THE SAFE ENERGY Bulletin

April 1998

Struggling with our nuclear waste legacy

Excavation of radioactive material from the Dounreay waste shaft has been given the go ahead, but will not start for at least 15 years. The United Kingdom Atomic Energy Authority (UKAEA) announced at the end of March that it intends to proceed with the extraction of 700 cubic metres of radioactive waste, nuclear fuel particles and machinery contained in the shaft where scientists believe up to 4kg of highly radioactive plutonium (Pu239) and 187kg of enriched uranium (U235) have been dumped.

Excavation work will not start until 2013 at the earliest, as it is expected to take 15 years to design and develop the robotic machines needed to handle the waste. Cost estimates for the clean up operation range between £215 million and £355 million over the 25 year period it is expected the project will take to complete. In reality, however, the true costs to the tax payer of the project are unknown, with Dounreay having admitted that they, "... have no idea how much it will cost to invent, design and build the robot."

Responsibility for ensuring the safety of the waste shaft remains unclear, after it emerged that neither HM Nuclear Installations Inspectorate (NII) nor the Scottish Environment Protection Agency (SEPA) are willing to accept responsibility for its safety.

In the meantime the Dounreay authorities are still looking to import radioactive waste from around the world for reprocessing. Dutch television has recently revealed that the UKAEA have signed a contract for Dutch material, which is now at Dounreay awaiting completion of a new reprocessing plant. However, the UKAEA do not have authorisation for its proposed conversion of the D2670 building, formerly a laboratory, for reprocessing. It has been reported that the NII had told Dounreay that no fuel could be taken to the Scottish site before approval is issued. A spokeswoman for the SEPA has stated that no consent had been issued for the work and that the approval of Euratom may be needed for a new reprocessing line.

The laboratory is part of the main D1206 reprocessing plant which has been closed since an accident and leak into the North Sea in 1996. Dounreay is still awaiting approval for an estimated £20 million repairs and improvement work programme for the plant demanded by the Nuclear Installations Inspectorate before it can be reopened.

The proposed new facility is also required for a contract to reprocess spent fuel from a small reactor run by the chemical company ICI. Dounreay management have been heavily criticised for misleading the public by initially claiming the work would involve the processing of unirradiated fuel, which produces much less waste than reprocessing irradiated fuel.

The recent Government announcement that on-land storage of the UK's nuclear submarines is being actively considered also raises questions concerning medium-term nuclear waste storage options in Scotland. Proposals have been made by Babcock Rosyth Dockyards, where several nuclear submarines are presently being decommissioned, for reactor compartments to be stored on their site and for much of the metal hull of the submarine to go for free release. There is growing concern that metal from the submarines will find its way into consumer goods. Proposals are even being made for part of the reactor primary circuit to be put out for free release after a layer of the circuit has been removed via a decontamination process.

However, it has been established that no level of radioactivity is completely safe and this material could end up in everyday products such as baked bean cans, children's toys and metal studs in jeans (which can remain in contact with the body throughout the day).

Under new legislation which the Government is obliged to put into UK law within the next few years, the nuclear industry would be able to dilute radioactive waste with other materials in order for it to be considered to be 'safe'. It appears that this Directive from Euratom is primarily aimed at helping the nuclear industry deal with its huge waste problem and reduce its decommissioning costs.

Already British Nuclear Fuels has sold approximately 7,000 tons of "decontaminated" metal from the Capenhurst uranium enrichment plant, some of which has reportedly been used to make kitchen pans.

There is also growing concern over the sale of other equipment from the UK's nuclear power plants. A CO_2 tank used at the Hunterston A nuclear power plant has been sold to Messer UK Ltd (a company which serves the food and drinks industry) who have subsequently sold it to company in South Africa. There are no restrictions in place which prevent such equipment from being used to make food and drink products.

Campaign call

Please express any concerns which you may have about this new Directive to Labour's Minister for Consumer Affairs, Nigel Griffiths MP, House of Commons, London SW1A 0AA.

Publications

Recent publications concerning waste management issues include:

- "Rethinking disposal", available from DETR Publication Sales Centre, Unit 8, Goldthorpe Industrial Estate, Goldthorpe, Rotherham S63 9BL, £8.
- "Management of separated plutonium", Royal Society (tel: 0171 451 2645), £12.
- "Radiological Protection Objectives for Land Contaminated with Radionuclides", NRPB, Vol. 9, No.2 (1998), available from the Stationery Office, £7.50.
- "Control and remediation of radioactively contaminated land", (this is a consultation paper from the DETR which includes proposals for dose limits for people occupying radioactively polluted sites to be less stringent than normal), available from Richard Watkins, Room A523, Romney House, 43 Marsham Street, London SW1P 3PY.
- Also, the House of Lords Science and Technology Committee inquiry on the management of nuclear waste is underway, and is expected to report in the Autumn.

