

# ENERGY WORLD

The magazine of The Institute of Energy

Number 194  
December 1991



**INSIDE THIS ISSUE:**  
Features on environmental  
regulation and energy  
efficiency





# ENERGY WORLD

DECEMBER 1991



Number 194

## The magazine of the Institute of Energy

Published by The Institute of Energy  
18 Devonshire Street, London W1N 2 AU  
Telephones: Publications & Conferences:  
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subscriptions: 071-580 0077  
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Printed by Headley Brothers Ltd  
The Invicta Press, Ashford, Kent

## THE INSTITUTE OF ENERGY

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Energy World is circulated free of charge to all paid up members of The Institute of Energy. To libraries, organisations and persons not in membership it is available on a single subscription of £45 for 10 issues. Energy World is also available with the Journal of The Institute of Energy (quarterly) at a combined annual subscription of £140.

ISSN 0307-7942

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## COVER

Lloyd's Register (LR) took delivery of a fully mobile air pollution laboratory (pictured on the front cover of this month's *Energy World*) in November. It is the first of its kind in the UK, and one of the most technologically advanced in the world.

The mobile lab can run for up to 16 hours without mains power, enabling pollution monitoring to take place on a number of sites in a single day, and allowing a rapid response to air pollution incidents where immediate monitoring is of vital importance.

The lab is equipped with six air pollution analysers, five of which measure gaseous components: SO<sub>2</sub>, CO, O<sub>3</sub>, NO<sub>x</sub>, CH<sub>4</sub>/non CH<sub>4</sub> hydrocarbons. The sixth monitor measures particulate levels. This is supplemented by meteorological equipment to assess wind speed and direction, ambient temperature, relative humidity and rainfall.

LR have already begun use of the new lab, with a study for the Department of Transport looking into ventilation and air quality on the vehicle decks of roll-on roll-off ferries.





# Solar energy: potential and obstacles

FOUR years ago I attended the biennial World Congress of the International Solar Energy Society (ISES) held in Hamburg. On my return I wrote a Viewpoint (Issue No. 152, November 1987) discussing the relative importance which Germany and the UK attached to the renewable energy sources. Most sectors of the UK economy seemed to be unaware of the considerable opportunities which others were grasping.

Today it is just a few months since I returned from the 1991 Solar World Congress held in Denver, Colorado. Once again the major exhibitors were the Germans, with the companies of the Bundesverband Solarenergie taking over 30% of the available space. The Japanese had several technically superb displays. Both the Germans and Japanese were clearly poised to be the major suppliers to a substantial sector of the world's renewable energy systems market — a market which, as yet, only very few UK companies are even aware of, let alone pursuing with any vigour.

But perhaps the most significant event at the Congress was the official release of the set of recommendations to the forthcoming meeting of the United Nations Conference on Environment and Development in June 1992. Through a network of 32 regional and national sections, the opinions of the world's leading experts in solar energy technologies were presented. Among the main points considered were the technical potential of and barriers to solar energy.

Economic development and environmental impacts are intrinsically linked to energy use. Over the past 30 years renewable energy has proven to be a reliable and growing source of energy with minimal adverse impacts on air, water and land resources, including biological diversity. The energy needs of a billion people are now being met by renewable energy sources.

Global resources of renewable energy are enormous and the technical potential of renewable energy is limited not by technological constraints but by the lack of leadership. The United Nations can play a vital role in providing their leadership.

Renewable energy technologies are indispensable to the goals of environmental protection and sustainable economic development at the global, regional and local levels. The use of renewable energy technologies can reduce or minimise many of the major pollution problems we face today, including:

- global climate change
- loss of land productivity
- loss of biological diversity
- ocean pollution
- depletion of the quality and supply of fresh water
- waste generation.

Although ISES recognizes the existence of current obstacles to solar energy's increased utilisation, they maintain that there are no unsolvable technical barriers to widespread implementation. The majority of current barriers fall more within the inter-related areas of social, economic and political concern.

Some of the more critical areas which should be addressed by the United Nations are the following:

- energy resource planning activities must be established which reflect environmental and societal costs; in turn addressing the key issue of sustainable development.
- Guidelines must be developed that could assist energy users in selecting between energy options. These guidelines would reflect life-cycle costs as well as societal costs of energy.
- The United Nations must take a leadership role in identifying and creating financial mechanisms for channelling funds to industry and end-users of renewable energy technologies where financial constraints prohibit their consideration.
- Technology assistance and transfer strategies must be developed that would encourage regionally appropriate renewable energy technologies. Additionally, technology transfer efforts must be enhanced to allow the industry to continue to reduce costs and improve reliability.
- If renewable energy technologies are to become widely utilised, there must be significantly increased efforts to educate all sectors regarding the environmental consequences of energy and the long-term economic and developmental benefits of renewable energy.

Although the impressive and very well briefed support given to the renewables by the Parliamentary Under Secretary of State, Colin Moynihan, since his appointment in July 1990, has raised public awareness and encouraged all who have been working in the field, even today "... many people still look upon renewable energy as something of limited relevance to their lives" (*Review*, 16, p2, 1991). But the only environmentally acceptable solution to the world's energy problems is with a rapidly expanding renewable energy industry. The European Wind Energy Association has just published a Plan for Action, suggesting that 100 000 MW of wind power plant could provide 10% of Europe's electricity by 2030 — a timescale which could be shortened. Worldwide production of photovoltaic cells in 1991 is projected to be over 60 MW and is increasing at an annual rate of some 20%.

Let the findings of the 1952 National Physical Laboratory Committee (a majority of the members were Fellows of the Royal Society) act as a warning for those who pay little or no attention to the renewables:

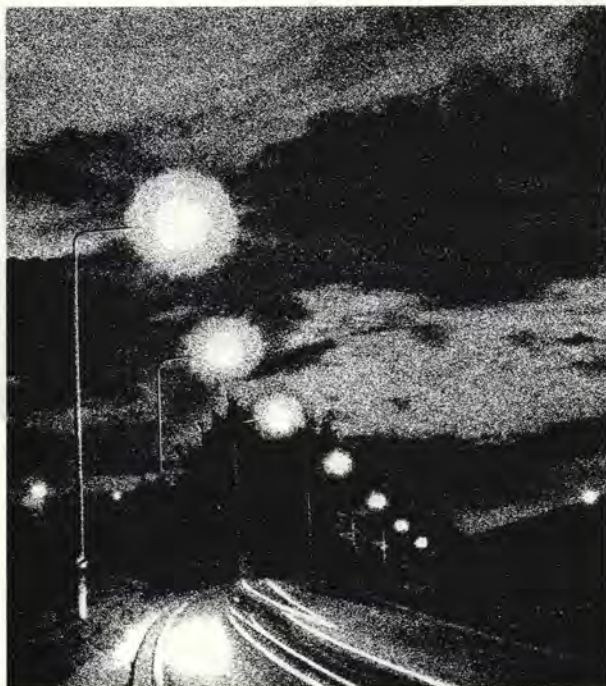
We do not consider that it is necessary to give any special encouragement to the improvement of photovoltaic cells for power production from solar energy ... prospects ... do not seem good enough to justify extra effort.

They had calculated that the maximum achievable efficiency of the solar cell was 0.53%. Two years later the Bell Telephone Laboratories had achieved over 5% efficiency. Today a laboratory efficiency of 37% has been reached.

