth of being "fatally compromised", the new Secretary of State for Agriculture, Dr Jack Cunningham, has given up his role in regulating radioactive discharges from the giant Sellafield nuclear reprocessing complex.

Cunningham, a former chemistry research fellow, and well-known champion of Sellafield, which is in his Copeland constituency, declared a number of links with the nuclear and chemical industries in the Parliamentary Register of Members Interests. The entries include a reference to "financial support for travel and accommodation in the USA" for Cunningham, and his wife, from BNFL Inc, a wholly owned US subsidiary of Sellafield operators British Nuclear Fuels.

As agriculture secretary, he is, in law, one of the final arbiters on radioactive discharge applications.

In a letter to the prime minister, Tony Blair, calling for Cunningham to be sacked, the chair of FoE England, Wales and Northern Ireland, Charles Secrett, said: "The associations, payments and gifts raise very serious issues of propriety and the ability to impartially carry out ministerial duties in the public interest at a time when the nation as a whole is anxious to clean up politics and leave the era of sleaze behind."

Welcoming the transfer of responsibility for nuclear discharges to a junior minister, Jeff Rooker, Secrett said: "it is not enough ... he should not be at agriculture or environment, where decisions on the nuclear and chemical industries are made.

"He has supped at the nuclear table for too many years. He cannot be asked to regulate an industry he has been a paid advocate for."

A decision from the Environment Agency is imminent on BNFL's application for a licence to operate the recently completed Sellafield Mixed Oxide Plant. The Agency is also about to embark on a public consultation into BNFL's application to massively increase aerial discharges of radioactivity from its Thermal Oxide Reprocessing Plant.

■ Meanwhile, a 'plume' of radioactive sea water from Sellafield has for the first time been picked up on the north western shores of Canada.

After leaving Sellafield's discharge pipeline, caesium-137 and iodine- 129 travel up the west coast of Scotland, then ride the currents through the Norwegian Sea, down the east coast of Greenland, into the Arctic Sea and then into the northern waters of Canada.

According to Per Strand, of the Norwegian Radiation Protection Agency, of the 40,000 billion bequerels released from Sellafield over the years, "so far, about 15,000 billion bequerels have reached the Arctic. This is between two and three times more than the contamination from Chernobyl, which is reaching the Arctic via the Baltic and North Seas." ❑

Dump Nirex?

NIREX has decided not to launch a high court appeal against former environment secretary John Gummer's rejection of its planning application for a Rock Characterisation Facility (RCF) at Longlands Farm near Sellafield.

Gummer's decision, taken on the day John Major called the general election, has thrown the UK's nuclear waste management plans into chaos, leaving the new Labour government to pick up the pieces.

While no decision has yet been taken on how to proceed in finding a final resting place for the UK's low and intermediate-level waste, which the industry had hoped to send to a Nirex repository in the first quarter of the next century, many observers now think that Nirex itself should be dumped.

Professor David Smythe, of Glasgow University's Geophysics Department, who had previously worked for Nirex and took a prominent role in the case against the RCF proposal, said: "Nirex's integrity has been questioned by the result of the inquiry ... Nirex should be wound up and replaced."

His view is backed by the former chair of the government's Radioactive Waste Management Advisory Committee, Professor Sir John Knill: "It has acted in a secretive manner. Material which is of importance has been held back. The management, the board of Nirex, has got to be looked at and probably to a large extent replaced."

■ Meanwhile, the government has ordered a study into how the UK should dispose of its high-level nuclear waste (HLW), which was not part of Nirex's remit, the bulk of which is currently being stored at Sellafield to allow it too cool for fifty years before disposal.

The award of the £345,000 contract to Quantisci, Oxfordshire, which advised Nirex on the Longlands Farm site, has been criticised by environment groups. Rachel Western, of Friends of the Earth (England, Wales and Northern Ireland), said: "The whole Nirex programme has been discredited, yet here we go again with the government starting to look for another deep disposal site with the same people, but this time for even more dangerous waste."

The Environment Department, however, maintained that Quantisci is "the most qualified company around", adding that deep disposal on land remains the best option for disposing of HLW. ❑

Cap La Hague

GREENPEACE has launched a court action in France against Cogema, the operators of the giant nuclear reprocessing complex at Cap La Hague, after it measured radiation levels at the plant's discharge pipeline some 3,900 times background levels when on two occasions a length of the pipeline was exposed during unusually low tides.

After the first low tide exposed the pipe on 11 March, the French Office of Protection against Ionising Radiation, OPRI, wrote to the Prefet (government representative) in La Mancha and Cogema advising them to close the beach to the public. However, Cogema failed to act on OPRI's advice. When contacted by Greenpeace, and asked why no action had been taken, the Prefet said he could not remember the letter and that he could not be bothered to respond as his office was too busy working on the up coming French elections.

Following the second low tide on 8 April, Damon Moglen, of Greenpeace International, said: "This is a very serious scandal. The Prefet and Cogema have sought to protect their political and corporate interests rather than the public's health and safety. These people have betrayed the public's trust."

DSIN, the French nuclear regulator, has classified the event as level one on the seven-level International Nuclear Events Scale. OPRI warned that the dose rate on the surface of the pipe was around 300mSv/hour "and thus liable to cause abnormal irradiation of a person spending several hours immediately next to the exposed pipe."

While claiming there was no risk, Cogema said whether and how long the pipe is exposed depends on weather conditions, but having a few meters exposed during very low tides is not unusual. The company is now drawing up plans for a "definitive" solution to the exposed pipe problem. ❑

Subsidising conventional

EUROPEAN hand-outs for nuclear power and fossil fuels are undermining its policies aimed at tackling climate change, according to a new Greenpeace International report, *Energy subsidies in Europe.**

Compiled by the Institute for Environmental Studies, Amsterdam, the report shows that every year of over $15 billion of direct subsidies from western European governments — European Union (EU) countries plus Norway and Switzerland — to the energy industry more than 90% goes to nuclear power (28%) and fossil fuels (63%).

"Existing subsidies and historic subsidies to fossil fuels and nuclear energy and the imbalance compared to renewable energy do not support the EU's policy goals to reduce emissions of carbon dioxide, increase the share of renewable energy or its intention to establish competitive energy markets," say the report's authors.

While cost comparisons using direct subsidies presents a picture of a badly skewed market in favour of polluting and dangerous energy systems "they are the tip of the iceberg" warns Greenpeace: "A multitude of hidden subsidies to fossil fuels and nuclear energy are likely to be far greater. Special taxation or royalty deals for oil exploration and reduced liabilities for nuclear industries are two examples." ❑

* *Energy subsidies in Europe: how governments use taxpayers' money to promote climate change and nuclear risk*, Greenpeace International, 1997.

DIRECT SUBSIDIES	MILLIONS OF US$ 1995
Fossil	
R&D Gas and Oil	5.4
Other subsidies gas and oil	10.7
R&D Coal	9.7
Coal production subsidies	1192.1
Total Fossil	*1217.9*
Nuclear	
Nuclear fission R&D	87.8
Nuclear fusion R&D	30.2
Subsidy fossil fuel levy	2768.0
Total Nuclear	*2885.9*
Renewables	
Subsidy fossil fuel levy	71.7
R&D renewables	23.2
Total renewable	*94.9*
Conservation	
R&D Conservation	
Energy efficiency programmes	94.6
Standard performance programme	39.4
Local Authority investment programme	453.5
Total conservation	*608.5*
Electricity	
R&D electricity	3.9
Total electricity	3.9
Total quantified direct	4811.1
Ratio renewable/non-renewable	*2.%*
excluding conservation and electricity	

Direct subsidies on energy in UK

Chernobyl replacements

ELEVEN years after the Chernobyl disaster, plans for the notorious nuclear plant's closure are still in disarray. Now, however, the European Bank for Reconstruction and Development (EBRD) is planning to ignore its own advice and hold an extraordinary meeting to consider a plan to complete two unfinished Ukrainian nuclear stations to replace the power supplied by the remaining Chernobyl reactors, which account for around 5% of the country's electricity supply.

A central tenet of EBRD funding is that any proposal must represent the "least cost" solution to alleviating nuclear risk. Ukraine and a number of western nuclear companies are adamant that completing Rovono-4 and Khemlnitsky-2 at a cost of $1.2 billion is the only way to close Chernobyl by 2000, as laid out in the Memorandum of Understanding with the G7. However, an Independent Review Panel, established by the EBRD, concluded that completing and upgrading the stations is unnecessary and not the least cost solution to meeting Ukraine's electricity needs.

According to Friends of the Earth International (FOEI), which has "reviewed and analysed the safety documentation associated with the project ... no satisfactory way exists to make Rovono and Khemlnitsky conform to either current western licensing and safety standards, or current Russian safety standards, within a remotely acceptable cost framework."

The Ukrainian government plans to complete the reactors, using EBRD and other western finance, to minimal safety standards with only a promise to perform further upgrades after the plants are operating, warns FOEI.

A similar project to upgrade Temelin in the Czech Republic has not only run into strong political opposition but is between two and five years behind schedule and $1 billion over budget.

Condemning the plan, John Hallam of FOEI said: "Ukraine cannot be allowed to blackmail the EBRD, Euratom, the European Commission and the G7 by saying it will close Chernobyl only if other almost equally unsafe nuclear plants are opened, particularly if there is doubt as to whether it will actually fulfil its part of any such bargain." ❑

Recycling radioactivity

SOME recycled products, such as glass and plastic, could in future contain very low level radioactive waste, following a decision by the European Commission to allow small quantities of radioactive material to be disposed of without reporting or an authorisation licence.

Accepting that there is no safe level of radioactivity, Augustin Janssens of the Commission's radiation protection unit defended the new Directive, arguing that it is simply not practical to regulate for very low levels.

However, the Directive expressly forbids the addition of radioactive substances to food, toys, ornaments or cosmetics. Other forms of so-called disposal, including recycling in plastics and glass, are permitted without authorisation if the quantities are below levels to be set by regulatory agencies in European Union member states.

In the UK disposal of very low level radioactive wastes from hospitals and industry is currently regulated under the Radioactive Substances Act 1993 and new legislation will have to be placed before the House of Commons before 2,000, when the directive is supposed to be incorporated in law.

According to Dr John Cooper of the National Radiological Protection Board, which helped the Commission draw up the new directive, "exemption levels" have been formulated for some 300 isotopes, at which he believes any risk would be "trivial".

However, the proposed levels for some isotopes are higher than the 1,000bq/kg limit in sheep deemed safe for consumption in the wake of Chernobyl: for strontium-90 and caesium-137 the permitted concentration is to be around 10,000 Bq/kg. ❑

Nikitin absent for prize

DESPITE being freed from jail last September, the former Russian Naval captain and senior inspector with the Department of Defence and Radiation Safety, Alexander Nikitin, is still facing charges of high treason for his work outlining radioactive contamination from Russia's Northern Fleet.

Considerable confusion still surrounds the exact nature of the charges. While treason can carry the death penalty, the maximum punishment now being sought by the FSB, the Russian security service (formerly the KGB), is believed to be ten years imprisonment. The FSB still has Nikitin under close surveillance and has restricted his movements, preventing him from leaving his St Petersburg home to attend a ceremony in the US to receive the (US dollars) $75,000 Goldman Environmental Prize in April.

The prize was awarded in recognition of Nikitin's work with the Norwegian environmental group Bellona, which focuses on the considerable environmental problems in north-western Russia. Together with Thomas Nilsen and Igor Kudrick, he produced a report: *The Russian Northern Fleet — sources of radioactive contamination.*

As a former chief engineer on nuclear powered submarines, he was in an ideal position to contribute a section to the report about Soviet nuclear submarines. Following publication of the report, the FSB accused him of releasing state secrets. However, an investigation by Amnesty International has backed Nikitin's claim that all of the source information used had been previously published. The report is currently the only book in Russia which is officially forbidden

Speaking from St Petersburg, Nikitin said: "The Goldman Prize is a welcome acknowledgement of the work we have done in Bellona. It is confirmation of the fact that the damage our planet suffered during the Cold war can only be repaired through our acting together."

The Kola Peninsula, adjacent to the Norwegian border along the Barents Sea, has the highest concentration of nuclear reactors in the world. With 52 retired submarines still containing their fuel, along with 67 operating nuclear submarines, the danger of catastrophic radioactive contamination, especially from corroded and leaking hulks, is enormous.