Burning agenda hidden

Notice of an application to burn tyres as a fuel at the Blue Circle cement works in Dunbar has been heavily criticised for not indicating that tyres, or any other hazardous substance would be incinerated. The notice, which was placed in local papers, only states that an application is being made to, "vary the conditions of an authorisation" at the site, making it very unlikely that the public would become aware of the planned tyre burning.

Planning permission has also been sought for two tyre pyrolisis schemes in Glasgow at Dalmarnock and Springburn.

Outcomes from Kyoto

The Kyoto Protocol, negotiated between over 150 nations in Kyoto last December opened for signature last month. At least 55 signatories, accounting for at least 55% of the industrialised (Annex 1) country emissions, are needed for the protocol to come into force. If the United States should fail to ratify, which is a distinct possibility given the country's strong fossil fuel lobby and the Senate's demands for developing countries to make a commitment to limit emissions, then ratification will only be achieved if virtually all the other Annex 1 countries sign up.

The protocol aims to reduce emissions of six key greenhouse gases from industrialised countries by 5.2% over 1990 levels between 2008 and 2012. However, emissions are already 4.6% lower than they were in 1990 and so only a further 0.6% cut will be achieved. There are also a multitude of loopholes which need to be closed if even this is to be achieved. Without the protocol, however, emissions are forecast to be 30% higher in Annex 1 countries by 2010 than with it.

EU countries are still to decide how to divide up the 8% reduction target among its members, and whether to attempt to reduce emissions beyond the requirements of the protocol. A decision is expected by the time the EU Environment Ministers meet next in June.

The main points of the protocol include:

- The protocol calls for a 5.2% reduction in a basket of six gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and three halocarbons - hydro-fluorocarbon (HFC), perfluorocarbon (PFC) and sulphur hexafluoride (SF_6).
- Emission quotas can be traded between industrialised countries. This will allow countries such as the US, Japan and Canada to buy unused quotas from Russia and Ukraine (which are presently 30% below 1990 levels due to their industrial decline) in order to avoid making all of the cuts in their own country. No limit has yet been set concerning the contribution which emissions trading can make towards a country's reduction promises.
- Forests and other vegetation will be accounted for as emissions "sinks". If the sink has been created by "direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990", then they can offset emissions corresponding to the net CO_2 absorbed. The way in which this will be done , and indeed some of the science behind calculating the net absorption of CO_2 from forest is still to be determined.
- A 'Clean Development Mechanism' will allow industrialised countries to invest in technologies which help to reduce fossil fuel use in developing countries, in return for gaining credits to emit more greenhouse gas emissions back home.
- Developing countries are not required to make target commitments under the protocol.
- No binding reduction targets have been set for 2005.
- No compliance measures have been agreed to as yet.

The next step will be in Buenos Aires in November this year where the Fourth Conference of the Parties (COP4) will attempt to close some of the many loopholes which exist in the Kyoto agreement.

Emissions targets to be met between 2008 and 2012 (percentage with respect to 1990 levels)

-8%	Bulgaria, Czech Republic, Estonia, European Union, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland
-7%	United States of America
-6%	Canada, Hungary, Japan, Poland
-5%	Croatia
0%	New Zealand, Russian Federation, Ukraine
+1%	Norway
+8%	Australia
+10%	Iceland
-5.2%	**Overall target for industrialised countries**

uNclear 'clean air' energy

The nuclear industry was out in force in Kyoto, promoting nuclear power as a sustainable, 'clean air' energy source. They organised a whole host of seminars with titles such as, **"Nuclear energy and sustainability"**, and **"Iglobal warming? Nuclear is part of the solution - let's bring empath❤ into the debate"**.

A statement released by the "International Nuclear Power Industry" proclaimed: "The nuclear industry call on the governments participating in the Kyoto conference to recognise the present role of nuclear power in limiting green-house gas emissions, and its potential for meeting future electricity demand without adding to such emissions."

The British Nuclear Industry Forum also released a glossy leaflet entitled, "Clearing the air .... with nuclear energy". Quotes in the leaflet included: "Attention must be given to the potential of nuclear power to increase the range of energy options, and in particular to reduce the EU'sCO_2 emissions in accord-ance with international agreements", Matikainen-Kallström, MEP and member of the European Parliament Research, Technology and Energy Committee.