**Dr Cleland McVeigh MSc PhD CEng FIMechE  
FInstE MIEE MCIBSE**  
*Fellow of the Institute of Energy*



# LIGHT



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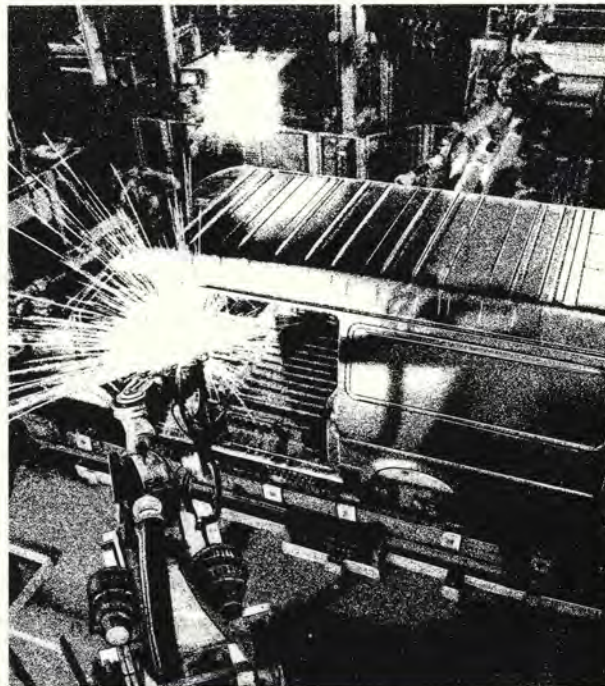
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## International power plant award

THE American professional journal *Power International* has awarded its 1991 International Power Plant Award to the Korean nuclear power plant, Ulchin 1 & 2.

This distinction, which underlines the progress made by the Republic of Korea in the nuclear field, was attributed first of all to KEPCO, the Korean company that operates the plant's two pressurized water reactor units. But it also recognises the main participants in the plant's construction.

Framatome, which designed and supplied the two nuclear islands, was thus a co-recipient of the award, and received this prize in October in Dusseldorf, Germany.

*Power International's* International Power Plant Awards are presented each year to single out power plant projects that illustrate successful applications in the fields of new technology, environmental protection, and energy conservation.

This year three projects concerning coal-fired technology were also recognised, alongside Ulchin 1 & 2.

## Slow down on production

THE Czechoslovak uranium industry will now produce sufficient uranium to cover the national need. The slow down programme is expected to be carried out before 1996.

Press spokesman of the state enterprise Ceskoslovensky uranovy prumysl (Czechoslovak uranium industry) Jiri Vosahlo says that uranium is no longer being extracted in Pribram, central Bohemia and the main domestic source of uranium is now situated in Straz nad Ralskem in north Bohemia.

Liquidation began at the last uranium pit in Pribram in October. The uranium mining slow down programme is for ecological reasons, but the needs of the Czechoslovak power industry will be fully covered by the remaining Bohemian pits.

## Yugoslavia's energy split in two

YUGOSLAVIA's energy sector has been split in two, according to Financial Times Newsletters' East European Energy Report.

War damage has devastated Yugoslavia's energy system. The power transmission grid has been cut into southeast and northwest halves. Closure of the Adria trans-Yugoslav oil pipeline, partly through damage and partly by the federal naval blockage of Croatia ports, is similarly reshuffling energy flows into two separate zones. EC sanctions involving an embargo on crude oil deliveries are only likely to exacerbate this situation.

## Slovaks seek alternative energy sources

THE Slovak Republic produces less than 12% of its energy needs from its own resources and more than 18% of the electrical energy is delivered from the Czech Republic and almost 70% imported.

Because of this Slovak Minister of Industry Jan Holcik says it is extremely important to put into operation such important energy resources as the Gabčíkovo water project and the Nuclear power plant in Mochovce. There is currently not enough money for the completion of these projects. The importance of these installations is highlighted by the gradual shut down of outdated nuclear units V1 and V2 in Jaslovské Bohunice.

Holcik said that the Slovak Republic's Ministry of Industry currently belongs to the largest consumers of energy and therefore its consumption must be considerably reduced. This could be done through cuts in types of production which consume an excessive amount of energy. However, possibilities to obtain energy from its own resources are being sought.

One of them is to make use of heavy fuel oil for the production of huge amounts of gas for steam-gas turbines in the Slovnaft chemical state enterprise. These would be able to generate around 400 MW of electrical energy annually: output of one nuclear unit.

## JET furthers fusion research

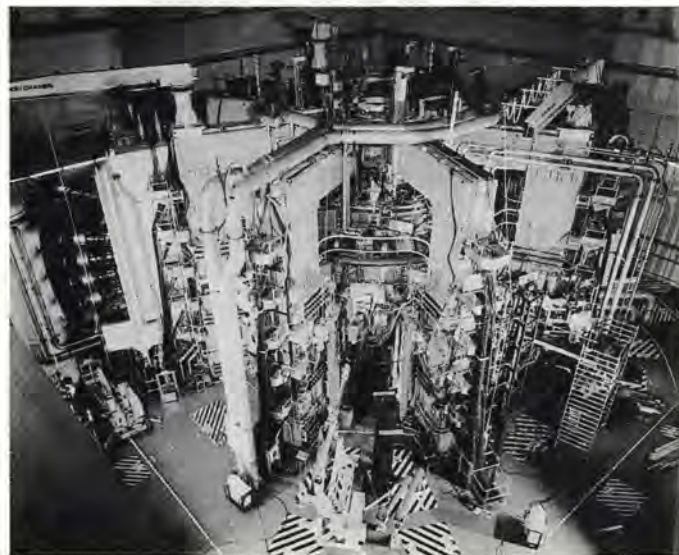


Photo by courtesy of the JET Joint Undertaking

The JET nuclear fusion experiment in which heavy hydrogen fuel is heated to temperatures of 300 million °C and confined by a magnetic field.

JOINT European Torus (JET), is jointly funded and staffed by fourteen European countries and represents the culmination of many years of fusion research. It is the world's largest fusion experiment which aims at confirming the scientific theory of fusion and the feasibility of nuclear fusion for power generation.

Jet says that the successful harnessing of nuclear fusion, that is the energy-producing process which takes place continuously in

the sun and stars, would provide a new and almost limitless source of energy.

This would have many benefits. For example fuels are plentiful, no long-lived radioactive waste products are produced and there would be no environmental damage from greenhouse gases or acid rain. What is more, nuclear fusion reactors are inherently safe since any malfunction results in rapid shutdown.

## Anglo-German safety report

A REPORT on the findings of a joint UK/Federal Republic of Germany regulators' working group on safety standards for nuclear fuel reprocessing concludes that the UK and the FRG approaches to regulating the safety of reprocessing plants have equivalence and are to modern high standards.

Under a joint governmental declaration signed in 1989, the regulatory authorities in the UK and Federal Republic of Germany extended their existing bilateral activities to consider safety standards for modern reprocessing plants, particularly in relation to design. A working group was set up with members drawn from the Health and Safety Executive's Nuclear Installations Inspectorate, Her Majesty's Inspectorate of Pollution (HMIP) and the Bundesministerium fuer

Umwelt, Naturschutz und Reaktorsicherheit (BMU) (Federal Ministry for the Environment, Nature Conservation and Reactor Safety). A report of their findings has been made available to both governments in accordance with the terms of the joint declaration.

The regulatory exchanges reinforced the value of bi-lateral cooperation and the contribution that this makes to nuclear safety and radiation protection. In addition to the study areas, the working group identified several further areas of interest which will be considered as a basis for future exchanges.

A copy of the report is available on request from Mrs J Boorman, Room 260, Health and Safety Executive, Baynards House, 1 Chepstow Place, London W2 4TF.





## HSC proposes emergency nuclear regulations

THE Health and Safety Commission (HSC) has published a consultative document which sets out proposals for new regulations governing off-site emergency planning at licensed nuclear installations.