Despite ten months in prison — the first six weeks in solitary confinement — Nikitin remains committed to the work of Bellona: "I am convinced that ecology cannot be secret. Environmental openness is an inalienable human right. Any attempt to conceal information about harmful impacts on people and environment is a crime against humanity."

Nikitin's wife, Tatania Chernova, who accepted the Goldman Prize on his behalf, told *Safe Energy* she thinks "that a special example is being made" of her husband. While expected changes in the Russian penal code should do away with the charges levelled against Nikitin, she is urging people to write to the Russian authorities demanding that the charges be dropped. ❑

Letters can be sent to:
Prosecutor General Yuri Skuratov
103793 Moscow
Bolshaya Dmitrova, 15 a.
Fax: 00 7 095 292 07 79

Japanese prosecutions

SENIOR management of Japan's state run Power Reactor and Nuclear Fuel Corp (PNC) are to be prosecuted after attempting to cover up details of a fire and explosion at the Tokaimura reprocessing complex earlier this year.

It has emerged that one of the company's top inspectors deliberately destroyed photographs of the 11 March accident, and that eight cleaners were exposed to low levels of radiation when they were instructed to clean up some of the debris following the explosion.

While PNC previously admitted that 37 nuclear workers had been exposed, it had claimed in its official accident report that the fire, which broke out in a building where low-level waste was being bitumized, had been put out and visual checks were made. It now admits that no such checks took place. The fire re-ignited and caused an explosion some ten hours later. Such was the cavalier attitude of the Tokai management that they continued to play golf during and after the accident. If found guilty, PNC officials will face fines of up to 200,000 yen and six months in jail.

While the police were still investigating the Tokai incident, 11 PNC employees were exposed to radiation following an accident at the Fugen nuclear power station. According to the police, PNC waited 30 hours before reporting the incident. PNC has also subsequently admitted to 18 other unreported radiation leaks from the Fugen plant. ❑

IAEA and North Korea

WHILE the International Atomic Energy Agency (IAEA) claimed, in May, to have strengthened international safeguards, to prevent the diversion of civilian nuclear materials towards clandestine weapons programmes, it also said it thought North Korea is hiding a stash of plutonium.

The question of North Korea's clandestine nuclear weapons programme was raised by the IAEA following its first inspection tour of the country in 1993.

North Korea signed the Nuclear Non-Proliferation Treaty, which committed it to opening its nuclear facilities to international safeguards inspectors, in 1992. Since then, the Agency has been involved in a cat-and-mouse game with North Korea in an attempt to discover how much plutonium has been amassed.

IAEA Director General, Hans Blix, said that North Korea had more plutonium than it claimed when it signed a deal with the US in 1994 to freeze its weapons programme in exchange for two pressurised water reactors. "We have never said — and we don't know — how much more than a few hundred grammes they have." However, he added that some countries' security services believe North Korea has several kilogrammes or enough for one nuclear warhead. ❑

Sir John Knill **was chairman of Rwmac when Nirex selected Sellafield for an RCF. Now the famously dubbed 'Trojan horse' has been found lacking, Sir John contemplates a future for Nirex.**

Half-lives after the RCF

THE dismissal by the Secretary of State for the Environment of Nirex's plans for a Rock Characterisation Facility (RCF) at Sellafield provides the best opportunity there has been, since the Flowers Report of 1976,[1] for a restructuring of national radioactive waste management policy. However, this is not an issue which our new government can put on the back burner. Decisions need to be made soon.

Why is this so? Because on face value only two questions are involved, the future of Nirex, and the need for longer-term intermediate level waste (ILW) storage. Both answers might appear self-evident.

Tucked away in paragraph 44 of the 1995 white paper on radioactive waste management policy is the decision that, in retaining the government's golden share in Nirex, there would be a new undertaking that Nirex "will abide by Government policy". Paragraph 87 then commits government to developing a new approach for repository site selection when the next opportunity arises. The consequence of these two policy decisions is that further site selection cannot start until government has determined the procedures to be used, and that would probably take at least two to three years. Nirex is hamstrung in its objective to develop a deep repository.

Does this all mean that there is no need for Nirex, and it should be closed down, starting afresh sometime in the future? In 1981 the government stopped the EC research programme into deep drilling of granite promising that studies into deep disposal would continue. This promise was not followed through, so in 1987 Nirex's *The Way Forward* contained cartoons of geological situations perceived to be suitable for an ILW repository which had never been scientifically tested. The rest, as they say, is history, but it would be foolish to make the same errors again. Until ideas come forward for a permanent solution to ILW and high level waste (HLW) in line with sustainable development, and which are better than deep geological disposal, we need a Nirex.

But we need a new Nirex which will work to an innovative agenda paced at the rate at which public confidence can be established through transparency of action and consensus building. Nirex has signally failed to gain public confidence. The Nirex board chose to go to a public inquiry on the RCF, and selected the timing, clearly confident that it would win. So confident was the Board that the construction contract for the RCF was let at the end of 1996. Of the order of £200m had been spent on investigations at Sellafield and it is reported that Nirex spent about £12m on the inquiry. Government criticisms of the case for the RCF are so comprehensive, despite this almost unlimited expenditure, that it would not be credible if the Board were to stay in place much longer. Indeed in comparable circumstances in private industry such a Board would already have been restructured.

It was the Flowers Report that recommended the formation of a Nuclear Waste Disposal Corporation (NWDC) which has, in the event, similarities to the Nirex structure except that the NWDC would have fallen under the Department of the Environment (DoE), rather than the Department of Trade and Industry (DTI). The consequences of the RCF inquiry demonstrate that DTI has failed, through its golden share or through its appointed directors, to maintain proper influence on Nirex.

New Nirex

A new Nirex, N(ew)nirex, should fall under the DoE, be created with a new Board, and take over the inheritance of Nirex. Membership of the Nnirex Board should balance out the knowledge, experience and skill base required at any period of time together with the interests of those who need to dispose of radioactive waste. For such a Board to be effective, it could not be totally independent but should be seen to operate in an independent manner. The Nirex Board has been dominated by the interests of industry shareholders and it has not contained appropriate scientific, economic and social expertise. Not unsurprisingly in the circumstances, the Board has not contained anyone experienced in real-world geological risks and uncertainty associated with deep investigations and large underground excavations.

What would the agenda for Nnirex be? The greatest urgency relates to establishing the future of the large investment made into borehole instrumentation and other geological investigations at Sellafield. This area should become a research site investigating deep ground water flow in fractured rock, a topic which is of primary interest to the deep disposal of radioactive waste internationally, and regional geophysical methods. Nnirex should plan and manage a ten year programme of investigations, building on the studies already carried out, and co-operating with industry and universities, nationally and internationally. Such a programme would require local support and formal consents, and it would fail if it were to be seen as another Trojan Horse. For this reason, the government would need to define an area within west Cumbria which would not be used, in the future, for radioactive waste disposal. In parallel to these continuing studies near Sellafield, the Nirex research programme into the behaviour of waste forms needs to be continued and extended.

In developing a site selection process designed to gain consensus, such as that set out in the Rwmac-Acsni group report of 1995,[2] the government would require technical support, and this might be best provided by in-house expertise within Nnirex. Indeed, with the experience from Sellafield, it would now be easier to begin to assess more realistically the extent to which deep repository sites actually exist in this country which would have a less than 10^{-6} risk ceiling.[3]

If Nnirex were to be established with the three functions of running a research site at Sellafield, continuing with its existing waste research, and providing technical back-up to a re-examination of site selection procedures, existing core scientific and technological expertise in Nirex could be retained and not disseminated. Nnirex should continue to prepare the national waste inventory and might have the wider role of creating and monitoring a national plan for decommissioning.

An illogical feature of Nirex's responsibilities was that it only had the task of constructing and operating a deep repository for low level waste (LLW) and ILW; HLW would have to be disposed of elsewhere. With the consequential delay that has now been imposed on the disposal of ILW, it would be more sensible for the Nnirex brief to embrace HLW. And if HLW, why not spent fuel? The 1995 white paper states that it "should be a matter for commercial judgement of the owner of the spent fuel, subject to meeting the necessary regulatory requirements" whether reprocessing is carried out. No doubt the new government will face calls for an end to reprocessing. An adept move would be for government to declare spent fuel to be a waste form which should be stored unless reprocessing can be justified on safety, economic, technical, environmental and social grounds. If government so determined, Nnirex would therefore be looking, in the years to come, for a single site for the co-disposal of ILW, HLW and spent fuel.

The delay to the opening of a deep repository means that ILW will now have to be stored at the surface well into, and not totally inconceivably beyond, the next century. Some parts of the nuclear industry have anticipated such a decision, and are well prepared with outline planning permissions for stores extending up to 2050. Elsewhere, where a more rosy view of Nirex's prospects has been adopted, the impacts are serious and there will need to be a construction programme to replace existing facilities, as well as providing for the future. Existing waste will have to be monitored and quality controlled to ensure that it can remain in storage without any need for repackaging. Pressure will need to be maintained by government, and the licensing authorities, to ensure that this opportunity is not taken to slow down (rather than accelerate) the conditioning and packaging of raw wastes, some of which have been in store for a long time.

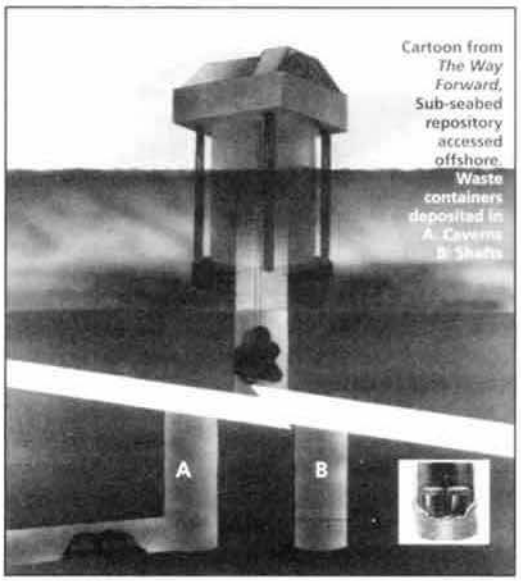
British Nuclear Fuel's (BNFL's) proposals for substitution are a related issue, and will come under further scrutiny. Substitution involves the return of a smaller volume of HLW to its overseas customers for reprocessing in exchange for a larger volume of ILW retained in the UK for storage and eventual disposal. The lack of a disposal route will now result in pressure to return all wastes.

Store-and-decay

A construction programme for ILW new stores is inevitable but will that be all? The case for the construction of a national long-term store-and-decay facility for short-lived ILW has now become very much stronger. Such a facility, which would hold short-lived ILW until it was acceptable for disposal as LLW, could be of value to the nuclear power industry, and also to the many "small users" thereby resulting in significant reduction of the ILW volumes to be disposed of in any eventual deep repository. The government's 1994 discussion document on the white paper also raised the question as to whether that waste might be sent "for disposal to Drigg which might otherwise be disposed of to a Nirex repository". Although the white paper did not propose such a change in policy, it might well be advanced by BNFL as a response to the delays imposed by the RCF decision. However, the function of Drigg should be LLW disposal, and it would be unwise to risk exhausting its radiological capacity while space still remains for LLW.

If the concept of a national store-and-decay facility were to be pursued, then this would provide a useful first test of the government's new site selection procedure in circumstances where the ability to achieve public reassurance would be on trial, rather than geological uncertainty.

When our new government grasps the nettle of radioactive waste management, it should have the courage and vision to put in place policies with half-lives which will take us well into the new millennium and beyond. ❑



Cartoon from *The Way Forward*, Sub-seabed repository accessed offshore. Waste containers deposited in A. Caverns B. Shafts

"An adept move would be for government to declare spent fuel ... a waste form"

NOTES

1. Nuclear Power and the Environment. The sixth report from the British Royal Commission on Environmental Pollution, chaired by Sir Brian Flowers. 1976.

2. Site Selection for Radioactive Waste Disposal Facilities and the Protection of Human Health. Study group drawn from members of the Radioactive Waste Management Advisory Committee and the Advisory Committee on the Safety of Nuclear Installations. March 1995.

3. 1 in 1 million risk of death.

Sir John Knill is former Chairman of the Radioactive Waste Management Advisory Committee (Rwmac) and the Natural Environment Research Council, and is now a freelance engineering geologist.