"Nuclear energy is the only sustainable option for meeting future world electricity demand while protecting the environment from the effects of harmful emissions", Bill Wilkinson, BNIF Chairman.

"The peaceful use of nuclear power is essential to overcome the global warming and the energy situation resulting from a lack of natural resources", Ryutaro Hashimoto, Japanese Prime Minister.

- British Energy told the House of Commons Trade and Industry Committee in February that new nuclear power stations are needed if the UK is to meet the Government's CO_2 target. Peter Warry, British Energy's Chief Executive also claimed that, "in today's market, nuclear is the only energy source that presently pays its full environmental costs." The basis upon which this statement is founded is at odds with a recent report by Sussex University's Science Policy Research Unit (SPRU): "Managing UK nuclear liabilities, available from SPRU Publications Office (tel: 01273 678176), priced £20.

OSPAR comes into force

The OSPAR Convention for the Protection of the North East Atlantic officially entered into force at the end of March, after being ratified by all the countries bordering the North East Atlantic.

The next Ministerial Conference of the OSPAR member states, which will take place in Lisbon on 20th-24th July this year, will discuss:

a) A ban on the dumping of offshore oil and gas installations at sea. This is supported by virtually all OSPAR member states.

b) An end to the discharge of radioactive substances into the marine environment. Ireland, Denmark, Iceland, and other countries are calling for an end to the discharge of nuclear reprocessing wastes from Sellafield (UK), Dounreay (UK) and La Hague (France).

c) An end to the discharge of harmful toxic chemicals, such as dioxin, endochrine disruptors and organohalogens, into the sea. The Nordic countries, amongst others, are seeking "Zero Discharge" of these toxic wastes.

News snippets

• The UK Government's Green Paper on utility regulation, "A fair deal for consumers: modernising the framework for utility regulation", has set out proposals for the regulation of electricity, gas, water and telecommunications. Recommendations include the merger of the electricity regulator (OFFER) with the gas regulator (OFGAS). Comments on the Green Paper are welcome until 31st May (tel: Utilities Review Team on 0171 215 5491) with legislation expected to be submitted to Parliament this Autumn.

• The first phase of full liberalisation of the electricity market in Scotland will begin in October in Inverness and Motherwell. A further 30% of domestic customers will be brought onboard in December, and all remaining areas by March 1999.

• National Power has applied for its 1998 sulphur dioxide emission limit for their Drax power plant to increase to 270,000 tonnes (almost triple its annual limit of 100,000 tonnes per year). The plant is operating without its flue gas desulphurisation (FGD) equipment after cracks were found in the fans. The power station, which provides 10% of the UK's electricity, could soon be shut down as this year's annual limit will have been used up by June. A consultation process is now underway.

• The New Scientist has reported that the arrival of Digital TV in the Autumn is forecast to eventually lead to electricity average demand rising by 500MW.

• The announcement in the Budget that VAT on heating controls, insulation and other energy-saving material is to be reduced from July, has been criticised for applying solely to grant-aided schemes. The UK is presently the only northern EC country to have a higher rate of VAT for energy saving material compared to that for domestic energy use.

• A £10-£12 million press and billboard campaign has been launched in Scotland by the oil industry under the banner 'North Sea Oil - We all get alot out of it'. A series of five adverts highlight the non-energy uses of oil (85% of oil is used as an energy source). Shell International is also hoping to create a green and ethical image through a US$200 million worldwide campaign. These industry campaigns contrast starkly with the meagre £1.7 million the UK Government have to spend as part of its climate change action programme on an advertising campaign to raise consumer awareness of the environmental impacts of burning fossil fuels.

UK energy reviewed

The Government is presently undertaking a host of reviews affecting the energy industry. Central to them all is the Electricity Supply and System Security review of energy sources for power generation, looking at the medium and longer term scenarios for the development of generating capacity, being particularly concerned with fuel dependence. This follows the announcement in December of a moratorium on all power plants above 50MW, principally aimed at preventing new gas-fired power plants being developed before a strategic review could be undertaken. Conclusions are expected by 30th June.

The first draft of the Renewables Review, which is considering how 10% of the UK's electricity supply can be obtained from renewables by 2010, has been submitted to the Renewable Energy Advisory Committee (REAC). The final recommendations will be very much influenced by the outcomes of many of the other reviews, which include:

- Utility Regulation Review - for which a Green Paper has been presented.
- Pool Review.
- Electricity Trading Review.
- Customs and Excise Review.
- Clean Coal Review.
- Environmental Tax Review.
- Select Committee of Enquiry into Aspects of Energy Policy.