The proposals would make local authorities responsible for preparing and keeping up to date an emergency plan for any site within their area that is licensed under the Nuclear Installations Act 1965. The aim of such plans is to protect people in the vicinity of nuclear installations in the event of a major accident.

HSC is content that satisfactory plans currently exist for all UK licensed nuclear sites. At present, however, the only legal requirement for emergency planning rests with the licensee, who has no authority off the site, although arrangements may need to extend beyond its boundary to protect members of the public nearby. Off-site planning therefore depends on voluntary co-operation between licensees and outside bodies.

## Viking A production halted

CONOCO (UK) Ltd, operator of the Viking gas field in the southern North Sea, has announced that production from the Viking A complex has been suspended. The platforms, which lie 86 miles off the Lincolnshire coast, will continue in service as an unmanned riser installation on the Viking gas transportation pipeline.

Production from Viking will continue through the B complex and its five unmanned satellite platforms.

Suspension of production from Viking A is not irreversible at this stage. Conoco is conducting further studies to evaluate options for production of hydrocarbons remaining in the area.

The decision was prompted by a combination of factors including safety considerations, the age of the Viking A facilities, and current production levels.

## DEn and DoE launch energy efficiency campaign



1987 storm damage (left) attributed to global warming by the campaign; and the campaign logo (right).

'HELPING the earth begins at home' adorns the logo of the Government's domestic energy efficiency drive.

Launched in November, the

campaign sets out to inform the public through advertisements in the national press about the links between saving energy and tackling the problems of global

warming. £10 million will be made available over the next three years to get the message across, but funding in the form of grants will not be forthcoming.



## New engineering design centre

PLYMOUTH Polytechnic South West has recently received an award of £330,000 from the Science and Engineering Research Council for the establishment of the sixth SERC Engineering Design Centre. The initial aim of the centre is to carry out fundamental research into the application of the genetic algorithm and related adaptive search techniques to engineering design. In this manner the techniques will be rendered accessible in a useful and understandable form, to engineering designers across a wide range of disciplines.

The genetic algorithm offers a non-linear search technique that is particularly suited to design problems involving large numbers of variable parameters. Unlike other more traditional optimisation techniques the algorithm will avoid local optima and rapidly converge on a global solution. It therefore represents a method of processing complex iterative design conditions with

significant savings in both time and effort. The non-linear aspects of the algorithm's search techniques can also provide innovative solutions to classic design problems.

It is intended to investigate the application of the algorithm to the design of manufacturing processes and to the establishment of 'best practice' programmes and energy efficient systems.

The genetic algorithm has already been successfully applied to the design of a novel low-head hydropower system and significant increases in predicted power output have been achieved. Considering the economic sensitivity of the renewable energy technology to overall system efficiency it is possible that these optimisation techniques could be of great value.

For further information concerning the activities of the engineering design centre please contact Dr I C Parmee, (Project Manager) on 0752 225885.

## Substation highly commended

HYDRO-ELECTRIC'S 132 kV and 33 kV substation on the Isle of Harris has been highly commended by the judges of this year's Business and Industry Commitment to the Environment Awards Scheme.

The substation, part of a major

project completed last year to bring the mainland grid to the Western Isles, provides a distribution point for the local electricity supply and steps up the voltage of the incoming submarine cable supply.

## OFFER approves renewables contracts

SCHEMES for generating electricity from wind, sewage and landfill gas, waste and hydro power are among some 122 projects which have been given final approval by Professor Stephen Littlechild, Director General of Electricity Supply.

The schemes had been submitted to him by the 12 regional electricity companies under the 1989 Electricity Act to satisfy the second renewables order announced on 5 November by the Secretary of State for Energy.

The projects, most of which are entirely new, comprise 49 wind projects, 28 landfill gas projects, 19 sewage gas projects, 12 hydro projects, 10 municipal and general waste incineration projects, and four projects using other non-fossil fuels.

Originally some 282 schemes were submitted to Professor Littlechild for assessment. A number subsequently withdrew, and some failed to meet OFFER's criteria based on the requirements of the Act.

The second renewables order sets an obligation building up to 457 MW declared net capacity over the period from 1 January 1992 to 31 December 1998.





## Obituary

**Alick Buchanan-Smith**

IT IS a privilege to be asked to contribute a short obituary about Alick Buchanan-Smith with particular reference to his energy-related interests. Much has been written already about his courage, his caring nature and his tireless endeavours on behalf of others. Those of us who knew him well and served in government with him can confirm that he carried those qualities into his ministerial duties in the same way as he had done in his constituency and his private life. In recent years he had continued his energy interests through his Chairmanship of the Parliamentary Group for Energy Studies, in which he will be greatly missed.

Representing as he did a seat in the North East of Scotland, energy, and in particular oil, was never far from Alick Buchanan-Smith's thoughts and it was an appropriate move in 1983 for him to be sent as Minister of State to the Department of Energy to accompany the new Secretary of

State Peter Walker, his friend and colleague, with whom he had established a successful partnership at the Ministry of Agriculture Fisheries and Food (MAFF). At the Department of Energy Alick assumed responsibility for the continuing exploration and development of North Sea oil and gas, a remit far removed from that which he had enjoyed at MAFF but with one common link: the fishing industry. He had, of course, had responsibility for the Scottish fishermen in the early 70s while he served at the Scottish Office. Now however, Alick had to argue the oil industry case and it says much for his tact and experience that he overcame many problems and produced a series of policies broadly acceptable to both industries.

Alick was a good listener but those with whom he dealt soon discovered that his easy manner was not to be mistaken for weakness, and he quickly

established himself with the oil industry as a minister genuinely anxious to learn, and prepared to consider suggestions, but who had his own views about many aspects of his remit and was determined to see certain of those ideas become standard practice within his department. He was particularly anxious to ensure that oil companies contributed some of their profits towards research and such a commitment became a major factor in the award of licences. Safety was another subject which caused him concern and he found it an advantage to have constituents who actually worked offshore and there is no doubt that the close association he maintained with them influenced his strong views on the subject.

A very experienced Parliamentarian, he piloted through the House of Commons the Bill which privatised British Gas. This included a lengthy committee stage during which his skills, his patience, and his sense of humour were tried to the limit but he stood up to the test well

and Peter Walker was generous in his praise of Alick's achievements at the conclusion. He left his mark on other energy legislation too. The Petroleum Act which dealt with, among other things, the controversial question of abandonment, and the creation of BNOC as an oil and pipelines agency are two examples. Furthermore his period at the Department of Energy included the abortive negotiations with Norway over gas from the Sleipner field, and it was completely in character that when the decision was finally taken that British Gas should not purchase the gas Alick Buchanan-Smith insisted on giving the information to the Norwegian Minister himself. He was not a minister to hide behind his officials.

With the passing of Alick Buchanan-Smith the energy industries have lost an understanding, sympathetic and knowledgeable supporter, and their members a respected and popular friend.

*The Rt Hon Lord Gray of Contin PC DL*

**The case for market forces**

THE Hon Colin Moynihan MP, Parliamentary Under-Secretary of State for Energy, gave a presentation on Conservative Party energy policy to a meeting at the Institute of Petroleum at the beginning of November. He gave particular emphasis to the oil and gas industry and to the issue of environmental protection.

There were no surprises, the Conservative Party would continue with its present policies if re-elected. It is committed to enabling the private sector to exploit Britain's oil and gas resources, and to providing energy at the lowest possible cost. Mr Moynihan claimed that privatisation has been a great success, and had resulted in price reductions to customers in real terms. They would go ahead with coal privatisation in the next five years.