Lobbying for lethargy

There's just 1.6% genetic difference between us and chimpanzees. Our leading edge, supposedly, is an ability to look into the future and act accordingly. *Dr Patrick Green* **and** *Blake Lee Harwood* **report on some evolutionary aberrants.**

IN 1995, the Inter-Governmental Panel on Climate Change (IPCC) — the official scientific body assigned to investigate climate change and comprising over 2,000 of the world's best scientists — delivered a stunning verdict that "the balance of evidence suggests a discernible human influence on global climate" caused by the burning of fossil fuels. This stark conclusion has stimulated a broad scientific and political consensus that climate change is real and has to be tackled urgently. Despite this, the December Kyoto Climate Summit looks set to fail to agree on anything other than tokenistic action to fight climate change.

The delicate negotiating process that could lead to legally binding agreements is being frustrated by a lobby that has clear, vested, financial interest in preventing any action whatsoever — the fossil fuel lobby. Arguing in the face of scientific consensus, the fossil fuel lobby contend that climate change science is flawed, that the industrialised world will be bankrupted if it takes early action and that the developing world is the major villain. None of these positions are true, and the real price of taking no action to combat climate change will be catastrophic for our civilisation, potentially leaving millions dead, homeless or impoverished.

The fossil fuel lobby

There are three fossil fuel industry groups which specialise in intervening in the climate change negotiations: (i) The Global Climate Coalition (GCC), whose members include Shell, Exxon, Texaco, Ford and General Motors; (ii) The International Climate Change Partnership (ICCP), whose members include British Petroleum, Dupont and Dow, and (iii) the Climate Council, a platform for Don Pearlman, of the US law firm Patton, Boggs and Blow, whose clients include DuPont, Exxon, Texaco and Shell.

While they claim to present a balanced view, they essentially share a common goal to ensure maintenance of a 'business-as-usual' scenario for as long as possible, allowing their members to maximise profits. This means the unimpeded production and use of fossil fuels.

The arguments

The fossil fuel lobby has focused its efforts on four major arguments:

1. There is no real evidence that global temperatures have risen as a result of human causes.

2. Computer models of climate change have predicted far more warming than satellite records actually show.

3. Responding effectively to climate change is simply too expensive and will cost the US economy billions of dollars and hundreds of thousands of jobs.

4. There's no point in the industrial world doing anything to curb emissions of heat-trapping gases, since developing countries like China and India will produce most of the heat-trapping gases in the future.

As the science has firmed up through the 1990s, the first two arguments have effectively collapsed and can only be used for public posturing before poorly briefed audiences, while being effectively abandoned within the negotiations themselves. Scientific consensus on climate change is now essentially unshakeable.

This has forced the fossil fuel lobby to re-emphasise their economic arguments and to point an accusatory finger at the developing world, especially those countries with the greatest industrial potential — India and China (and this despite the fact that per capita emissions of greenhouse gases in these countries are one twentieth of those in the US). These economic arguments against combating climate change inevitably conjure up extreme visions of industrial collapse and widespread unemployment (600,000 job losses annually is the favoured figure of the GCC), but show little grasp of real world economics.

As their strategy of trying to discredit climate change science has failed, so they have instead switched to promoting junk economics. Models used are deeply flawed and assume the only way to reduce emissions is by an enormous carbon tax. In reality, countries are likely to use a range of fiscal, research, informational, incentive and regulatory policies to achieve cost-effective emissions reductions. The IPCC has itself pointed out that cost effective, win-win, energy efficiency measures could secure early emissions reductions of 10-30% were governments to agree their implementation.

Despite their junk science and fantasy economics, arguments of the fossil fuel lobby carry particular weight in the US. As a result, the US government (backed up by Canada, Australia and New Zealand) is now the principle block on agreement of early action to prevent dangerous climate change.

Yet experience clearly demonstrates that industry always grossly overestimates compliance costs of environmental measures and underestimates its ability to achieve the kind of technical innovations necessary. Once national standards have been set — whether to reduce air pollution, clean out rivers and streams, or protect the

stratospheric ozone layer — industry has successfully implemented cost-effective solutions, creating hundreds of thousands of new jobs and improving many companies' competitiveness in global markets.

Ignoring the alternatives

As recently as this February, 2,000 economists, including six Nobel laureates, signed a statement arguing that the US should join other nations to take measures to slow climate change, and agreed that "preventable steps are justified". The economists, who are from across the political spectrum, argued: "Economic studies have determined that there are many potential policies for which the benefits outweigh the costs. Policy options are available that would slow climate change without harming employment or US living standards, and these may be economically beneficial in the long-run."

The last argument deployed by the fossil fuel lobby — that action is pointless in the face of growth in the developing world — is simply a red herring. Firstly, it is obvious to all parties to the climate negotiations that the developing world will postpone action until convinced the industrialised nations are serious about tackling climate change. International action must start with the West. Secondly, developing nations currently make relatively small per capita contributions of climate change gases, and are not responsible for the historic burden of carbon dioxide (CO_2) currently in the atmosphere. So from a perspective of political pragmatism, equity or simple justice, it seems clear that the industrialised world must take the lead in combating climate change by reducing emissions of greenhouse gases.

Lobbying for a future

In contrast to the 'lobbying for lethargy' conducted by the fossil fuel lobby there are alternative business groupings actively working for real action to fight climate change. These groupings, including the US Business Council for a Sustainable Energy Future (BCSEF) and the European BCSEF, represent industries willing to accept that action on climate change can be good for jobs and the economy. There are also lobbyists working on behalf of those commercial sectors which believe themselves to be particularly vulnerable to the effects of climate change. In particular, insurance and reinsurance industries are not able to sustain the scale of economic losses severe climate change is expected to precipitate. However, whether these lobby groups can successfully counter the influence of the fossil lobby in 1997, fuelled as it is by millions of dollars, remains an open question. If they fail, dangerous climate change will be becoming increasingly inevitable

The overall objective of the United Nations' Framework Convention on Climate Change is the "stabilization of greenhouse gas concentrations in the atmosphere at a level which would prevent dangerous anthropogenic interference with the climate system." While the IPCC has not suggested specific emission reduction targets, it has stated that maintaining atmospheric CO_2 concentrations at present levels can only be achieved by immediate reductions in emissions of 50-70%. In the absence of such cuts, concentrations will rise, and developed nations will eventually need to reduce their carbon emissions by significantly more than 60% by the middle of the next century.

World governments are currently negotiating emissions reductions for developed nations of the order of somewhere between 0% and 15% by 2010. Environmental groups, including Friends of the Earth, have backed calls from the Alliance of Small Island States (AOSIS) for a 20% reduction in CO_2 emissions by developed nations by 2005. A reduction of this magnitude is likely to be the minimum required as a first step to ensure that global climate change stays within ecologically tolerable limits.

It can be seen therefore, that if the fossil fuel lobby is successful, dangerous climate change will be inevitable. Fighting climate change in the long-term means reducing our dependence on fossil fuel energy resources. Two basic avenues are open. The first is to do more with less and improve the efficiency with which we use fossil resources. The second is to find other sources of high quality energy that don't cause climate change, or, unlike nuclear power, don't have other serious environmental impacts. Such sources include wind power, solar power and other renewable sources of energy.

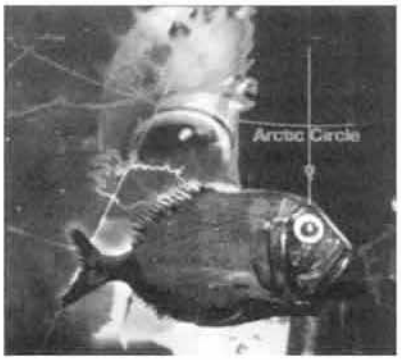
Ultimately, governments of the world must decide whether to allow the suicidally short-term interests of the coal, oil and gas lobby to prevail or whether a sustainable future based on renewable energy technology is something worth working for. It is no exaggeration to state that the future of our civilisation is in their hands. ❑

websites:
http://www.shell.com
.ford.com
.texaco.com
.Exxon.com
.General-Motors.com
http://165.121.20.76 (BP)

Dr Patrick Green is senior energy, nuclear and climate campaigner, Blake Lee Harwood is media co-ordinator, at Friends of the Earth England, Wales and Northern Ireland

Oil's not well on the Atlantic Frontier

It's carbon logic. If we are to avoid catastrophic changes in our climate, 75% of the world's fossil fuel reserves must remain in the ground. *Pete Roche* **elaborates on why Greenpeace is calling for a halt to oil and gas exploration in the Atlantic Frontier.**



JUST over 24 hours before British Petroleum's (BP) Annual General Meeting, Greenpeace activists installed an array of 25 solar panels on the roof of BP Exploration's Aberdeen Headquarters and called on the company to switch investment from oil exploration to its subsidiary BP Solar. BP is the lead oil company involved in the £826m Foinaven project which will begin producing oil soon from the recently discovered field west of Shetland. This could be the start of a new oil rush on the Atlantic Frontier, which stretches from west of Ireland to the Faroes and from west of Rockall to Norway.

BP says it "regards global warming as a serious issue and actively participates in the debate to find solutions to this problem".[1] But at its core BP produces a fundamentally polluting product. And it is planning to increase production, worldwide, over the next decade from 1.5 million barrels of oil and gas a day to 2.5m barrels.[2] To avoid serious, irreversible damage to our climate, most fossil fuels will have to remain in the ground. The first step is to stop expanding fossil fuel reserves, which means an end to new oil exploration.

The United Nations' Climate Convention has committed governments, including the UK, to work towards "stabilization of greenhouse gas concentrations in the atmosphere [to] prevent dangerous anthropogenic [human made] interference with the climate system". BP's major investment in the Atlantic Ocean and its aim to increase oil and gas production by 5% per year are incompatible with this commitment.[3]

Scientists on the Advisory Group on Greenhouse Gases working for the United Nations Environment Programme, found that temperature increases beyond 1°C by 2100 may lead to "extensive ecosystem damage".[4] The rate of change should be less than 0.1°C per decade. Based on this, it is possible to estimate a 'budget' for fossil fuels: how much we can extract and burn, while limiting the temperature increase to 1°C. The small amount of oil, gas and coal which we can afford to burn could then be used wisely, in an orderly phase-out.

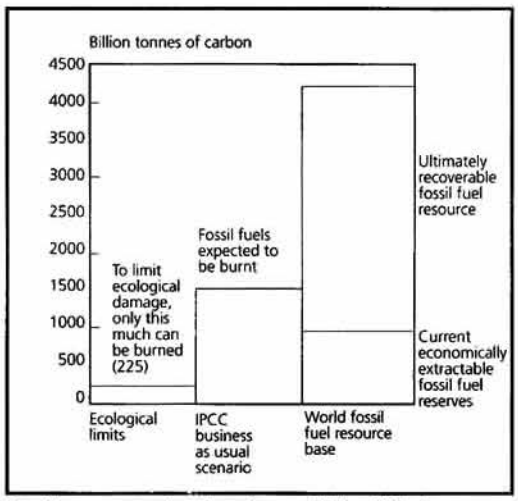
Using computer models of the world's climate it is possible to predict that, to stay within a 1°C temperature rise over the next 100 years, the total amount of carbon that can be released from the burning of fossil fuels (as CO_2) is around 225 gigatonnes of carbon (GtC). This means that around 75% of the known, economically recoverable reserves of fossil fuels can never be burned. They must remain in the ground.

The inescapable conclusion of this climate logic is that there is an overriding need to ensure most oil, coal and gas remain below the ground, and to rapidly increase investment in the alternatives to fossil fuels. The question is not if, but when we phase out fossil fuels. Clearly an immediate end to the use of fossil fuels would be impractical. But it is time oil companies recognised an end must come, in decades, beginning with an end to further expansion of oil development.

BP already has a profitable and expanding solar subsidiary, BP Solar, so it is well placed to find profitable market-based alternatives to the continued extraction of oil, compared to other oil companies. But in comparison with BP's investment of more than £0.5 billion in the Foinaven oil field in the Atlantic Frontier, the company has only invested £60m in the 10 years of BP Solar's existence.[5]

According to industry analysts, as of the end of 1995, BP Solar was the third largest solar company in the world, employing some 500 staff worldwide with 10% of the global market and sales for 1995, earning BP Solar some $47.8m.[6] However, the vast majority of BP Solar's business activities are taking place outside the UK. This is symbolised by a decision made late last year to invest $7m in a solar manufacturing plant in California. BP Solar manufactured an estimated 100,000 solar panels in 1995, but not one of these solar panels was made in Britain as all of BP manufacturing and assembly plants are based overseas in Spain, Australia, America, India, Saudi Arabia and Thailand. At most only 1% of BP Solar's production was actually sold in the UK.