Consultations initiated to help with these reviews and other matters which have an impact upon energy policy include:

- Consultation on the Implementation of the EC Directive on Environmental Assessment.
- Consultation on Introducing Constraint Payments in Scotland.
- Consultation on Introducing Contracts and Payments for Ancillary Services in Scotland.
- Consultation on Transmission Constraints and Generator Connection Costs.
- Inter-departmental consultation led by the Department of the Environment, Transport and the Regions on the UK greenhouse gas reduction targets. By the Summer the Government is expected to undertake a wide ranging consultation exercise to consider how it can achieve its binding commitments and its 20% reduction target for CO_2 emissions by 2010.

Also, the Royal Commission on Environmental Pollution are reviewing energy prospects for the 21st Century. Consideration is focused upon environmental implications and identifying the actions required to develop a sustainable strategy for energy provision and use.

UK Government Bill status

Energy Efficiency Bill. This requires mortgage lenders to provide an energy rating, together with recommendations for energy efficiency improvements in all surveys undertaken before a mortgage is granted. The Bill has successfully passed through its second reading, but at the Committee stage amendments were made to prevent it from applying in Scotland. The Bill will receive its third reading on 24th April, after which it will be passed to the House of Lords and is expected to become law in this parliamentary session.

Energy Conservation (Housing) Bill. This will require housing associations to collect information about their housing stock and pass it to the local authority. It will also receive its third reading on 24th April and is expected to become law in this parliamentary session.

Energy Efficiency (Information) Bill. This requires prospective occupiers to be advised about the SAP rating of a dwelling. It is due for a second reading on 24th April, but although it is not opposed in principle by the Government it is unlikely to be successful in this session.

The Warm Homes and Energy Conservation (Fifteen Year Programme) Bill. This calls for implementation of a 15 year programme to tackle fuel poverty by improving energy efficiency of 500,000 homes each year. It has been through the Committee stage, but is not expected to become law this session.

Scottish Public Inquiries

The Laggan windfarm on Islay has been sent back to inquiry. Two other wind farms in Scotland at Largie and Helmesdale are still awaiting determination, as is the Sheildaig public inquiry into its proposed small-scale hydropower scheme and the Gartcosh gas-fired power plant being proposed by PowerGen.

Up & coming events

- April 26th: Twelfth Anniversary of the Chernobyl disaster.
- 15th-17th May: G8 meeting, Birmingham.
- 2nd-12th June: COP4 pre-meeting, Bonn.
- 16th-17th June: European Environment Council meeting.
- 23rd-25th June: Environment for Europe meeting, Arhus. Ministers from east and west to discuss action programmes from Central and Eastern Europe.
- 20th-24th July: OSPAR Ministerial Conference on Marine Pollution in the N.E. Atlantic.
- 2nd-13th November: Climate Change Convention COP4 meeting, Buenos Aires.
- 31st December 1998: Sewage sludge dumping at sea must end.

LITTLE BLACK RABBIT

Poor irradiated pigeons

The last few months have been particularly distressing for LBR. Following the revelation that pigeons are being irradiated at Sellafield, other animals, including rabbits, are under threat of being culled in an attempt to stop radioactive contamination flying or hopping off the site.

The announcement by the Ministry of Agriculture Fisheries and Food which warned local residents within a 10 mile radius of the Sellafield site not to handle, slaughter, or consume pigeons, originally came as a relief to the pigeon population which has long been unhappy at being consumed, or handled. However, adding insult to radioactive injury, they were not best pleased with being ridiculed as being 'flying radioactive waste'. Their relief was further short-lived as they were soon slaughtered.

The cull will also include mice, crows, starlings, sparrows and mosquitos. Lobsters living near to Sellafield, some of which have been shown to have radioactive technetium up to 28 times higher than EU limits for consumption after a nuclear accident, are also likely to be swimming for their lives.

Shell's illness warning

Shell is evidently beginning to realise the impact which its business is having upon people's health and well-being. LBR has come across one of their documents which mentions the term 'tonnes of ill equivalent'. This was probably just another slip-of-the-pen by one of their technical staff concerning oil. However, LBR has since been wondering, if one tonne of oil induces one 'tonne of ill equivalent', what is the impact of one tonne of coal. At first sight the obvious answer seems to be 0.7 tonnes of ill equivalent, but any advice, particularly from anyone living near to an opencast site, would be most welcome.