Mr Moynihan expects that environment issues will dominate the industry until the end of the century. This fact will be reflected in costs, but it is unlikely to happen quickly. He is in favour of industry coming forward with its own regulatory regime, rather than for govern-

ment to impose legislation. There was a suggestion that a firm's environmental record might be taken into account in the licensing procedure, in the same way that technological and financial performance are currently considered.

Mr Moynihan believes that he has a clear energy policy, which defers decisions to the market.

**Upgrade for Notts district heating**

NOTTINGHAM's district heating scheme, which is managed by British Coal in partnership with Nottingham City Council and Nottinghamshire County Council, is to be upgraded in a £5 million scheme announced in November.

The plan to install a new system turbine will upgrade the system from 3 MW of electricity currently generated to 8 MW — and also allows 15% more rubbish to be burnt on the system.

The surplus electricity will be sold off via the national grid.

**New Chairman for PGES**

Following the recent death of Alick Buchanan-Smith MP, Alex Eadie BEM JP MP (pictured above) has been appointed Chairman of the Parliamentary Group for Energy Studies.





## Membership and you

IF I were to take a random selection from the bound copies of *Energy World* and the *Journal* which are situated in my office, turn to the report of the Presidential Address of the various Presidents who came into office in the year under review, I would find in the majority of cases a reference to increasing membership by the simple expedient of each member recruiting one more member. This has been, and still is, an old chestnut pulled from the glowing embers from time to time.

If I was to go further and look at the membership figures at the end of the year I would see that far from increasing membership, the figures would have dropped slightly. It is fair to say then that these appeals have mainly fallen on deaf ears — or must I assume that we really have reached saturation point where prospective members are concerned. No, I do not think so.

I make no apologies, therefore, for pulling the old chestnut out yet again. Can I do so without getting my fingers burnt I ask? Well I believe I can because the idea is delightfully simple — but, with *your* cooperation, it can work. Although I have never been involved in 'pyramid selling' I suppose the idea is much the same. I understand in that case however, each 'one' is asked to recruit 'two', and all I am asking is for a ratio of one to one.

The main purpose of the Institute at the present time is to raise its profile, to be recognised as the authoritative voice in the energy sphere. In short to carry out the main thrust and objectives of its Royal Charter. To do this we need a strong Institute, and the strength of any body such as ours is in its membership.

The Chairman of the Membership Committee and I have recently been touring various Universities and Polytechnics, talking to students and explaining how the Institute relates to their current studies and future prospects. I am happy to report that this incentive is going well and our student numbers are increasing. This obviously augers well for the future but it is not enough.

We need members coming in NOW to the more senior grades and this is where YOU can play the major role. I would like to

## McAndrew prize for Katy



Pictured above is Katy Kirkham, from the Blake High School, Hednesford, receiving the Junior McAndrew Prize for 1991 from Dr Rachel Palmer, chairman of the Midlands branch of the Institute of Energy.

14-year-old Katy earned her title of Young Engineer for Britain by designing and building a plant propagator using everyday objects, such as caravan lamps and a fish tank heater.

give the old idea of each member recruiting one member new impetus. You will find in this issue of *Energy World* a simple application for assessment of grade. Give it to a colleague or associate, and stand over him/her if needs be until it is completed and returned. We will do the rest. Alternatively, ask them to complete the membership enquiry card which is to be found in every issue of *Energy World*.

I cannot emphasise too strongly the importance of having a strong, growing membership base. It is from this that all other activities and services evolve. This is YOUR Institute and it is in YOUR interests to see it thrive and flourish. Please help.

**Jim Leach**  
Deputy Secretary

## Next issue of *Energy World*

The next issue of *Energy World* will appear in February, and will be a combined January/February edition.

## Periodicals collection

THE Institute receives over 100 journal titles, and an even larger number of company magazines and newsletters from a wide variety of organisations. These are on display in the Member's Room at 18 Devonshire Street, and are available for use by members.

Examples of some of the periodical titles we hold are: *Energy in Europe*, *Energy Policy*, *The International Journal of Ambient Energy*, *Energy in Buildings*, *Coal Abstracts*, *Electrical Power Engineer*, *Gas World*, *UK CEED Bulletin*, *Petroleum Economist*, *Solar Energy*, and *New Scientist*.

We also have some foreign publications such as *Revue Generale de Thermique* and the *Journal of the Fuel Society of Japan*. Some of these foreign language journals contain English abstracts.

*Fuel and Energy Abstracts* is published for the Institute and contains abstracts of articles published in a wide range of journals. It is available from Butterworth Heinemann at a cost of £235 a year for six issues. It is a good starting point as it is possible to search many journals at once, copies are available for members to use at the Institute. It is also possible to have a search carried out by the Information Service at a cost of £0.40 per abstract found (£0.50 for non-members), with a minimum charge of £10 (£15 non-members).

If you would like any further information on the Institute's periodicals collection, contact the Information Officer, Linda Norbury, on 071 580 7124.

## New President for EIC

INSTITUTE Vice President and Chairman of the National Grid Co Ltd, David Jefferies, is the new President of the Energy Industries Club.

His inauguration took place at the Club's monthly luncheon in October, when he gave an optimistic speech about the future of the energy industries operating in the free market.

## 58th Melchett Lecture

THE Institute of Energy's 58th Melchett Lecture will be given by Dr Harry Beckers at the Royal Society of Arts in John Adams Street, London on 24 March 1992.

The title of this year's lecture is *Energy future: wishful thinking and reality*. It will begin at 6pm, and will be followed by a buffet in the recently opened vaults under the RSA's offices.

Further details will be published in the January/February 1992 issue of *Energy World*.

## Royal Society Esso award for Fellow

THE annual Royal Society Esso Energy Award this year was presented in November to Dr Frank Fitzgerald, CBE, FEng, FInstE of British Steel plc for his contributions in improving the energy efficiency of British Steel, resulting in a subsequent reduction in costs following the energy crisis which occurred during 1974 and 1979.





THE implication for industry of environmental legislation has increased substantially in the last two decades. An example of this is the increase of European Community (EC) environmental legislation, both existing and in the draft stage. This article will review some of these new legislative developments within the EC, however given the quantity and complexity of legislation only a small number of directives/regulations are covered. In determining the coverage, consideration was given to the subject of energy from raw materials to power generation and efficiency with a focus on these processes; and legislation encompassing proactive and reactive directives, excluding the nuclear industry.

Before dealing with specific pieces of legislation it is necessary to briefly review where the legislation originated from and the principles discussed in this article.

Prior to 1972 within the EC there had been a limited effort to control pollution of the environment, since then environmental legislation has stemmed from five EC action programmes<sup>1</sup>. The most important principles of these programmes are:

- prevention;
- environmental effects should be taken into account at the earliest possible stage in decision making;
- exploitation of natural resources which causes significant damage to the ecological balance must be avoided. The natural environment can only absorb pollution to a limited extent;
- improvement in scientific knowledge should be encouraged which would enable further action to be taken;
- the principle of 'the polluter pays';
- activities carried out in one member state should not cause deterioration of the environment in another;
- the principle of the appropriate action level. In each category of pollution, eg air, water, soil, it is necessary to establish the level of action best suited to the type of pollution and to the geographical zone to be the protected; and
- national environmental policies must be harmonised in the community without hampering progress at national level.

The action programmes set a framework and do not strictly constitute EC policy. The first two action programmes set out objectives, principles and tackled acute pollution problems. The third and fourth action programmes show a shift in emphasis towards the preventative approach. As yet the precautionary principle has not been adopted.