If the £826m spent so far on Foinaven had been used for solar in the UK, it could have solarised some 100,000 homes. BP clearly gives priority to investing in new UK oil production rather than opening solar factories in Britain and developing a solar market for Britain. These misplaced priorities are symbolised by BP's apparent failure to install any of its own solar panels on its UK offices.



Total amounts of carbon in world fossil fuel reserves

John Harford, of BP, has offered a public explanation for this lack of development of solar power in the UK, which is effectively blocking further market expansion of BP Solar's operations. Writing in the November/December edition of *Environment Business Magazine* he states: "There are some really far-sighted programmes in PV [photovoltaic] systems taking place in other countries but here we are stuck in a short-term view of energy. Eventually that will have to change ... Those governments developing supportive and well-integrated PV programmes will greatly enhance the position of the domestic industry and enhance their share of world trade in PV products."[7]

BP Solar is a full member of the UK Photovoltaic Association (UKPVA). In February 1997 the UKPVA published a summary of its strategy document entitled *Photovoltaics: A Growth Industry for Britain*. UKPVA describes a £100m investment programme by the industry, which, if combined with a government investment of £18m a year up to 2010, will generate major economic and environmental benefits; create 40,000 new British jobs and increase Britain's share of the world solar market from 9% to 15%. This would result in annual sales of £750m.[8]

Furthermore, this level of investment is necessary to enable BP Solar to increase its manufacturing capacity, reduce costs of the technology and maintain its status as a leading solar company. Increasing manufacturing capacity is critical to ensure BP Solar's share of the rapidly expanding global market for solar, estimated to be worth some £5bn a year by 2010.[9]

Kyocera, Japan's leading solar manufacturer will be investing $122m in new production facilities over the next three years, resulting in a five-fold increase in their production capacity, allowing the manufacture of around eight times more solar panels than BP Solar shipped in 1995.[10]

BP's activities at the Climate Change Convention also raise questions about its claims to be concerned about climate change. It is a high profile active member of two industry lobby groups, whose main intention at the climate negotiations is to delay action by governments to set early CO_2 emission targets.

BP also plays a major political and market role in promoting the use of oil. It will be the first to develop deep-sea extraction of oil in the Atlantic Ocean — a much more hostile environment than anywhere this technology has been used before — setting a precedent and opening the way for other companies to enter frontier areas such as the Arctic and Antarctic seas, and increasing the threat to the climate.

Dr Mike Grubb, head of the climate programme at the Royal Institute for International Affairs, told *The Scotsman* newspaper "if it is opening up a whole new global area and capability then it is effort being put in the wrong direction". The major oil exporting nations are very frightened about the outcome of this year's round of international climate negotiations "... if the countries which are limiting their emissions also start pulling back on their exploration and new production that will mean that not all of the reduction is taken off the current major energy exporters ... and that could make them [OPEC countries] feel as if they are being treated fairly".

BP is not the only company involved in new oil exploration on the Atlantic Frontier. One of the last acts of the outgoing government was to award licenses for 25 of the 68 tranches offered in the 17th licensing round. The majority of these tranches are located in the Rockall Trough, west of The Hebrides. Seismic surveys are expected to begin this summer. A Statoil/Enterprise/Mobil consortium secured the largest number of licences, but the list of companies involved reads like a roll call of all the world's major oil companies.

Waters of the north-east Atlantic Ocean hold an immense richness and diversity of wildlife. They are the richest habitat in Europe for whales. For bird life, the seas and coastal habitats are of worldwide importance. Off the Scottish continental shelf, the deep ocean is an area of unique ecology about which very little is known. Dozens, if not hundreds of new species are expected to be found there.

Seismic testing, routine and major oil spills, and pollution caused by drilling operations will all have significant impacts upon the marine ecosystem. Yet BP is producing so-called 'environmental assessments' at the same time as developing an oil field in the Atlantic Ocean. There is minimal public consultation, information is kept 'confidential', and there is no provision for halting development if damage to the environment is found to be unacceptable.

Sooner rather than later we are going to have to stop exploring for new fossil fuel reserves, if we are going to avoid serious irreversible damage to our climate. It is madness to start opening up pristine marine environments like the Atlantic Ocean for new oil developments. ❑

NOTES

1. A new frontier for Britain — Why BP is backing the Atlantic Frontier Project. BP Leaflet cApril 1997.
2. "BP Signals Plans for Sustained Growth in Production". BP Press Release, 12 March 1997. (available on http://www.bp.com/press).
3. BP Annual Review 1996. p6.
4. Rijsberman and Swart, 1990. UNEP Advisory Group on Greenhouse Gases (AGGG).
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6. From: Strategies Unlimited. 1996 Photovoltaic Industry Competition Analysis. Note, BP's chief executive John Browne announced on 19 May that the company aimed to increase sales of solar equipment to $1bn over the next decade from $100m now.
7. John Harford, Planning Manager, BP Solar. Environment Business Magazine, Nov/Dec 1996.
8. Photovoltaics: a growth industry for Britain (Executive Summary). British Photovoltaic Association, February 1997.
9. The Solar Letter, 14 February 1997, Vol7, No.4 p71. Note Kyocera intends to increase its manufacturing capacity to 12MW by year-end 1997, to double to 25MW shortly after, and to increase it further to 60MW of manufacturing capacity by year 2000. In comparison BP Solar shipped 7.2MW in 1995.

A 50 page briefing and short summary are available from Greenpeace Sane Energy Campaign, Canonbury Villas, London, N1 2PN. Phone Pete Roche on 0171 865 8229. Or visit our new web site: http://www.greenpeace.org.uk/atlantic

Pete Roche is Atlantic Frontier campaigner at Greenpeace UK.

Renewable Energy Life Cycles

LCA is being used in the development of EC eco-labelling criteria. As renewables multiply energy options, LCA might similarly be of use in making appropriate energy choices. *Tertia Waters* **reports on a pilot study.**

LIFE Cycle Assessment (LCA) offers a robust procedure for quantifying the net environmental benefits of renewable energy projects. A preliminary study has recently been conducted for the European Commission DGXVII's Thermie Programme to investigate the application of LCA to renewable and energy efficiency projects.

Why LCA? While some renewables may be emission-free during operation, associated manufacture and transport do have impacts. Likewise, conventional technologies have significant impacts outside those associated with generation. Since LCA studies are conducted on a comparative basis, differing energy technologies can be set side by side and net environmental benefits calculated.

LCA's are conducted according to standardised codes of practice. An initial *scoping* exercise and subsequent *inventory* — quantifying all system inputs and outputs — gathers data to be fed into the four main impact assesment stages: 1, ***classification:*** groups data into environmental effect categories; 2, ***characterisation:*** accounts for relative potencies within effect categories; 3, ***normalisation***: accounts for relative magnitudes of effects between categories; and 4, ***Valuation***: uses value judgements to determine the relative importance of different effects. Finally, ***improvement analysis*** audits the results and identifies areas with the greatest potential for reduction of environmental burden.

Among the examples chosen for the Thermie study were a wind farm in Spain and a photovoltaic (PV) facade in the UK. Each was compared to an appropriate conventional generating mix (and for PV, cladding materials avoided by building-integration of modules) displaced by the particular project — the 'counterfactual'.

After characterisation, comparison of each renewable technology against its counterfactual enables the net benefits of each renewable project, in terms of avoided emissions, to be calculated. Significant emissions savings (for instance greenhouse gases and acidification precursors) were found to result from the adoption of wind and PV technologies (see table 1).

Final valuation entails aggregation of environmental effects, expressed in Eco-indicator points, giving a relative measure of the overall environmental impact of each system (see figure 1). Note that the gross environmental burden of the PV facade is significantly higher than the wind farm, due to the energy intensive manufacture of silicon cells,[1] but that its counterfactual (UK generating mix plus avoided cladding materials) is also high, resulting in a net difference similar to that between the wind farm and its counterfactual (Spanish generation mix).

Applications: LCA is a scientifically based environmental assessment tool which could provide sound information upon which to base plans and policies. It has already been adopted by the European Commission as a means of establishing eco-labelling criteria. In formulating energy policy, LCA could be useful in determining renewables' role in achieving emissions reductions. On the ground, it could aid project planning by providing data on environmental benefits of renewables projects, and evaluating the merits of alternative sites or technologies. ❑

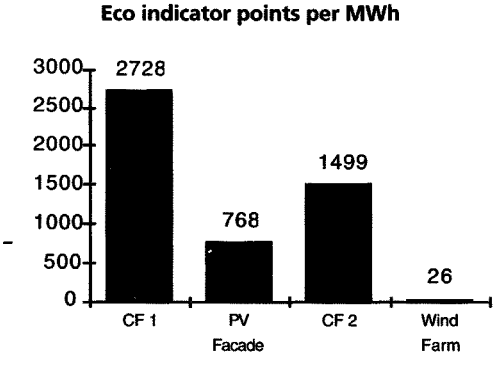
For further information please contact Tertia Waters or Robert Forrest at: Energy Unlimited, Cloney Cottage, Kippen, Stirling, FK8 3EZ, Tel: +44 (0)1786 870770, Fax: +44 (0)1786 870828, email: EUnlim@aol.com

Note: 1. This assumes the energy used to manufacture renewables is itself geneated by conventional means.

Table 1. After Characterisation:-
Net benefits of wind farm and PV facade, per MWh.

environmental effect	*equivalent unit*	*wind farm avoided emissions per MWh*	*PV facade avoided emissions per MWh*
Greenhouse effect	CO_2	414	449
Ozone layer depletion	CFC-11/12	7.16×10^{-5}	6.7×10^{-5}
Acidification	SO_2	3.037	1.09
Eutrophication	Phosphate	0.162	0.14
Heavy Metals	Mercury	8.36×10^{-3}	1.02×10^{-2}
Carcinogens	PAH	1.9×10^{-4}	7.98×10^{-4}
Winter Smog	SO_2	2.28	0.34
Summer Smog	Ethene	7.98×10^{-2}	3.30×10^{-2}

Figure 1



Paltry policies on efficiency

*Euro*ACE

A new EC strategy paper highlights the gaping hole between intent and action on climate change. Following the dilution of one efficiency initiative and the obstruction of another, *Andrew Warren* joins the authors in calling for "serious reflection".

"CLIMATE change is a subject which concerns us all. The overall situation on climate change will be affected by our current behaviour on and policies in the energy field." So begins the long-awaited strategy paper on climate change and energy policy, *The energy dimension of climate change*, finally published by the European Commission (EC).[1] It identifies the enormous chasm emerging between the official Community target of reducing emissions of greenhouse gases, and what will occur without any policy changes.

This spring the Council of Ministers committed Europe to 15% fewer greenhouse emissions by 2010, than in 1990. Relying upon business-as-usual to deliver these savings would, according to the EC, be most unwise. Under prevailing circumstances, rather than falling, there is every likelihood that emissions of CO_2 will increase by at least 8%. Leaving a carbon chasm of at least 23%.

Even that may be understating the problem ahead. The business-as-usual forecasts assume efficiency improvements far higher than we have enjoyed over the past decade. By convention, progress in energy efficiency is evaluated by comparing energy consumption growth with growth in Gross Domestic Product. This measures energy intensity. In ten years between 1975 and 1985, Europe's energy intensity improved by 20%. (Japan managed a 34% reduction over the same period).

So in 1986 we set ourselves the reasonable target of a further 20% improvement over the ensuing decade. And we came nowhere near meeting it. In the end we managed just a 9% improvement by 1995 — and most of that occurred during the later 1980s. In several years Europe's energy intensity actually worsened.

Yet despite this salutary experience, the EC forecasters have blithely assumed a 14% improvement over the next 10 years. Quite how and why such an enormous increase in Europe's energy efficiency can be expected to occur miraculously from the present paltry set of policies is far from clear. What is certain is that if this heady optimism is factored out of the EC projections, we are more likely to be facing a 30% gap between aspiration and reality on climate change.

Whichever is right, one conclusion is clear: we are going to have to introduce a whole raft of new policies throughout Europe to promote sustainable energy.