More bird monitoring please

A little bird has been whispering in LBR's ear concerning the windfarm bird monitoring programmes. Rumours suggest that some bird organisations are putting pressure on developers to undertake monitoring exercises not because the windfarm could threaten the local bird population, but in order to improve their own bird database. LBR is sure that the intention of these very respectable organisations is solely to ensure that the precautionary principle is being followed.

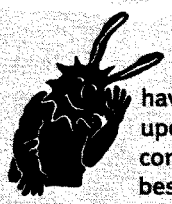
Hurricane Exxon?

LBR is dismayed that the European Parliament has rejected a bid by the Parliament's Greens to call on the World Meteorological Institute to name storms and hurricanes after companies of the Global Climate Coalition (Exxon, Ford, General Motors, etc). Newspaper headlines such as 'Exxon kills 20 in Miami' or 'Ford causes £500 million of damage in Japan' would perhaps help to focus the mind of those companies which have been opposing action being taken to tackle climate change. However, given that 'no publicity is bad publicity' they may be quite keen on the idea!

Decommissioning PR 'going well'

LBR recently went undercover and had a tour around the Rosyth Naval Dockyards where several nuclear submarines are in various stages of decommissioning. The disguise was evidently so good that one of the glowingly warm people from Magnox Electric who was also on the tour took LBR as being 'one-of-us'. Waxing lyrical about how well the PR is going on their nuclear power plant decommissioning at Hunterston A, Berkeley and Trawsfynydd he appeared oblivious to LBR's real identity. Evidently with virtually no adverse publicity and the public being blissfully unaware of the recycling of materials from the reactors, all appears to be boding well for a new phase of nuclear power plant in the future. 21st century pigeons beware!

On the tour, however, not a pigeon was to be seen. Perhaps the Scottish flock have a bit more nous and are keeping well away from radioactive installations.



Being crapped upon

The good luck element of having bird droppings fall upon one's head has been considered by many to be at best dubious. However, now there is a further threat to this ancient belief, following the analysis of pigeon droppings around Sellafield. Droppings have contaminated the soil off the Sellafield site to levels of radioactivity higher than those which forced the US Government to clean up after nuclear weapons testing in the Pacific. Perhaps the Sellafield authorities should offer to clean up after any unexpected bird strike by providing free hair care. With the offer of a free hairdo, the belief that it is lucky to be crapped upon from on high may yet continue.

Rabbits by Wilf Plum

Hydro's green credentials crash land

The green credentials of the electricity companies will be thrust to the fore come deregulation of the market in the Autumn, but so will all manner of other schemes to woo a whole array of discerning and not so discerning customer. Scottish Hydro will be offering a 'green tariff' to customers based on its considerable hydropower resource. At the same time, however, their image is set to hit rock bottom in the eyes of the greens, as they are looking to offer customers airmiles - the more energy you use the more airmiles you receive. So, not only is the customer being encouraged to consume more energy, s/he is also being encouraged to fly and consume even more energy. LBR wonders whether these two schemes will be combined for those customers who would quite like to consume large quantities of renewable energy in the hope of being able to set off into the sunset, perhaps to view other renewable energy schemes in exotic locations. LBR is sure that Scottish Hydro's market researchers would love to hear from anyone who falls into this particular market niche.

Patients beware

Next time you're at your doctor's surgery with a wee ailment, be on the lookout. If you see a tall dark-haired Scot with a pony-tail tracking you with notebook in hand, see whether he follows you home. In an attempt to assess the level of increase in illness caused by inadequately heated homes, Energy Action Scotland now has a roving researcher who is checking patient's home conditions during cold weather periods. Results from the research will hopefully include how many wee drams the researcher managed to cadge during the home assessments.

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FRIENDS OF THE EARTH SCOTLAND

Nuclear power is no solution to climate change: exposing the myths

"A clever man solves a problem; a wise man avoids it." Einstein

uNclear-Nuclear: Exposing the myths

The nuclear industry is hoping that concern over climate change will result in support for nuclear power. However, even solely on the grounds of economic criteria it offers poor value for money in displacing fossil fuel plant. Further, with its high cost, long construction time, high environmental risk and problems resulting from waste management, it is clear that nuclear power does not offer a viable solution to climate change. Rather a mixture of energy efficiency and renewable energy offers a quicker, more realistic and sustainable approach to reducing CO_2 emissions.

Exposing the myths 1: Nuclear power is economical and cost effective

The full costs of nuclear power have been seriously underestimated by all countries which have the technology, and it is only recently that the true costs have begun to come to light. The hidden costs of waste disposal, decommissioning and provision for accidents have never been adequately accounted for, resulting in a massive drain upon economies. This drain will continue for many years to come as the expensive and dangerous task of nuclear decommissioning gets underway.