*\*Environmental Assurance Lloyd's Register*

# EC environmental legislation and the energy industries

by Gerald G Yardy BEng and  
Dr Anne-Marie Warris CEng MInstE\*

The Treaty of Rome, the basis of EC law, was amended in 1987 by the Single European act to include a section entitled 'environment' providing a legal basis for actions in the Community relating to the environment. The most important provision of which stated under article 130R that 'environmental protection requirements shall be a component of the Community's other policies'. The most recent move has been the adoption of article 100A for environmental protection requirements which has allowed the change from unanimous to majority voting, which gives greater weight to more populous countries. This move should produce more effective implementation of EC environmental laws.

EC legislation generally takes one of three forms: a regulation, a directive or a decision.

**Regulations** — A regulation is a directly applicable law in any member state. This means it can be implemented immediately and used in national courts.

**Directives** are binding as far as the objectives which are set must be achieved but leave the individual states free to choose the form and methodology to achieve those results. Directives are therefore blue prints for legislation and take effect through national legislation.

**Decisions** are legally binding and are enforceable in their entirety on those to whom they are addressed, possibly only one EC member state.

## Proactive legislation

This section will highlight some key pieces of current and proposed legislation which primarily aim to set a proactive approach rather than a reactive 'end of pipe' approach. This includes the freedom of access to information, Eco Audit, Seveso and integrated permitting.

*Directive on the Freedom of Access to Information on the Environment*<sup>2</sup> This directive, in conjunction with the directive on Strict Civil Liability for Damage Caused by Waste provides pressure groups with a powerful tool for legal action. The directive covers information on: air, water, soil and habitat quality; public and private activities likely to damage the environment; and measures to preserve and protect the environment.

In the UK under the Environmental Protection Act 90 (EPA90), there will be a range of information and data held on public registers. Any information held by public bodies on registers will be accessible to the public. Hence, the regulatory authorities will be under greater pressure to take enforcement action as the public becomes increasingly aware of the short comings in environmental performance.

This aspect of public authorities being taken to court by action groups is exemplified by the decision of Greenpeace to take the National Rivers Authority (NRA) to judicial review for failing to carry out its statutory duties with respect to the Albright & Wilson, Whitehaven pollution prosecution.

*Eco Audit — Environmental Auditing Regulations*<sup>3</sup>

The 1988 International Chamber of Commerce definition of environmental auditing is;

"A management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing with the aim of helping to safeguard the environment by:

(A) Facilitating management control of environmental practices.

(B) Assessing compliance with company policies, which would include regulatory requirements."

The original EC proposal required mandatory environmental auditing for certain specified areas of industry. In the most recent proposal this has been changed to a voluntary scheme allowing any installation to register. An individual EC member state may still decide to implement the regulation as a mandatory scheme.

Companies which choose to register under the scheme should conduct a comprehensive environmental audit of all operations of a plant or company, the result of which will be an environmental statement made available to the public. The audit and the statement will be verified by an accredited external third party. EC members states will establish a competent authority to maintain the registers and accredit verifiers.

It is expected that it will be 1993 before the regulation is finalised and the scheme implemented. If the voluntary phase is considered to have failed after four years of implementation





the regulation will be reviewed and may become mandatory thereafter.

There are significant advantages to the scheme and to protection of the environment. As part of an overall management system the audit should reveal:

- if the process complies with relevant controls;
- that potential liabilities are identified; and
- financial savings to be made by changes in operations and management.

In association with the draft Eco Audit legislation a BSI Environmental Management Scheme has been proposed. This was originally planned for the end of 1991 but has now been delayed until April 1992. The aim is that a company taking on this scheme may meet or exceed current environmental legislation by stating targets and methods. The BSI standard may form part of the registration under the EC regulation.

Similar schemes are well developed in the US. Only in Sweden and Norway do laws exist for environmental auditing where some 6000 installations are subject to internal environmental audits.

#### *Integrated Permitting Draft Directive<sup>1</sup>*

The Integrate Permitting (IP) Directive will largely be covered by the Integrated Pollution Control (IPC) authorisation system under EPA 90 in the UK. In addition to the IP directive countries will be expected to graft on their own more stringent integrated permitting systems. The time required to achieve compliance is expected to be shorter than the five years stipulated under the present UK legislation. The IP directive includes the disclosure of information, reinforcing the Freedom of Access to Information Directive (EEC/90/313) and the EPA 90 requirements in the UK.

The most significant difference between EPA 90 and the IP directive is the use of 'Best Available Techniques' (BAT) in the directive and 'Best Available Techniques Not Entailing Excessive Cost' (BATNEEC) in EPA 90. The dropping of the 'Not Entailing Excessive Cost' may have serious implications for industry, ie severe financial penalties may be incurred to achieve BAT.

#### *The Seveso Directive and the Environment (CIMAH Regulations)<sup>4</sup>*

The 1982 Seveso Directive (EEC/82/501) is shortly to be amended after a fundamental review with regard to lessons learned from major accidents. The Seveso Directive is implemented in the UK by the Control of Industrial Major Accident Hazards (CIMAH) regulations.<sup>5</sup>

It had been assumed by legislators that damage to the environment from a major incident would be covered within these regulations. This view changed with the Sandoz incident in Basle, Switzerland in 1986 where a mixture of ecologically toxic chemicals were involved in a fire and subsequently washed from an inadequately protected warehouse into the river Rhine. The result was heavy pollution of many 100s of miles of river in more than three countries. This pollution had a substantial environmental effect on much of the river ecosystem.

The Seveso directive is being amended to

## How the EC energy tax will affect fuel prices

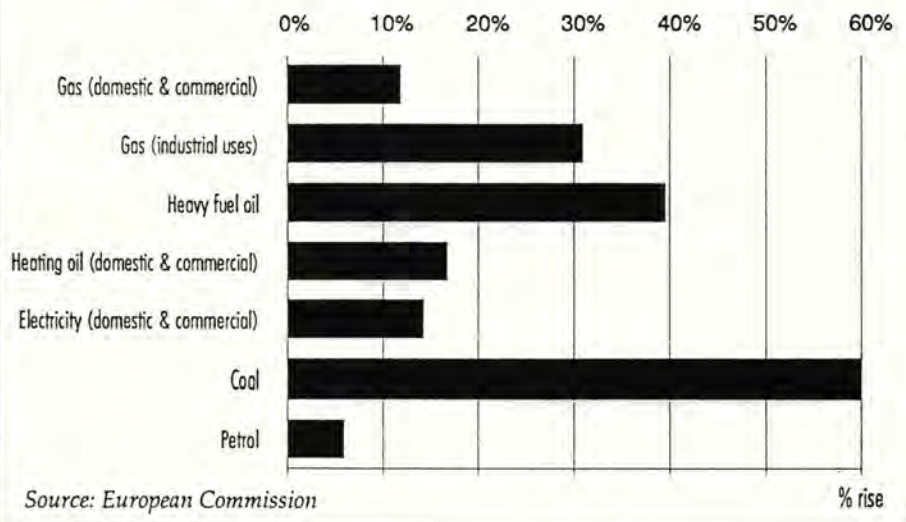


Fig 1: Effect of EC energy tax on fuel prices.

take this potential into account with the wording 'The prevention of major accidents which might involve dangerous substances and with the limitation of their consequences on the environment and man'. The focus is on dangerous substances rather than activities.

The proposed amendments now cover:

- storage of substances that fall into the 'very toxic' categories at either isolated or process sites;
- increase in the number of substances qualifying in the categories of 'very toxic' and 'toxic';
- the introduction of the cumulative threshold approach with aggregation within categories;
- sharpening up of the two tier system to 'general' and 'Top Tier'. Top Tier being subject to specific provisions.

Table 1 shows the trigger quantities used for each tier and category.