Inevitably the EC document is rather less prescriptive on action. It sets out a series of potential areas for action in energy policy. Beginning inevitably, and quite rightly, with energy saving. "Unused energy sources," the paper states, "correspond best to the concept of sustainable development. In addition, they reduce energy imports and increase security of supply, whilst creating related jobs." Importantly it adds: "Energy consumption does not have to grow, even if GDP is growing."

So far, so good. But while the paper rightly describes the Save[2] programme as "an important element of the Community's CO_2 reduction strategy", it is somewhat muted when it comes to describing how the programme has been emasculated. It mentions agreed efficiency regulations for refrigerators and freezers, and domestic gas boilers, but it does not concede how much these were watered down before being adopted. Nor is there any recollection of the commitments given to the European Parliament as recently as 1990 to have no fewer than 11 further such measures in place by 1995, none of which ever saw the light of day ("Hopes pinned on Save-2," SEJ 110).

The Commission is overtly fed up with the Council of Ministers regarding their hostility to providing much in the way of funds under Save for pump-priming schemes. Such was the horse-trading during the relevant budget negotiations that the Council eventually ended up voting resources which worked out at the grand total of £350,000 per country per year — absolute peanuts when the potential for energy saving is acknowledged.

One other draft directive, now in the public domain, is intended to provide gas and electricity suppliers with incentives to help customers save fuel. This directive, to promote 'rational planning techniques', has received the whole-hearted support of the European Parliament. In a survey we undertook of those 34 utilities around Europe who *are* already implementing such measures, the directive received a thumbs-up. But it is bitterly opposed by Brussels-based trade associations Eurogas and Eurelectric, who have succeeded in delaying its progress for over two years already.

Interestingly, the EC paper does offer one imaginative way of kick-starting achievement of these targets. Sadly it is heavily camouflaged in Euro-jargon, but it effectively points the way to finding necessary funds for grant and loan schemes — proven to be the best way to get energy conservation measures installed. Juxtaposed with £400bn as the annual expenditure on energy in Europe, it talks about levying a "minimum contribution", to fund savings schemes. Earlier drafts of the EC report were less mealy-mouthed. I have an earlier (French language) version which unequivocally refers to levying between 0.1 and 1% of expenditure.

The energy dimension of climate change dryly concludes, "new commitments for emission reductions must lead to serious reflection on how to go well beyond what has been achieved in recent years for energy saving." Quite so. ❑

NOTES

1. A press release can be found on http://europa.eu.int
2. Save: Specific Actions for Vigorous Energy Efficiency.

Andrew Warren is Director of the European Association for Conservation of Energy

Renewing the Renewables Orders

Electricity privatisation transformed the industry, and further upheaval is just around the corner with 1998's planned full liberalisation. *Nicola Steen* **explains why the AEP is calling for changes to the current renewables support mechanisms.**

THERE are going to be big changes in the electricity industry in 1998. Firstly, the electricity market will be opened up to full competition in supply. Domestic customers will be able to purchase electricity from whoever they want. Second, there's no government commitment for renewables orders after 1998, although the new government has a commitment of 10% of UK electricity to come from renewables by 2010. Thirdly, contracts awarded in orders 1 and 2 under the English and Welsh Non Fossil Fuel Obligation (Nffo), and Scottish contracts arranged in 1991, will end, and it's not clear what will happen to the projects generating under these contracts if they are left to compete in the market.

Characteristics of the present Renewables Orders are not wholly suitable for the post-1998 open electricity market. In 1990, the Nffo was relatively straightforward. In 1998, it would be an obligation upon whom and to do what?

The Association of Electricity Producers (AEP) represents a wide range of electricity producers, large and small. They represent most of the generating technologies used in the UK. About half of the members are involved in the production of electricity from renewable energy sources. Some develop and run projects, others provide services to the renewable energy industry. Between them, they have immense experience of renewable energy and the operation of the government's renewable energy orders, enacted under the Nffo in England and Wales, the Scottish Renewables Obligation (SRO) in Scotland, and the NI-Nffo in Northern Ireland (see box 1).

After privatisation

Government support for renewables research & development, in the form of direct grants, has been falling. In recent years, support has concentrated instead on encouraging technologies to move towards commercial viability, through the Renewables Orders. In providing a market place for renewable-generated electricity, the orders have been successful. Since 1990 they have attracted substantial private investment into renewable energy, bringing to developing technologies an awareness of commercial pressures. Some 440MW of contracted capacity is built and operating to date. Renewable energy is now taken more seriously by the electricity industry, opinion formers and energy users — not least because the price of electricity from renewable energy has fallen considerably and some technologies are almost able to produce electricity competitively. This has been achieved at little cost to the electricity customer, and in the challenging business environment in which investors expect high rates of return (even from investments attractive over the longer term).

Industry and government are keen to move into the potential multi-billion pound export market for renewable energy — but know that the UK will be able to compete more effectively abroad from a strong home industry. AEP is playing a part in export development by working with other trade associations and assisting with the formation of the British Renewable Energy Federation, to promote UK exports of renewable energy technology and expertise.

Post-1998

In its discussions, AEP has identified a number of problems with the current arrangements:

1. Current Nffo legislation places its obligation on Public Electricity Suppliers (PESs). That may be less appropriate after 1998, when current PESs are due to face more competition from new suppliers as the market is fully liberalised.

2. Technologies at different stages of development do not fit equally well into the current orders.

3. Financial resources are limited. Levy funds appear to be restricted by a judgement on what customers should be required to pay. Continuing the orders as they are has risks: resources could be wasted; funding near-market projects perhaps capable of standing on their own feet could deny support for deserving, but more expensive technologies; and some existing schemes might cease generating when contracts expire in 1998.

4. The current obligations stimulate generation. The efficiency of this approach, compared with stimulating demand for 'green' energy, has not been tested.

5. Although competitive pressures have driven prices downwards, some technologies may find it difficult to maintain the rate of price reductions, not least because the most attractive sites have been taken up in previous orders. Price pressure is also driving some technologies towards environmentally sensitive sites, sometimes leading to planning problems.

So, it seems that legislative and administrative changes will be needed. The post-1998 obligation must address these five points.

In addition, AEP is promoting, through the Office of Electricity Regulation (Offer) and the Department of Trade and Industry, the case for price better reflecting suppliers' cost savings from 'embedded' generation (embedded in the local low voltage system). Generation near to the point of use saves on transmission losses, reduces the need to use high voltage transmission and helps preclude line reinforcement.[1]

Possible responses and remedies to the problems outlined above have also been identified. For instance, the obligation could be on all suppliers, which would probably mean new legislation. There should be differentiation between technologies at noticeably different stages of development. Those closest to the market warrant only a simple support mechanism — and representatives of those technologies favour this. Less-developed technologies require more substantial support, including long-term contracts, while more expensive technologies might benefit from capital grants. It should also be remembered that it is in consumers' interests that any levy to support the obligation is spent as efficiently as possible.

There are various mechanisms that could be put in place after 1998. The AEP's overriding concern is that procedures be transparent and non-bureaucratic.

One option could be a similar process to the current Nffo process, with rounds of bidding, and government-set capacity (and effectively, price). If this were considered a way forward, having acknowledged the importance of Nffo, SRO and NI-Nffo, it is only fair to say they have a number of failings. The AEP has written to government suggesting improvements to deal with, for example, problems related to: the cost of making an application for a contract; the effect of intermittent orders; and the unclear nature of project scrutiny conducted by Offer, when the real test of a project is financiers' scrutiny.

Some technologies are close to meeting the government's requirement that renewable energy prices should eventually converge with market prices. The next round of Nffo, and perhaps future support mechanisms, could include a rolling 'open' band, available to any proven project able to provide electricity below a specified price, obtain a system connection agreement and demonstrate secure financing arrangements in all respects bar a power purchase agreement. The Non-Fossil Purchasing Agency could be the buyer of last resort for producers' un-contracted, 'spill' power.

A second option is for government to set a price and impose a 'must-take obligation', as happens in Germany and Denmark.

A third possibility is to oblige suppliers to take a certain percentage of their electricity from renewables, a percentage (or trading volume) obligation. This idea is among the possibilities the Association would like to discuss with government and the regulator. Licensed suppliers could be notified in advance of an obligation to secure a certain percentage of electricity from renewable sources, which would increase over time. Clearly, this would give an initial advantage to the most competitive technologies but, as cheaper capacity was taken up, less competitive technologies would move into consideration. Credits for renewable energy could probably be traded between suppliers, thus enabling the most competitive and efficient use to be made of renewable resources. If this approach were adopted, developers of new projects would still have to meet the concerns of financiers who, before lending money, require long-term power sales contracts to be in place. If necessary, within a percentage obligation there could be a more specific allocation of capacity to particular technologies.

Outside orders

Some generators are already trading outside the support mechanisms of Nffo, SRO and NI-Nffo, and further options will develop post-1998. Price will partly hinge on the price of conventional generation and tightening of environmental legislation.

AEP is pursuing the continuation of the Non-Pooled Generation Scheme in the Electricity Pool. Introduced in April 1996, it allows pooled suppliers to buy from non-pooled producers. AEP is trying to ensure it remains effective in the 1998 framework. Arrangements will also be proposed by the AEP to allow small producers not wanting the full burden of pool membership, to join the Pool in a special associate membership category.

In Scotland, the Scottish Supply Forum and Scottish Trading Arrangements Group, have been set up, and under the eye of Offer, are deciding how the Scottish supply market should be opened up in 1998. AEP is involved in these groups.

The possibility of running a green pool is being studied, while green supply companies are already in operation.[2] In 1998 there will be greater scope for such companies, when all consumers will be able to vote with their pocket. This is something the Association has welcomed and encouraged.

In conclusion: the current orders for renewable energy have helped encourage development of the industry. However, there is the ongoing problem that in the competitive market the value of local generation and less environmental impact is still not paid for. We need to improve market imperfections where possible, and where it's not possible, there will need to be intervention by government, to counterbalance market bias. Different technologies are at different stages of development. A continuation of a statutory support mechanism for renewable energy -- some form of obligation — is needed. This may not sound easy, but it is achievable and there will be pressure for it from producers and customers. ❑

The 1989 Electricity Act set out the Nffo. Arrangements are similar for SRO and NI-Nffo.

Nffo obliges the Public Electricity Suppliers (PESs) — in effect the Regional Electricity Companies (RECs) — to buy specified amounts of electricity from non-fossil sources. Nuclear generators were paid a premium price for contracted output until the 1996 floatation of British Energy, while renewables still receive a premium price. Renewables electricity costs the RECs more than much fossil fuels electricity, but the RECs aren't allowed to pay higher prices–they have to show the regulator they have bought power economically. They pay a price similar to that for fossil fuel electricity, the balance coming from a 'Fossil Fuel Levy' (FFL). Electricity customers pay the FFL, which in England and Wales is currently 2.2% on each bill (about 58% of this year's levy will go towards renewables, the remainder covering nuclear payments postponed from previous years). The logistics of the Nffo are as follows:-

- Orders begin with the Government inviting bids for contracts.
- The Electricity Regulator makes sure the bids meet PESs' obligation to buy non-fossil fuel electricity.
- The regulator advises the Minister for Energy about the most economic way in which contracts might be awarded.
- Department of Trade and Industry analyses the bids and the Minister announces the Order — the capacity to be taken and the price paid.
- An organisation called the 'Non-Fossil Purchasing Agency' buys the electricity for the PESs.

Box 1

NOTES

1. AEP has published a guide to embedded generation, Electricity Production Connected to the Local Network, which helps producers understand what they ought to be asking for in negotiation with suppliers.
2. For a few pounds extra on larger consumers bills, green supply companies ensure their money buys electricity from renewable sources.

Ideas about future markets for renewable energy come from AEP's policy document, *Renewable Energy: Building on Success*, published May 1997. Free from AEP, 1st Floor, 41 Whitehall, London, SW1A 2BX. Tel. 0171 930 9390.

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Corporate affairs

As an example of how not to win over the public, Brent Spar is a nagging reminder for all oil company execs as they face continued attacks over pollution and human rights, and more fundamentally, climate change worries which question their very reason for being.

Companies are hoping to learn from past mistakes in deflecting an ever escalating tide of criticism. In a series of exchanges between environment groups and oil companies over the past few months — in which both are claiming the pragmatic high ground — the oil giants are this time arming themselves with media awareness, environmental reports and reasonableness.