Privatisation and liberalisation of the market in the UK, has led to the true costs of nuclear power being exposed. It has become clear that nuclear power cannot exist in a competitive energy market without significant subsidy from Government. This process is now being followed around the world with investors being unwilling to accept the high cost and risks associated with nuclear power. Moreover, if fully comprehensive insurance was required to cover all of the risks of nuclear accidents, the cost of electricity from nuclear power would increase many times from the present level.

Reactor decommissioning costs also remain a major uncertainty. In the UK, for example, the cost of dealing with the unwanted debris of the nuclear industry is officially estimated at about US$70 billion. Of this, just US$22 billion is covered in secure funding arrangements, with the remaining US$48 billion (almost 70%) likely to be paid for by taxpayers. The nuclear industry's claim that, "In most countries, the full costs of waste management and plant decommissioning will be funded from reserves accumulated from current revenues" [1] is clearly untrue.

Countries, particularly in Central and Eastern Europe, are continuing to build new nuclear plants even though it has been shown that investment in energy efficiency measures is the quickest and safest way to tackle their energy crises. For example, the nuclear power plants proposed to replace the remaining reactors at Chernobyl have consistently been shown not to be the least-cost option.

Also, in terms of cost-effectiveness in reducing CO_2 emissions, nuclear power fairs very poorly. In 1995, after a year-long, exhaustive review of the case for nuclear power, the UK Government concluded that nuclear power is one of the least cost-effective ways in which to cut CO_2 emissions. In the USA improving electricity efficiency is nearly seven times more cost effective than nuclear power for obtaining emissions reductions [2].

Nuclear power one of the least effective and most expensive ways in which to tackle climate change.

Table 1: CO_2 abatement options, in order of cost-effectiveness (10% discount rate) [3]

1 Fuel switching
2 Appliance efficiency improvements
3 Industrial CHP
4 Lighting efficiency improvements
5 Small-scale CHP
6 Cooking efficiency improvements
7 Service sector space heating
8 Advance Gas Turbines
9 Water heating
10 Industrial motive power
11 Domestic space heating
12 Country-wide CHP
13 Renewables
14 Process Heat
15 Industrial Space Heating
16 Nuclear
17 Advanced Coal Technology

Exposing the myths 2: Nuclear power does not produce CO_2

Nuclear power is not greenhouse friendly. While electricity generated from nuclear power entails no direct emissions of CO_2, the nuclear fuel cycle does release CO_2 during mining, fuel enrichment and plant construction. Uranium mining is one of the most CO_2 intensive industrial operations and as demand for uranium grows CO_2 emissions are expected to rise as core grades decline.

According to calculations by the Öko-Institute, 34 grams of CO_2 are emitted per generated kWh in Germany [4]. The results from other international research studies show much higher figures - up to 60 grams of CO_2 per kWh. In total, a nuclear power station of standard size (1,250MW operating at 6,500 hours/annum) indirectly emits between 376,000 million tonnes (Germany) and 1,300,000 million tonnes (other countries) of CO_2 per year. In comparison to renewable energy, nuclear power releases 4-5 times more CO_2 per unit of energy produced taking account of the whole fuel cycle.

Also, with its long development time a nuclear power programme offers no short-term possibility for reducing CO_2 emissions.

Exposing the myths 3: Nuclear power is safe

Problems of security, safety and environmental impact have been perennial issues for the nuclear industry. Many countries have decided against the development of nuclear power on these grounds, but radioactive contamination is no respector of national borders and nuclear power plants threaten the health and well-being of all surrounding nations and environments. There is also the very serious problems of nuclear proliferation and trafficking.

The UN Intergovernmental Panel on Climate Change (IPCC) view is that if nuclear power were to be used extensively to tackle climate change, "The security threat ... would be colossal".

Just one month after The Economist, a British magazine, had declared in its lead article that the technology was "as safe as a chocolate factory" (1986), there followed a catastrophic nuclear accident at Chernobyl. The accident caused an immediate threat to the lives of 130,000 people living within a 30 kilometre radius who had to be evacuated (and who have been permanently relocated) and 300-400 million people in 15 nations were put at risk of radiation exposure. Forecasts of additional cancer deaths attributable to the Chernobyl accident range from 5,000 to 75,000 and beyond. The nuclear industry argues that the problems in the former Soviet Union are different to those in developed countries, but the United States itself had a serious accident at Three Mile Island in 1979. Whilst the new European Pressurised Reactor and the fusion programmes are being promoted as offering safer operation, no form of nuclear power technology is totally without risk of a major accident. With public opinion strongly set against nuclear power, it would be far better to invest in renewable forms of energy which have widespread public support. The development of new nuclear technology would mean spending huge amounts of money going down another nuclear road, with the prospect of finding the same type of problems and public opposition.