Table 1

Categories of substances and preparations	Quantities (tonnes)	
	Top Tier	General
'Very Toxic'	5	20
'Very Toxic', 'Toxic'	50	200
'Oxidizing' 'explosive'		
Highly flammable gases (including LPG & LNG)	5000	50000

Sites must now consider changes in toxicity or changes in chemical nature by breakdown as a result of a fire and subsequent dispersion pathway such as a river, for example. Such information will have to be provided for public registers under the directive of Freedom of Access to Information and under EPA90.

These amendments are expected to bring

several hundred more sites under the 'Seveso' directive.

## Specific directives

It is now appropriate to turn to the specific directives aimed at either air, water or waste.

**Air — Air Quality Directive<sup>6</sup>.** This directive lists air quality limit values and gives guidelines for SO<sub>2</sub> emissions. These are used as the basis for other legislative instruments.

**Industrial Plant Emissions<sup>7</sup>.** This directive requires prior authorisation of most industrial plants to prevent or reduce air pollution and provides further legislation on emission limit values.

**The CO<sub>2</sub> or energy tax.** The EC have proposed a CO<sub>2</sub> emission/energy tax in the EC. The goal is to stabilise CO<sub>2</sub> emission at 1990 levels by 2000, (2005 in the case of the UK). The tax has been recommended to the Council of Ministers for legislation.

Half of the tax is to be levied on all non-renewable energy sources including the nuclear industry, this is intended to cut energy consumption. The other half is to be collected according to the carbon content of the fuel.

The most recent suggestion is for an initial \$3 per barrel of crude in 1993 increasing each January by \$1/barrel to \$10/barrel in the year 2000.

The Commission has indicated that energy intensive industries may receive special consideration indicates that the tax will be balanced by incentives in other areas.

There is opposition to the tax from a number of member states including the UK, as well as from industry groups such as the petrochemical companies. The European Chemical Industry Council have said that for each \$100 spent in the EC on CO<sub>2</sub> reduction strategies the equivalent effect could be seen for \$1 spent in Eastern Europe. This is of relevance when considering that it is currently estimated that former East European States represent 25% of world CO<sub>2</sub> production whereas the 12 mem-





ber states represent 13%, the US 23% and Japan 5%.

**Large Combustion Plant Directive.**<sup>8</sup> This directive applies to combustion plant aggregates in excess of 50MW (th) and fixes emissions for SO<sub>2</sub> and NO<sub>x</sub> for existing plant. 'Aggregate' means the combined power output of all systems to one common stack including auxiliary equipment.

The overall aim is to reduce emissions to 1980 levels. New plant will have to adhere to strict monthly levels<sup>9</sup> of 400mg/Wm<sub>2</sub> SO<sub>2</sub> for solid and liquid fuel and 650mg/Wm<sub>2</sub> NO<sub>x</sub> for solid fuel and 450 mg/Wm<sub>2</sub> NO<sub>x</sub> for liquid fuel. Existing plants will be forced to consider expensive retrofitting options and the use of low sulphur content fuels.

**Bubble emission concept** — Within the Large Combustion Plant Directive it stated that member states must achieve reductions in emissions to air of SO<sub>2</sub> and NO<sub>x</sub>. This could in the future be applied to individual plants and to overall air emissions from all large power stations. This would be regulated by the introduction of permits which may be transferred. This is known as the bubble concept and would allow a trade in these permits that would be reset every five years with more strict controls. The permits would have a value in the emission levels allowed and in the availability to the market. An old power station would pay more for a high emission limit permit rather than perhaps a new or retrofitted plant for a low emission permit.

**Water Quality — Ground Water Directive**<sup>10</sup> This regulates the direct and indirect discharges to ground water of listed dangerous substances. An inventory of discharge authorisations must be kept along with compliance records.

**Dangerous Substances.**<sup>11</sup> This directive sets the framework for elimination of pollution of inland, coastal and territorial waters by dangerous substances and requires compliance with limit values or quality objectives. There are further daughter directives covering 17 other substances such as mercury and cadmium.

**Waste — Strict Civil Liability for Damage Caused by Waste.**<sup>12</sup> This Strict Civil Liability proposal is aimed at establishing a framework in which the costs of environmental repair could be recovered from waste producers and hence focus business on the environmental impact of waste. The proposed directive covered all types of waste produced by any economic activity. Specifically it states that:

- waste producers will be held liable for damage caused to property and the environment irrespective of fault;
- liability for injuries caused to humans will not be subject to a financial ceiling;
- liability may be shared with anyone who has control of the waste;
- where damage results from several sources then all of the waste producers may be held liable;
- in the event that the waste producer is not identifiable then the holder of the waste will be held liable;
- the directive does not cover the nuclear industry and oil pollution. These are

covered by other directives;

- the liability extends for 30 years or more at present.

The UK draft Codes of Practice on the Duty of Care of Waste<sup>13</sup> state that owners of waste must ensure transfer occurs only to an authorised person and that the waste must be accompanied by a specific descriptive document.

The directive was to be ratified in the near future, but this has now been setback for possibly some years by recent moves to make this directive cover environmental damage arising from all types of environmental pollution.

A report on the initial proposal suggested that environmental insurance cover be made mandatory and that the system of applying strict civil liability be carried out from a level playing field in all EC member states. The very nature of national legislation in the member states may have produced a variation from country to country therefore infringing on the EC basic right to free trade.

The main question to be answered is how this legislation will be implemented and to what extent it will be retrospective. If this is the case then we can expect litigation and expensive court cases. At present UK law is not inherently retrospective and therefore there could be difficulties in applying this proposed directive in its current format.

The experience of the US Superfund,<sup>14</sup> established to help clean up hazardous waste sites, has seen large sums of money being spent on legal costs as well as on remedial operations.

The draft directive requires environmental insurance cover, which at present is not easy to obtain in the UK. The following highlighted points are causing major concern to insurance companies:

- insurers will have to consider the environmental performance of companies and sites seeking insurance;
- where insurance is obtained premiums will be relatively high and cover restricted;
- waste disposal contractors will require insurance to satisfy clients that they can cover compensation claims for damages awarded against a producer who was not at fault;
- insurance is difficult to obtain at present as the market is not willing to follow the path to massive pollution claims as experienced in the USA.

A recent US legal decision that insurance companies are liable for cleaning up of hazardous waste and for reimbursement under the policy 'as damages' could cost the US industry up to \$5 billion a year.

The concerns of the insurance industry are introducing environmental audits to waste producers and disposal contractors so that environmental risks can be assessed and managed.

**Toxic Waste Directive.**<sup>15</sup> This requires toxic and dangerous wastes to be disposed of without harming human health or causing damage to the environment and to ensure that the waste is stored, treated and disposed of by authorised contractors. This directive also covers disposal plans, permits, records, transport, inspection,

separation and packaging.

**Transfrontier Waste Shipment.**<sup>16</sup> This directive on the supervision and control within the EC of transfrontier shipment of hazardous waste and has been amended a number of times. The directive sets up a system based on notification and acknowledgement for transfrontier shipment of hazardous waste including packaging, labelling and emergency instructions.

## Future legislation

The EC has adopted international law to set the objectives for certain directives within the community. A recent international convention developed the Montreal Protocol, this used the words 'adopt the precautionary approach' to protect the environment, whereas, previous protocols specify the 'preventative' approach. This subtle change in wording may have far-reaching consequences.

It is clear that environmental legislation is going to have significant impacts upon industry in general and specifically upon the energy industries. To ensure that these latter industries can achieve sustainable growth and development it is imperative that a positive, proactive approach be adopted to the environment. □

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HOW FAR is Government committed to promoting greater energy efficiency?