The crux of the green argument is the inevitability of massive reductions in fossil fuel use which climate change predictions necessitate. In its 'sane energy' campaign launched in May, Greenpeace is calling for an orderly phase-out of fossil fuels. Taking limits to ecological change identified by the United Nations' climate change advisers (a 1°C temperature increase and a 20cm sea level rise), Greenpeace put the earth's long-term carbon budget at 225 Giga tonnes of Carbon. "The logic of this is that 75% of the known, economically recoverable reserves of conventional fossil fuels (as carbon) can never be used as fuel," says Greenpeace. The entire fossil fuel industry is being asked to undergo a sea change to adapt to this "climate reality".

In the UK, British Petroleum (BP), and some thirty other companies involved in new oil extraction in the stormy waters of the North West Atlantic, were expecting classic Greenpeace action following the arrival of one of the campaigning group's boats near BP's Foinaven field. Using new equipment developed with the help of the UK government, oil will soon flow from Foinaven, an area rich in whales, cold water coral and as yet undocumented sea-bottom dwelling communities.

True to form, on 10 June, three Greenpeace activists landed on Rockall — a 75 ft granite outcrop 250miles into the Atlantic — claiming her seas for "the planet and all its peoples." Rockall's last visitors, two Royal Marines plus sentry box, occupied the rock briefly in 1975. They were staking a UK claim for the potentially oil-rich waters.

Compounding climate change concerns, Shell is charged with continued environmental negligence and human rights abuses in Nigeria.

Dressed as devils and wearing 'shareholders from hell' badges, Friends of the Earth (FoE) protested at Shell Transport and Trading Company's AGM on 14 May, urging attendees to support a resolution on Shell's environmental and corporate responsibility policies. Lodged by Pensions & Investment Research Consultants, a shareholders' advisory group, it requested Shell to designate responsibility for environmental and corporate policies to high-level management, and for such policies to be externally audited and regularly reported. There was also specific mention of Nigeria. Amnesty International, the World Wide Fund for Nature (WWF) and the Church of England backed the motion. The Shell board opposed the motion, and block institutional voting overturned the resolution by a comfortable 8:1.

But as Shell knows to its cost, an endorsement from allies is academic in the face of bad publicity. A report published two months before the AGM is disparaging of Shell's continued failure to make any significant progress in Nigeria since the execution of Ken Saro Wiwa in November 1995.

Shell in Nigeria, published by Environmental Rights Action, documents broken promises and slow progress. For instance, a liquified natural gas project ostensibly developed to utilise otherwise flared gas associated with oil extraction will, according to the report, get two-thirds of its gas from specially developed gas deposits. The project will use 950 million cubic feet of gas per day (mcf/d) — 2,000 mcf/d is flared in Nigeria. (The 30-year-old project faces further delay following the recent dissolution of its board by Nigeria's oil minister). Shell has promised to eliminate unnecessary gas flaring by 2008. Community projects are described as being "tailored to public relations concerns." The report concludes with the recommendation that Shell undergo a "cultural revolution of its management structures."

Oil Offensive

There is a revolution of sorts occurring in the oil community as it wakes up to the spotlight of public interest.

Brent Spar caught Shell in a self-confident mood, while the company holds that continuing troubles in Nigeria are largely outwith its control. Shell's confession is to concede a slowness in recognising the need to consult with interest groups as well as government. According to Cor Herströter, Shell Royal/Dutch president, Shell "were somewhat slow in understanding that these [environmentalist and consumer] groups were tending to acquire authority."

Echoing Greenpeace's climate reality, both Shell and BP say their actions are a reflection of economic reality.

Speaking on 20 May, the day Greenpeace launched its Atlantic Frontier campaign, the Managing Director of Shell Expro, Heinz Rothermund, told the Institute of Pertroleum: "they [environmentalists] ignore the economic realities of the energy market and overlook the operational limits of a commercial enterprise."

Seeing no alternative to fossil fuels in the foreseeable future, Rothermund nevertheless conceded that Greenpeace "raises a key question: 'In how far is it sensible to explore for and develop new hydrocarbon reserves given that the atmosphere may not be able to cope with the greenhouse gases that will emanate from the utilisation of the hydrocarbon reserves discovered already?' Undoubtedly, there is a dilemma".

The day before, John Browne, BP's Chief Executive, also referred to environmentalists when he told a Stanford University audience that "actions which sought, at a stroke, drastically to restrict carbon emissions or even to ban the use of fossil fuels would be unsustainable because they would crash into the realities of economic growth". However he also announced BP's intention to increase BP Solar sales to $1bn over the next decade.

Over the past two months, Shell has published revised business principles and a health and safety report, both incorporating environmental and human rights issues. Shell Nigeria has an environment report and Shell UK published an independently audited environment report a day after its parent oil company had rejected the necessity of external verification at its AGM.

A theme throughout Shell's new publications is a stated desire to consult interest groups. FoE Norway met with Shell so-called Corporate Affairs staff in April, describing the meeting as a "useful and interesting exchange of information and points of view".

WWF Canada has nominated Shell Canada for the 'British Columbia Minister's Environmental Award for 1997' for giving up marine exploration rights around the Queen Charlotte Islands.

But despite welcome gestures, green groups are yet to be convinced.

In a letter to Shell International, FoE Norway states that "a certain degree of correlation between the top management's policy statements and the strategy and practice of the national companies is imperative if one wishes to be taken seriously." In his 20 May speech, Rothermund himself admitted: " In recent years we have all become adept at green talk. But examples of clear actions which match up to those words are less easy to come by." ❑

New ministers, new lobbying

NEW appointments are settling in, with Meacher set to press for multilateral greenhouse gas emission reductions.

John Prescott is Deputy Prime Minister and Secretary of State for the Environment, Transport and the Regions. After his first environment speech, he admitted "there's quite a few things I don't know enough about yet," adding that he needed to "translate ... technical language into something people can understand." After just a month in office, on 11 June, he merged the departments of environment and transport.

Minister for the environment, outwith the cabinet, is Michael Meacher. He appears to have been handed the climate change brief, reiterating Labour's pre-election 20% CO_2 reduction by 2010 at his maiden speech as a minister on 4 June. There were strong words for the global climate coalition and certain developed countries stalling on their duty to take action. On emissions trading and joint implementation, Meacher believes "we should not dismiss them out of hand," but that the UK was "not going to agree flexible options just to enable some countries to avoid having to take difficult measures and substantive measures at home."

Margaret Beckett heads the Department of Trade and Industry from the cabinet. John Battle has responsibility for energy and environment issues at the DTI, with support from Nigel Griffiths on the environment.

Green transport groups are more than happy with Gavin Strang and Malcolm Chisholm. Cabinet Minister for transport Strang has been a member of the Edinburgh cycling campaign Spokes, for over 10 years, while Chisholm, Scottish transport minister, doesn't hold a driving licence.

Lord Sewell is the Scottish environment minister, and as Scottish industry minister, Brian Wilson has responsibility for energy in Scotland.

Jack Cunningham, MP for Sellafield's constituency, was a controversial appointment ("Cunningham relinquishes rad brief" this issue, p5), as was former BP chairman Sir David Simon's appointment as Minister for Competitiveness in Europe. Sir David's brief includes corporate affairs.

■ The government has announced it will explore the possibilities for meeting Labour's promised 10% of electricity from renewables by 2010, and in the meantime run the Fifth Non Fossil Fuel Order.

In a written parliamentary answer published on 6 June, John Battle said: "I anticipate reviewing policy including considerations of what would be necessary and practicable to achieve 10 per cent of UK's electricity needs for renewables by the year 2010 and how renewables can make an effective contribution to meeting requirements for future greenhouse gas reduction commitments." He went on to say that consultations with Offer on Nffo-5 will begin shortly.

In a separate written answer on the inclusion of other forms of energy in Nffo, Battle said extending the scope of Nffo will require primary legislation and clearance from the European Commission. ❑

Negotiating for a change

EXASPERATED by the lack of progress since Rio's promising beginning, environment groups are hoping to be surprised when heads of state meet in June for the world's second earth summit. On the agenda is the whole panoply of issues falling under the environment banner, with climate change set to be the most divisive item.

Five years on from the world's first Earth Summit, Earth Summit II or Rio plus five — or Rio minus five as non governmental organisations (NGOs) now prefer to call the impending top-level gathering — kicks off in New York on Monday 23 June.

NGO attendees at two weeks of pre-Earth Summit II talks in April, under the auspices of the New York based UN Commission on Sustainable Development (CSD), expressed their concern over the failure of governments to reach consensus on global issues — exactly what Rio was supposed to achieve. In a statement issued by 'the CSD NGO community', it says it is "utterly dissatisfied at the manner in which political commitments made in Rio have been reduced to perverse politicking by regional blocks in the pursuit of narrow economic interests at the CSD ... instead of moving forward with concrete targets and timetables, we find we are compelled to defend already established agreements and prevent faithless backsliding by governments in every region."

Going on to list specific weaknesses in addressing global issues, the statement concludes: "World leaders must recognise that they cannot expect to turn up in New York in June, make fine speeches and expect glowing reviews. There is a crisis of confidence ... They must provide targets, timetables and free up resources to reinvigorate the process with a sense of urgency ... Our eyes are on you."

Climate change is a case in point. While the US is, and has been, a major greenhouse gas emitter, Clinton's summit speech is widely expected to contain little more than fluff on the issue — no emission reduction targets, no new money on the table, no concrete efforts, just showmanship. Shirking its responsibility, the US is on a collision course with several European countries prepared to agree significant action, but not, in the words of the UK's Environment Minister Michael Meacher, so that others can do less.

Furthermore, Australian Prime Minister John Howard said in May that the country would rather withdraw from the UN Framework Convention on Climate Change than accept reduction targets that could damage Australia's economy. The remarks followed talks with Japanese Prime Minister Ryutaro Hashimoto aimed at gaining Japan's support for a flexible approach that sets reduction targets based on each country's circumstances.

Detailed climate change negotiations will take place half a year on from Earth Summit II, in Kyoto, Japan ("Climate negotiations," SEJ 112). However, as world leaders will not be attending Kyoto, Earth Summit II is an opportunity for differences to be settled at the highest level of face to face discussion. To this end, President Clinton is being urged to speak on the first day of the Summit. As *Safe Energy* went to press, he was rumoured to have postponed attendance to the 26 June, when most leaders will have gone home.

■ During the Earth Summit, Friends of the Earth International will highlight climate chnage with an ice sculpture. Entitled 'Melt', the event will take place in New York on Wednesday 26 June. ❑

Green paper "ambitious"

HAVING elicited the whole range of responses during consultation, the European Commission's (EC's) renewable energy green paper was described as "useful guidance" by energy ministers at a May meeting. Ministers didn't endorse the paper's centrepiece 12% target by 2010, although they were agreed on the desirability of a renewables strategy.

Ministers have also given the go-ahead to Altener II, allocating Ecu30m for its first two years — Ecu10m short of Altener I's opening two years.

Issued in November '96, the EC's green paper on renewable energy is anything from too ambitious or not ambitious enough, according to consultees. The paper outlines mechanisms for promoting renewables growth and proposes a target of 12% of gross inland European energy consumption to come from renewables by 2010.

Responding to the green paper, both Greenpeace and Friends of the Earth welcomed the paper for promoting discussion, raising the profile of renewables among EU strategists and favouring a target-based approach. Recommendations for improvement include: consideration of the adverse impacts of large-scale hydro; waste incineration to be considered inferior to true renewables; and non-near market renewables such as wave power to get increased attention. Friends of the Earth suggest increasing the target to 15% while Greenpeace wants a target "significantly greater" than 12%.

Members of the European Parliament's committee on energy, research and technology (CERT) also want the paper strengthened. Recommendations in a paper by MEP Mechtild Rothe include a 15% 2010 target and the creation of a fund to research renewables in the field, while MEP Eryl McNally is pushing for a 'Eurenew' treaty to match nuclear's Euratom treaty. A resolution passed by Parliament calls on the Commission to endorse Rothe's 15% target and to consider an energy chapter in the new European Treaty.

Meanwhile, two industry associations are alarmed at the prospect of targets. CEEP, representing European state-owned companies, regards the 12% aim as inflexible and overly ambitious, favouring instead an approach in the vein of the illustrative nuclear programme, which promotes energy choices at national government level.