Recent in-depth studies in the United States challenge the claim that exposure to low-level doses of radiation is safe. The health and safety of employees, local communities and the contamination of the environment are genuine risks. A recent study (completed August 1997) funded by the US National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention, examined the health and mortality of 14,095 workers from the Oak Ridge National Laboratory. The study found "strong evidence of a positive association between low-level radiation and cancer mortality" [5]. As of 1990, 26.9% of deaths were due to cancer.

The exposure risk to workers in the uranium mining industry is also great.

Exposing the myths 4: Nuclear power is sustainable

Nuclear power plants produce extremely long-lived toxic wastes, for which there is no safe means of disposal. The only independent scrutiny of a Government waste management safety case [NIREX in the UK] led to the cancellation of the proposed test site for nuclear waste disposal. As disposal is not scientifically credible, there is no option other than interim storage of radioactive wastes. This means that the legacy of radioactive wastes will have to be passed on to the next generation. Producing long-lived radioactive wastes, with no solution for their disposal, leaving a deadly legacy for many future generations to come is contrary to the principle of sustainability, as laid out in Agenda 21 at the Earth Summit.

In 1976 the UK Royal Commission on Environmental Pollution warned that it is, "irresponsible and morally wrong to commit future generations to the consequences of fission power on a massive scale unless it has been demonstrated beyond reasonable doubt that at least one method exists for the safe isolation of these wastes for the indefinite future"[6]. Over twenty years on, still no such method has

been found. Nuclear waste management policies are in disarray and there is growing public opposition to the transport and storage of nuclear waste - as has been demonstrated by the scenes at Gorleben, Germany.

Under no circumstances can nuclear power be considered to be sustainable.

Exposing the myths 5: Nuclear power can provide an endless source of energy

With the virtual demise of the Fast Breeder research programme and no foreseeable commercial development of fusion reactors, the belief that nuclear power can supply an endless source of energy is fast disappearing. The Japanese Monju Fast Breeder reactor has been inactive since a serious accident in December 1995, whilst the French Superphoenix and the breeder reactor programmes in the UK have been permanently closed.

Diminishing uranium supplies and the failure of the breeder reactor programmes mean that nuclear power will not be able to make a long-term contribution to meeting the world's energy needs.

Exposing the myths 6: Nuclear power makes a vital contribution to energy supply

The assertion by the nuclear industry that, "It is essential that nuclear generating capacity is maintained if emissions from power generation are to be successfully limited over the next 10 to 15 year and beyond" [7] is fundamentally untrue. Emissions can be cut without building more nuclear power plant. In October 1997, the US Department of Energy released a report in which they concluded that the US could cut CO_2 emissions to 1990 levels by 2010 with no net cost to the economy. Shell has forecast that renewables could meet up to 50% of the world's energy demand by 2060 [8]. Nuclear power only supplies 17% of world electricity supply at present.

Nuclear power is seeing its role in the world's energy mix diminish. Since 1986, according to the IAEA, only three nuclear power stations have been ordered annually. In Europe fourteen out of fifteen European nations have no plans to develop nuclear power; the majority of the countries within the European Union have, "little desire to launch, or to re-invigorate, nuclear power programs" [9]; and nearly half of the EU countries are nuclear free and others are planning to decrease or phase out nuclear power completely. It is clear that the vast sums of money being spent on research and development and on subsidising the industry are in total disproportion to the contribution nuclear power is likely to make to Europe's energy supply in the coming decades.

With a limited amount of funding available for research and development, reallocation of funds from nuclear power and towards renewable energy and energy efficiency would reduce the costs of these technologies, making them even more competitive. However, funds are still being wasted on nuclear power programmes, which are opposed by most people, are more expensive than other alternatives and require a long development time.

It is a myth that "Nuclear power is the only fully developed non-fossil fuel electricity generating option with the potential for large-scale expansion" [7]. Nuclear power plants take 10 years to build. Over the next 12 years the European Union is aiming for 10,000MW of wind power and 10,000MW of biomass to be developed. This is a just part of the solution and is equivalent to about 15 nuclear power plant.