A target to contain CO<sub>2</sub> at 1990 levels by the year 2005 was confirmed in the Environment White Paper *Our Common Inheritance*. Fuel switching to cleaner energy will assist, as will the development of renewables, but hardly enough within the agreed timescale. The major contribution must come from reducing waste in the production, conversion and use of energy. No other options offer greater potential, at less cost and over a shorter period.

However, on present indications we need to question if there is the political will to implement our target?

Some countries have not only set themselves bigger 'insurance policies' to reduce global gas emissions, but are paying the necessary premiums. We appear to have signed up but not so far followed up with a strategy that will deliver.

The Netherlands, Denmark, Sweden and Germany are setting examples that should embarrass us. Not only are the targets tougher, some even stronger than the Toronto protocol to reduce emissions by 20 % from 1988 levels by 2005, but policies are actually being applied which seem likely to achieve these much more demanding commitments.

Government cannot claim there is a shortage of good political initiatives, already proved to work abroad in most cases at a 'no regrets' cost. Nor has there been a shortage of informed advice from those who have the professional expertise to assess best energy efficiency policies elsewhere and recommend how we could apply them here; nor are we short of good working examples on our own doorstep of what can be achieved. A visit to the energy efficient housing in Milton Keynes or one of the interesting number of successful combined heat and power (CHP) installations in

# Energy efficiency: does Britain have the political will?

by Peter Rost MP

**Increasing energy efficiency is being perceived as being of vital importance: as a 'fifth fuel'; to help conserve remaining fossil fuel resources; and to reduce greenhouse gas emissions. In this article Peter Rost MP examines the nature of the present government's commitment to energy efficiency.**

industry, hotels, hospitals and leisure centres, for instance, should convince that we know what can and needs to be done.

## Directives

Much good sense has come from the EC Energy Commission, such as the 'SAVE' programme. Unfortunately, it seems we only respond to proposals, such as energy labelling of domestic appliances or energy audits for buildings, when they are forced on us years later as directives.

Three recent important, well-researched Parliamentary reports showed the way forward. The Energy Select Committee's work on *Energy Policy Implications of the Greenhouse Effect* was published in July 1989. It concluded

that much energy efficient investment incurs no net cost. Neglecting what can yield a genuine economic return places us at an unnecessary competitive disadvantage. The report offered a mass of constructive recommendations; a range of measures.

Considering the risks of global warming, the Committee concluded that it would be irresponsible to neglect measures to improve energy efficiency, as a least cost insurance policy. Market imperfections should be removed by a mixture of regulation, penalties and incentives to promote energy efficiency. Most of the Committee's recommendations are still in Governmental 'pending' trays.

Earlier this year, the Select Committee published another report on energy efficiency

## The author



Peter Rost MP, Conservative Member for Erewash in Derbyshire, entered parliament in 1970, and has spent the last 20 years specialising in energy politics. He has been a member of the Energy Select Committee since its formation in 1979 and before, was on the energy subcommittee of the Select Committee for Science and Technology.

He is a long-standing campaigner for energy efficiency, CHP, environmentally cleaner energy and renewable energy.

Chairman of the Bow Group Energy Committee Mr Rost has published papers on energy policy for them. He is Deputy Chairman of the

Parliamentary Alternative Energy Group, Deputy Chairman of the Parliamentary Group for Energy Studies and is an active member of the Conservative Energy Committee. He has participated in study groups set up by successive Conservative Energy Ministers, to advise and formulate energy policy.

In more recent years Mr Rost has taken on commercial interests as an energy consultant, for energy management and energy from waste companies. He is honorary Vice President of the Combined Heat and Power Association; a regular contributor to the national energy debate as a broadcaster; a speaker at energy conferences and author of many papers on energy strategy. He is also an advisor to the Major Energy Users' Council.





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with a further range of proposals, acknowledging some progress over recent years, but reminding Government that there is no room for complacency. The report recommends that a comprehensive, integrated and targeted programme is needed to promote energy efficiency, based on thorough analysis of the barriers and combining information, taxes, subsidies, incentives and regulation to achieve the greatest effect at least cost.

The Government's response is disappointingly negative, rejecting further regulation, targets and energy pricing to provide stronger market signals.

Meanwhile, last June the House of Lords Select Committee on the European Communities published an important report on Energy and the Environment, supporting initiatives from the EC and contrasting progress in other countries with our own lack of an overall strategy.

The messages are clear enough. Progress elsewhere is more impressive, with stronger commitment. The potential is enormous in

many sectors of energy use. We only have to study the contribution that could come from an extension of CHP reducing energy consumption and emissions from higher thermal efficiencies achieved, as the heat from power generation is used instead of wasted.

Much could be done by improving market signals and tackling existing disincentives. Why is VAT charged on insulating materials, instead of the fuel used for heating? Why have the tariff structures of the privatised regional electricity companies been regulated to penalise them, rather than reward them for selling less if they promote efficiency amongst their customers? Why are we still waiting for an agreed national yardstick for auditing the energy efficiency of buildings? Why is it taking so long to apply a consumer friendly system of energy labelling for domestic electrical appliances? The public sector could be making much more use of energy management and investment capital from the private sector contract energy management business.

Our failure, so far, to introduce anything like

a comprehensive programme, must raise doubts about our genuine commitment to achieve even the modest target of stabilising greenhouse gas emissions. Yet if it is clear from the evidence that a political commitment is lacking, the blame should not be directed at the Department of Energy. Ministerial intentions there are convincing enough. The problem is, the Department does not appear to have enough clout within the government machine. Policies to improve energy efficiency embrace all departments and particularly the Treasury, whose priorities place this area too low down the list. Jealously guarding their own territories, government departments have never shown much eagerness to surrender any sovereignty to an overriding priority which requires a co-ordinated strategy between the cubbyhole empires.

Yet without such co-operation at a higher priority and at a more senior level of Government, it is difficult to see how a strategy with policy decisions to address what needs to be done can be implemented. □

## THE INSTITUTE OF ENERGY

### Presidential officers and honorary officers 1992/93

The undermentioned have been elected by Council to take office following the annual general meeting on 15 May 1992.

**M C ROBERTS** to be President; **J S HARRISON** to be President-elect; **D JEFFERIES** to be Vice-president; **H F FERGUSON** to be Honorary Secretary; **M P PITWOOD** to be Honorary Treasurer.

### Election of Council 1992

Following the AGM, the undermentioned will retire:

**DR A B HEDLEY, DR G A JONES, H B LOCKE, DR A M WARRIS**

The undermentioned has resigned from Council:

**DR S D FAWKES**

The undermentioned co-opted member will retire but is eligible for election:

**A J MINCHENER**

The undermentioned has been nominated by Council:

**A J MINCHENER**

Any 10 Corporate Members may nominate in writing any duly qualified person to serve on Council.

There is also one vacancy for Associate Member. Any three Corporate or Associate Members may nominate in writing an Incorporated Engineer to fill the vacancy. A vote for Associate Members would be by Associate Members only.

All nominations, together with the written consent of the nominee to serve, should reach the Secretary of the Institute not later than eight weeks before the AGM, but preferably earlier. (Members are not, however, permitted to join in the nomination of more than three persons in any one year.)





IN 1979, leaders in business, trade unions and academic life on both sides of the divide in Ireland, came together to research and develop methods of increasing communication and co-operation between all communities. These leaders established Cooperation North as a registered charity to act as a vehicle for the progress towards a closer liaison in all walks of life. The organisation set up is strictly non-political and non-denominational.

The main objectives have been and are to change attitudes, create networks, improve communications and to act as a catalyst to promoting a dialogue between all the people of Ireland.