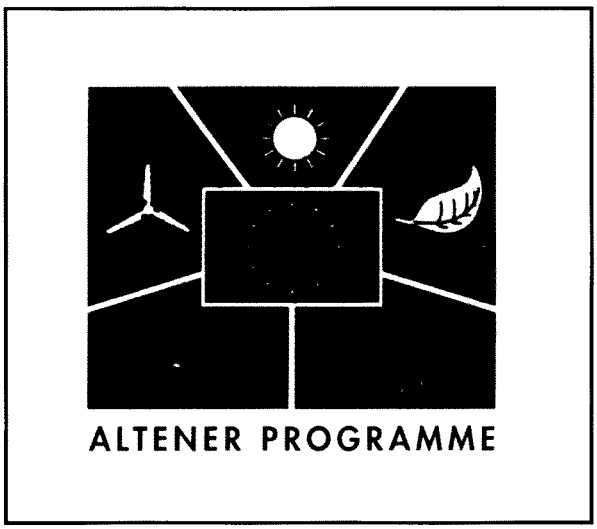
Electricity producers' association Eurelectric doubts the economic viability of "most" renewables, describing 12% as "more than ambitious" and "unrealistic unless very large economic sacrifices are made by society". It also wants waste incineration to be considered equally as desirable as hydro, wind, solar and biomass.

Energy ministers meeting in Brussels on 27 May urged the Commission to draw up a renewables strategy, saying in a resolution that it could provide "useful guidance for increased efforts at EU and Member State levels." The 2010 target was however "ambitious".

Approval from ministers of continuation of the EU's renewable energy research programme, Altener, was also given at the May meeting. In a subsequent June meeting, the energy council settled on a Commission-recommended budget of Ecu30m for Altener II's first two years, less than the Ecu40m allocation for Altener I.

MEPs regard this decision as hypocritical against the recent EU commitment to a 15% cut in greenhouse gases. Parliament would like to increase Altener funding to nuclear's take, around Ecu630m. However, for Altener funding to get anywhere near this level, it first needs to be given a much stronger legal grounding. At best, this would mean something akin to Eryl McNally's Eurenew treaty.

The Commission plans to produce a renewables white paper by this Autumn. ❑



German wind up

ESCALATING a row over wind power prices in Germany, the head of a wind company tore up documentation at a meeting with an economy ministry official. Renewables industry representatives subsequently refused further talks with the Federal Economy Ministry, and the German Wind Energy Association, GWEA, accused the Ministry of "representing the interests of Pressenelektra," a German utility.

German utility tempers have been flaring over the Electricity Feed Law (EFL), which obliges them to purchase wind energy at a premium price. At Ecu0.05/kWh, German wind power is around 80% more expensive than British wind power. And because the cost of the EFL is not spread equally among utilities, falling instead just on those utilities with wind farms in their area, some utilities are more rattled than others. Pressenelektra's supply area has experienced Germany's biggest expansion in wind.

Countering accusations of excessive money making, the German wind industry insists profit margins are tight. An analysis by *Wind Power Monthly* suggests the price differential between Germany and Britain is due to Britain's higher wind speeds and lower turbine and infrastructure costs.

Turning the tables, *Power in Europe* cites a German coal giant investing in foreign mining and German utilities buying stakes in foreign power companies as the embodiment of profiteering through subsidisation.

In an effort to reach agreement on future premium payments for wind generation, a meeting was called between the renewables industry and the Federal Economy Ministry.

Following the unceremonious end to the meeting, renewables associations were questioning the Ministry's impartiality, with the GWEA accusing it of reducing EFL payments "to the point where the wind industry in Germany collapses."

A 29 March newspaper job advertisement from a Pressenelektra subsidiary is an indication of struggles to come. According to the advert, the successful applicant will be required to secure "company sales by preventing independent power generation (for example by recognising potential danger areas of independent generation)". ❑

SRO projects surface

WHILE official decree on project details of the second Scottish Renewables Order (SRO-2) is yet to issue from the Scottish Office at the time of going to press, some of the winning bidders are beginning to emerge. Three developers share the seven wind contracts, a contentious Dundee waste to energy scheme has a contract, and there is surprise for biomass — the sole contract has been awarded to the most expensive bid.

Of the seven SRO-2 wind contracts announced by George Kynoch three months ago (SEJ), Scottish Power has two, Powergen two and Ecogen three. Scottish Power's two contracts comprise one development on the Kintyre peninsula of a 30MW wind farm (50, 600kW turbines).

A 10MW municipal waste incineration scheme at Baldovie, Dundee, is intended to take the place of a previously retired incinerator on the same site. Proposed in 1993, it is badly needed by Dundee district council as part of its waste management strategy, but opposed by some locals on health grounds. Dundee has contracts giving it responsibility for the disposal of clinical waste from three Scottish health boards. The contracts are potentially very profitable if the plant becomes a reality (it already has planning permission). However, clinical waste is relatively high in PVC, incineration of which is linked to the formation of suspected cancer-causing, gender bending dioxins.

Biomass

Meanwhile, earth moving biomass news is the Scottish Office decision to award the sole biomass project to the smallest, most expensive bid. A local consortium with support from Borders Biofuels are behind the proposal for a 2MW wood-fired combined heat and power plant in Brodick, Arran. It will utilise local forestry waste.

Out of a total of three biomass bids, two were under 6p. The successful application bid in at around 6.88p. At about 12MW apiece, the cheaper bids were also considerably larger than the successful 2MW scheme.

Unsuccessful bidders could be forgiven for being a little surprised at the outcome, bearing in mind all the indications to date have pointed to low bid price as the foremost consideration for gaining a contract. Economies of scale is the only way to get prices so low, which is why the lower bids are so much bigger in size.

Developers will have spent about £15,000 per megawatt submitting a bid for a renewables contract.

One tentative interpretation of the apparent turnaround is a desire to secure a token biomass project at the cheapest overall cost. Going for a larger biomass project would have been cheaper per KWh of electricity delivered, but over the 15 year contract would have taken a larger chunk of the total SRO budget. Choosing the smallest biomass project enables the Scottish Office to spend the least amount of money on the biomass band, while target capacity is made up with wind and waste bidding at some 2-3p less than the cheapest biomass bid.

However, developers are rejecting this possibility out of hand, attributing much more noble motives to the Scottish Office. Surprised but nevertheless pleased with the Scottish Office's decision, John Seed of Borders Biofuels told *Safe Energy*: "All three of the SRO-2 biomass bids were commendable, deserving schemes. The successful bid, a community based scheme, is ideally suited to Scottish conditions. Evidently, we shall have to revise our outlook now the Scottish Office has indicated a preference for such schemes and come SRO-3, we shall be ready and waiting to give the Scottish Office what it wants."❑

Solar marches on

CHEAP silicon solar cells, of the kind used mostly for low grade purposes, are set to break into the solar panel market.

Amorphous silicon cells are cheap and easy to manufacture, with a huge market in common applications such as calculators. But with a conversion efficiency of just 6%, falling to 4% within a few months exposure to sunlight, it has not been suitable for use in the majority of solar panels. Instead, crystalline silicon — where the atoms of silicon are in a rigid ordered state compared to the random distribution in amorphous silicon — is the most common material for solar panels. Although manufacture is lengthy and consequently relatively costly, crystalline silicon works with an efficiency of 12%.

Now researchers from Japan and America believe they have solved the main problem dogging amorphous silicon.

Because of the disorder in amorphous silicon, atoms can be left without a bonding partner. Migrating electrons — the electrical current generated in the cells — are soaked up by these 'dangling' bonds, hence reducing the cell's efficiency.

A combination of ideas to overcome this problem, such as capping free bonds with hydrogen and using thinner silicon layers to allow electrons more chances to escape, has resulted in an amorphous silicon cell of a reported 14.6% efficiency (declining to 13% after 1,000 hours in use). Fifteen per cent efficiency is the researchers' ultimate target. ❑

Third Irish Order

A third Irish Alternative Energy Requirement (AER III) will contract for 90MW of wind (installed capacity), 7MW of biomass and 3MW of hydro. Energy minister Emmet Stagg made the announcement on 24 March.

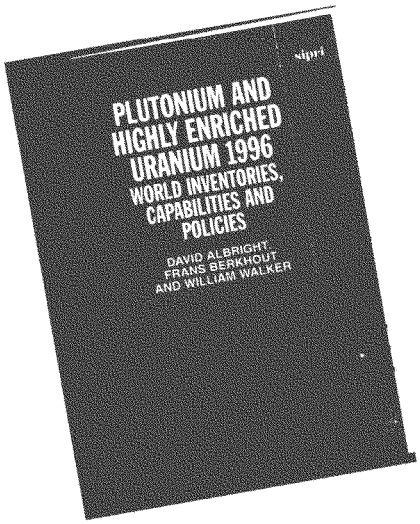
Bid prices are capped at IR£0.039 and power purchase agreements will run to the end of 2014.

There is a subdivision of the wind category: 25MW will be reserved for 500kW to 5MW, while the remaining 65MW has an upper 15MW size limit. All projects submitting to the Scottish Renewables Order similarly have a 15MW ceiling, although developers have bypassed this with relative ease by gaining two separate 15MW contracts on the same site. The precise wording of the Irish requirement is that "maximum installed capacity per wind project will be 15MW per site." Inevitably it is a grey area, but an upper limit of 20MW per developer will further prevent wind farms over 15MW — unless there is some creative company offshooting ❑

The Plutonium and HEU Bible

Plutonium and highly enriched uranium 1996: world inventories, capabilities and policies
by David Albright, Franz Berkhout and William Walker

Sipri & Oxford University Press, 1997, 502pp, £40 (hb)



MUCH has changed since Albright, Berkhout and Walker produced their first inventory of plutonium and highly enriched uranium in 1993.

They believe "much has been achieved in lessening the threat of nuclear war, reducing the scale of nuclear armament and preventing the spread of nuclear weapon capabilities." In the last few years we have seen the conclusion of the Comprehensive Test Ban Treaty (CTBT); the incorporation into international non-proliferation treaties of many former Soviet states; the renunciation of nuclear weapons by South Africa; the destruction of the Iraqi weapons programme; progress towards arms reduction under START; and the permanent extension of the Nuclear non-proliferation Treaty.

The world would appear to be becoming a safer place. But, how much safer? Is the trend reversible? And, how far do we still have to go to eliminate the threat of nuclear proliferation and mutually assured destruction (MAD)?

Optimist or pessimist? Do current developments really represent a sea change in the "salience of nuclear weapons as instruments of military strategy and great power politics", as the authors propose?

While they manage to maintain their optimism in believing significant advancements are being made, it is clear that these are only the first faltering steps.

The US and Russia have agreed to dispose of around 50 tonnes of military plutonium each, in order to establish the irreversibility of START-I. In so doing, they are committed to using the military plutonium in Mixed Oxide Fuel for conventional reactors. This represents the reversal of over twenty years of US hostility to the 'plutonium economy' or commercial trade in weapons usable materials. It will lead to plutonium being held in an accessible form at a number of fabrication plant and power stations world-wide providing possible diversion routes and extra targets for terrorist attack. It will further undermine US non- proliferation policies and its lead in opposing commercial plutonium separation in reprocessing plant. Any nation will now be able to cite US MOX activity to acquire plutonium under the guise of civilian nuclear power.

As the book demonstrates, by the turn of the century the amount of separated military plutonium from nuclear power stations will be greater than the 260 tonnes produced for the military during the cold war. A decade later, while military stockpiles are expected to remain stable or even decline, so-called civilian plutonium from reprocessing will have almost doubled to 437 tonnes.

In producing an inventory of "plutonium and highly enriched uranium" and surveying international policies, Albright et al, have made a valuable contribution to the disarmament debate and are to be congratulated. However, as with any major undertaking of this kind, some things slip through the net. The authors say that the unirradiated plutonium fuel from the abandoned German fast reactor at Kalkar is "presumably still stored at Dessel and Hanau." Fuel from Hanau was transferred to Dounreay for storage and possible reprocessing.