Energy policies post-Kyoto

1. Joint Implementation and the Clean Development Mechanism should not be allowed to be used as a smoke screen for new nuclear power development. Western governments must not be allowed to use nuclear power technology in Eastern Europe and in developing countries to obtain greenhouse credits in return for "reducing" future emissions in those countries. Canada had been proposing a system of credits for low carbon-intensive fuels including uranium and natural gas.

The World Bank has made a decision not to finance new, or the upgrading of old, nuclear power plants based on the following rationale: i) in almost all cases, nuclear is not the least-cost solution to the power supply problem; ii) environmental risks are high and require specialised agencies for their handling. [10]

2. Governments should not be fooled into believing that nuclear power is acceptable IN ANY WAY as a technically viable, economically feasible or publicly acceptable solution to climate change. The nuclear industry in the developed world, particularly Western Europe and the United States is on its last legs due to its consistent technical problems (accidents, construction errors, unreliable operation), economic failures (cost overruns, non-competitive with renewables in an era of increased deregulation, rising waste storage costs) and dramatic public disaffection (communities in the US, Western Europe and now even Japan, are vehemently opposing the siting of a new nuclear reactors).

3. Developed nations' governments should not be encouraged to support nuclear power construction abroad under the mask of a climate solution, in order to support their own failing nuclear industry. There are real fears that Central and Eastern Europe will become an electricity generating centre for the rest of Europe, producing cheap electricity based upon lower environmental and safety standards and lower public opposition to highly polluting and dangerous energy infrastructure.

Further, Western corporations have targeted energy-hungry China, where public awareness of nuclear's environmental, economic and public health disasters is virtually non-existent, as an economic goldmine and saviour of their dying industry. Exploiting public innocence of the Chinese people is cruel and unusual punishment. The health and safety of the Chinese people, as well as the ecosystems and peoples of other nuclear industry targeted countries must not be sacrificed on the altar of a nuclear industry bailout.

Japanese Government delegates to the preliminary conference for COP-3 climate change negotiations in Bonn proposed that expanded use of nuclear energy should be referred to in the draft policy protocol to be signed at COP-3. The proposal had to be withdrawn almost immediately due to opposing voices.

4. Governments need to increase financial investments and incentives in renewables, conservation and energy efficiency. Such measures will create more jobs per unit of energy than traditional fossil fuel and nuclear power industries. For example, while also being cheaper than nuclear power, wind power provides four times as many direct jobs as nuclear power per unit of energy produced.

Conclusions

Under no circumstances can nuclear power be considered to be a solution to climate change:

- It is one of the most expensive ways to reduce carbon dioxide emissions.
- The nuclear industry does contribute to carbon dioxide emissions.
- No proven strategies exist for the permanent safe storage of nuclear waste.
- Nuclear power poses a very real health risk.
- Nuclear power is uneconomic, unsustainable and unsafe.

Climate change is a serious problem which needs to be tackled in a way which safeguards the future for generations to come. Tackling climate change through the development of nuclear power is both expensive and just swaps one serious problem for another. Nuclear power cannot be considered to be a "clean source of electricity" [7].

The nuclear industry is hoping to use the Climate Change negotiations to save itself, because the economics of nuclear power has meant a rapid decline in the industry's fortunes. This is a desperate attempt to generate business from the misfortune of the problems we all now face.

[1] Foratom and the Uranium Institute, 'The contribution of nuclear energy to limiting potential global climate change'.
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[3] Jackson, T., 'Efficiency without tears - 'No-regrets' energy policy to combat climate change', Friends of the Earth, London, 1992.
[4] Lim Sui-San, 'Comparison of greenhouse gas emission and abatement cost from nuclear and alternative energy resources from lifecycle perspective', Öko-Institut, Germany, 1997.
[5] Richardson, D. and Wing, S., Department of Epidememiology, The University of North Carolina.
[6] Royal Commission on Environmental Pollution, 'Sixth report: Nuclear power and the environment', HMSO, London, 1976, p81.
[7] 'Clearing the air: nuclear power and climate change', Statement by the international nuclear power industry to the Third Conference of the Parties to the UNFCCC in Kyoto.
[8] Kassler, P., 'Energy for development', Shell Selected Paper, London, 1994.
[9] Office for Official Publications of the European Commission, 'European Energy to 2020 - a scenario approach', Luxembourg, 1996, p80.
[10] Letter from Achilles Adamantiades, Principle Power Engineer, The World Bank, Washington DC, to Professor Mendelsohn, University of Melbourne, 25th October 1996.

Nuclear power is one of the least effective and most expensive ways in which to tackle climate change.

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