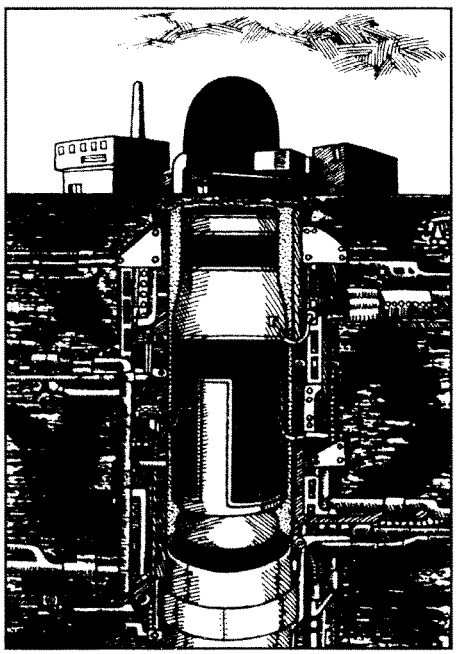
However, one thing is made clear, there are no magic tricks which will make the threat of nuclear proliferation disappear, and only openness and honesty about stockpiles and programmes can create a climate in which nuclear disarmament can be taken forward.

While the authors take heart from international disarmament negotiations, this reviewer is more concerned about how much still needs to be done. For example, the authors report: "Over 3,000 tonnes of plutonium and highly enriched uranium have been produced since the birth of nuclear technology. The majority is still outside international safeguards, and a significant proportion may be inadequately protected. Furthermore, events in the 1990s — the revelations about the Iraqi and North Korean clandestine weapon programmes, the huge arms reduction programmes mounted by the USA and the FSU (former Soviet Union), the threats posed by nuclear smuggling, and the emergence of large overhang of surplus weapon material — have shown up inadequacies in the present regime. It is acknowledged that they cannot be overcome solely through incremental adjustments: they are systemic in origin and demand major reforms."

The authors conclude on a cautionary note: "Achieving the goals of nuclear disarmament and non-proliferation will also depend, as always, on the reduction of tensions in several parts of the world and on the judicious exercise of power and diplomacy."

The result of painstaking research, this is a vital text and reference book for all involved in the nuclear power and nuclear weapons debate, although at £45, an expensive one.

Mike Townsley



A guide for future energy policy

The future for renewable energy: prospects and directions
EU Renewable Energy Centres' Agency

James & James, 1996, 209pp, £35 (hb)

THIS book, really a report in A5 format and with a hard cover, is crammed full of useful information. With each chapter devoted to a different energy source (or group of sources) there is a summary of the available resource, the different technologies, the current state of research and development, environmental impacts, and specific proposals for future development, including: areas for research and development work, targets for deployment, and recommendations for policy makers.

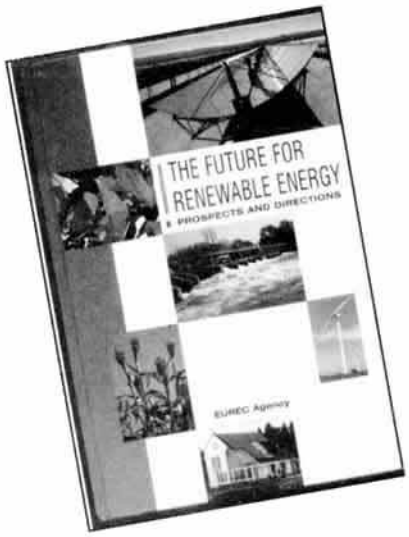
According to the blurb on the back of the book, it is aimed primarily at energy policy makers and planners — which doesn't bode well for UK sales.

Fortunately for James & James it is also aimed at a wider readership: "all those involved in the research, development and implementation of renewable energy in any way." It is a book which deserves to be more widely read than I suspect it will be. It should be compulsory reading for whoever has cabinet responsibility for energy (Margaret Beckett?), her/his junior ministers and their civil servants. Without government support, most of the content of this book is next to worthless for all but EU-funded renewable energy researchers.

Anyone who sees renewables as peripheral to 'real' energy sources like coal and nuclear ought to be impressed by the sheer range and diversity of the renewable energy sources and technologies.

It is clear that renewable energy will play an increasing role in meeting the world's energy needs in the coming century. The authors refer to studies by the World Energy Council, Shell and the United Nations, which forecast a total renewables contribution by the middle of next century in the range of 20-50%. The EU is likely to be at the forefront of research, development and deployment of new renewable energy technology, but whether the UK will play a major role remains to be seen.

This country's track record on renewables is not good. With the best wind resource in Europe, and leading



players in the development of modern wind turbines, a lack of government resources and commitment saw us overtaken by countries like Denmark which are now able to exploit growing export markets. The UK's failure cannot be pinned solely on the old Tory government. Innate conservatism, a big-is-beautiful mentality and a long-lived love affair with nuclear power were hallmarks of the energy establishment (industry and civil servants as well as ministers). And it was an approach which went back to well before the last 18 years of Tory rule. Will New Labour want, and be able, to change things? Ironically, the Tories' privatisation of the industry will have helped.

As can be seen from *The future for renewable energy*, the UK remains at the forefront of R&D in wave power, no thanks to government. Having failed to see the way the wind was blowing, let us hope the UK doesn't also miss out on the forthcoming sea-change in energy supply.

Though written in a rather dry, academic style and often in Euro-English, the book should prove an interesting read for anyone wanting to know more about the prospects for renewable energy and the wide range of technologies and processes which exist, or may be developed, to exploit the various resources.

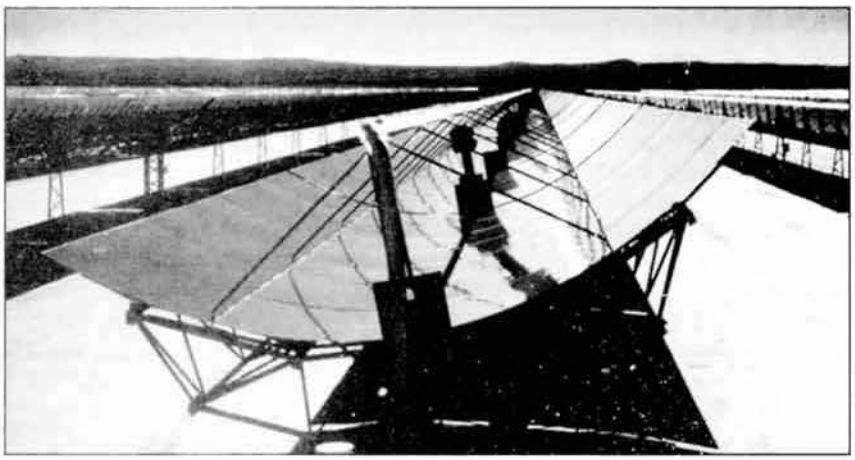
My only serious (but not too serious) criticism of this book is that there is an inconsistency in coverage of different technologies. With each chapter having a different author or authors, inconsistency in approach is a fairly inevitable problem. But issues like environmental impact receive widely varying consideration, even allowing for the different stages various technologies have reached. Wave power, for instance, is given less coverage than it deserves: just 6 pages compared with 42 for solar thermal systems (and another 34 for photovoltaics).

There were also a few minor points: I doubt that there is no noise pollution from marine current turbines; and wind power in the UK is not "nearly competitive" it *is* competitive with fossil and nuclear plant.

The concluding chapter is especially interesting as it addresses the need to integrate the various renewable energy technologies, with their widely varying benefits and problems, into an overall energy supply system. This is an issue which is often overlooked but which will become increasingly important as the proportion of our energy supply from intermittent sources grows.

This final chapter demonstrates the realistic, forward-looking approach of the whole book. The goals set are ambitious but attainable, and the recognition of the role for governments and policy makers in helping to drive forward the necessary advances in renewable energy technology shows an understanding of the real world not always apparent in scientists.

Graham Stein



solar thermal parabolic trough

Rabbits drawn by Wilf Plum

Boy blunder

LBR has received reports of a talk given in April this year by Robin Jeffrey, chairman and chief executive of Scottish Nuclear and deputy chairman of its parent company British Energy.

The lucky recipients of Jeffrey's words of wisdom were the Institute of Directors, Scotland. Jeffrey, concerned about climate change, trotted out the usual line about renewables being a good idea, – but.

On this occasion, he conjured up the picture of solar powered trains unable to run after dark. The corollary of this is nuclear powered commuter trains running passengerless day and night, with their nuclear reactors unable to adjust output to meet changing demand.

Jeffrey went on to make a virtue of the fact that he was about to head down to London by train rather than plane, with only half the resultant carbon emissions.

He didn't explain why he was having to go to London for a British Energy board meeting when the sop to Scottish Nuclear at the time of merger with Nuclear Electric was that the merged company would be run from Scotland.

Later in his lecture, Jeffrey cited *Energy Paper 65*, describing it as "the DTI's bible". Strange though that he makes no mention of the prediction therein of no new nuclear power stations.

The forecasts of rapid energy growth are more to Jeffrey's liking — he was after all project manager for Torness nuclear power station, built to meet a massive growth in Scottish electricity demand which never appeared.

Robin in boy-wonderland's clinching argument, demonstrated by graphs of energy use against life expectancy and infant mortality, is: "with available and convenient energy you live ... and without it you die."

That Jeffrey should spout this familiar nuclear industry propaganda — which wouldn't even merit a pass mark in a secondary school exam — is not surprising, but apparently some of his eminent audience were actually convinced by it.

Think of a hole

The continuing trickle of nuclear waste mismanagement revelations has reminded LBR of an experience with Johnny 'think of a number' Ball.

LBR was in the participatory audience of a late night discussion show, and the childhood icon was vigorously defending the motion 'radiation is good for you'. Brandishing an International Atomic Agency report, Johnny implored us to trust in the atomic scientists, they wouldn't do it if it wasn't safe.

LBR will however have to take issue with the jolly science junkie, and contend that stupidity infiltrates the atomic science community just as any other.

To pick just two recent examples:

A water-filled silo at Dounreay is to be taken out of use at the insistence of the Scottish Environmental Protection Agency. The silo is Dounreay's second example of radioactive waste containing soduim, being dumped into water. (The first example, the infamous waste shaft, exploded). With an inevitability that an 11 year old chemistry pupil could have predicted, the pond has experienced several fires over its lifetime.

Now it appears unmonitored Ministry of Defence radioactive waste dumps litter the country. In the words of a spokesperson on the radio, there was "an awful lot of hole digging and hurling things down holes".

No matter how hard you think some things just don't add up.

Body power

Colleagues at Safe Energy HQ had one of their more unusual enquiries recently. The gentleman caller wondered if he could make good use of his energy expended in notching up the miles on his exercise bike. The bike is on his sailing boat, and he wants to usurp fossil power with muscle power.

Asked if he was interested in any other energy-generating technologies besides the exercise bike, he eagerly replied that press ups were also in his exercise repertoire.

Does anyone know of anything to help *Safe Energy* with the request?

If not, there's a market there for the killing. Several fellow office workers suggested a similar arrangement for watching the TV. As well as Teresa's energy freaks ("Concerned, of Billericay", SEJ 112) there's an ocean of health freaks out there.

New ministers

New ministers, new opportunities for saying you knew a government minister in the dim and distant past, with the photos to prove it. Not wanting to be any exception to the popular mood, LBR isn't above scouring the past for a few snippets.

LBR was remembering the other day chatting to Robin Cook at the 1979 Torness demonstration — the one where we all climbed over the fence using hay bales provided by local farmers. That demonstration was only two days after Maggie Thatcher got elected. Robin was saying "it's going to be dreadful" or words to that effect, and sounding altogether quite depressed about the result. LBR piped up — "they're all the same aren't they — you couldn't possibly get much worse than Callaghan?".

Now we now who posterity proved right. It's probably just as well that rabbits can't be Foreign Secretary. In any case little black rabbit would be far too ugly ever to be offered the job.

A hard place

While Norway, Denmark, the UK and Ireland are contesting oil rights in the North Atlantic, it appears the Scottish National Party will have to battle it out with the Continental shelf if it wants to claim North Sea oil.

William Waldegrave admitted in January that if a share of North Sea revenues was included, Scotland has been a net contributor of £26bn to the Treasury since the Tories took office.

In a parliamentary answer to further SNP questioning, Waldegrave explained just why regional accounts omit this contribution. Apparently, the continental shelf is a separate region whose GDP cannot be estimated as there is no resident population. It's GDP belongs to neither Scotland, England, Wales or Northern Ireland.

As Rockall in the North Atlantic now has a resident population in the form of three Greenpeace protesters, perhaps they would like to declare an independent state and claim any oil earnings for themselves?