A major part of Cooperation North's work has focused upon youth, education and community programmes. Funding for projects approved by a Board of Executives drawn from all walks of industrial and commercial life in Ireland, comes from a number of sources. Much depends upon the particular project undertaken. Overall, the income for 1990 drew 11% from the EEC with the Irish and the UK governments jointly providing 13%. By far, the main source of income came from fund raising events and donations, some 63% of the total of nearly 1.6 million Irish pounds.

# Cooperation North

by F John L Bindon CEng FInstNucE MInstE MIEE

**'Cooperation North' is a registered charity which tries to bridge the divide between the North and South of Ireland through the mediums of business and education. The Institute of Energy's Northern Ireland branch's contribution has been 'Project Energy', involving school children from North and South of the border, and encouraging the increased study of energy and its related topics.**

This article describes one particular event of interest to readers of *Energy World*. It featured the Northern Ireland branch of the Institute. The programme was called 'Project Energy'. In essence, the event was a trial attempt to involve school pupils from the North and South of the country to combine in researching, preparing and submitting a project on one of the following themes: energy in the school; energy in the home; energy conservation in the community; energy in the arts and sport.

By taking the schools in the catchment areas of Cork and Belfast, the organisers saw 'Project Energy' as an important tool in relation to the National Curriculum. It was foreseen also as a method of promoting tolerance and understanding between the people of Cork and Belfast. In addition, the NI branch of the Institute hope that a successful outcome would further a better understanding of energy and encourage a greater study of energy related topics.

Five categories of submission were agreed. These were as follows:

Belfast	Cork
1 Primary 7	6th class (primary)
2 1st form (sec)	1st class (sec)
3 2nd form (sec)	2nd class (sec)
4 3rd form (sec)	3rd class (sec)
5 Special school	Special school

The organisers allowed the project work to be submitted in one or more of the following media. Pictorial/photographic, written/audio/video or three dimensional models.

Certain guidelines were established for judging the entries. Consideration was given to the depth of research; quality; evidence of team work (very important); and learning potential through discovery and evaluation.

The whole event was divided into three main stages. Stage One was the preparation and submission. Stage Two, members of the various categories were introduced to one another in order to compare reports and lifestyles. Finally, in Stage Three, the five successful teams of pupils in Cork and Belfast would with their families visit North Wales. Here, the idea was to visit energy establishments such as power stations, in order to see at first hand the direct relevance to them of their work and the theme of the project.

Cooperation North secured funding from four main sources in order to initiate the cross-border school exchange programme. These were the Energy Efficiency Service (£6500), Bord Gais (£5000), Dept of Energy, R.O.I. (£3000), Eolas (Government Consultancy) (£1000).



The Holland family from Northern Ireland enjoying their prize for winning 'Project Energy'.





A steering committee was set up to organise the whole project which was launched in September 1990. Many promotional activities implemented the plan with a great deal of media coverage on TV and radio. The sponsoring bodies also provided adequate resource materials and literature.

In Stage One, some hundred projects were completed and submitted from the schools of Cork and Belfast. The curricular areas saw initially entries mainly from pupils studying Geography and Science. In order to provide a greater cross-curricular appeal, pupils studying Mathematics and Home Economics were included.

The 1990/91 Pilot scheme provided the judges with a good deal of surprise when examining the entries. The quality of research undertaken was of a high level. Because of its relevance to the National Curriculum, the Department of Education from the North and the South were invited to join in with a number of aspects of the whole programme. This served to encourage educationalists to regard energy as having a valuable and important place in the school's formal educational

programmes. Undoubtedly, 'Project Energy' was seen, following the initial responses, to be an innovative, imaginative and a creative event.

The organisers took great pains to ensure a proper marketing plan and this paid handsomely in the successful outcome of the whole project.

The steering committee for the project were fortunate in securing the services of an excellent project manager, Mr Ian White. His drive and enthusiasm for the project from its conception to conclusion guaranteed success. Of course, his efforts were supported by many others and it would be invidious to mention other names. However it is important to record that the Institute should be most proud of the hard work and enthusiasm given to this project by Mr William (Bill) Swindells, then Chairman of the NI Branch of the Institute. Both Ian White and Bill Swindells were deeply involved throughout the whole project.

By February 1991, winners in all categories from the North and South were notified and plans made for the prize winners to visit North Wales in September 1991.

The lucky winners with their parents, totalling about 45, were treated to a week-long visit to power stations in North Wales. Arriving by ferry from Dublin, the voyage sponsored by B&I Ferries, the visitors docked at Holyhead on 17 September. The first full day saw them visiting the giant Dinorwig Pump Storage Power Station. As a contrast, on the second day, the visitors went to the Wylfa Nuclear Power Station on Anglesey, to have explained to them the technology of nuclear power for electricity production purposes.

Another power station visited later in the week was the Ffestiniog Pump Storage Station situated near Blaenau Ffestiniog. This is a similar but smaller station to Dinorwig, nevertheless, the principles of generation are the same. Dinorwig has six machines capable of generating 1800 MW within ten seconds, while Ffestiniog has a 360 MW capacity. Both stations provide the National Grid system with stability, particularly at times of sudden peak demand.

At Ffestiniog, the visitors were taken by coach to the top reservoir over 503 metres above sea level. The station was currently shut



Project Energy winners from Ireland at Ffestiniog with National Grid Chairman, David Jefferies (centre, back).





Kelly Boyd (right) and Celia Ferris (left), two of the winners of the Institute of Energy's Project Energy.

down for the maintenance of its pipelines and turbines and so the visitors witnessed a sight seldom seen, a drained reservoir. This provided an insight into the enormity of the amount of water required by the machines in order to generate or to pump the water between the upper and lower lakes.

After a weekend free to explore the scenic beauty of North Wales, the visit concluded by a meeting at the Trawsfynydd Nuclear Power Station. Here were displayed the prize winners' project work and at the reception given by Nuclear Electric plc, the winners were presented with certificates of merit by Mr Jim Leach of the National Grid Company. The only unfortunate missing item in the programme of this final day was the ecology visit at the station. It was intended that Nuclear Electric's Environmental Initiatives Officer, Dr Peter Nolan would introduce the visitors to aspects of the nature trail walk within the 1500 acres owned by the station. This would have allowed the pupils to see something of the environmental care which is exercised by the company. In view of the inclement weather, an interesting talk was given instead to the visitors by Dr Nolan.

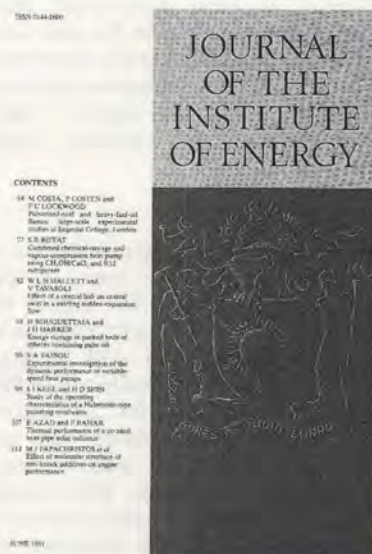
As an observer, one could not help but be encouraged by the way in which these pupils had used their imagination and their initiative to compete enthusiastically in this excellent project. Such has been the success of 'Project Energy' that it is intended to repeat the exercise. It is hoped that this article will serve to encourage similar projects to be organised in other parts of Britain. □

## Are you missing out on the Journal?

The *Journal of the Institute of Energy* is the technical journal of record for the Institute. Published quarterly, it carries refereed technical papers on a wide range of subjects and it is available to members of the Institute who register their wish to receive it. To put yourself on the mailing list, simply write to the Membership Secretary at The Institute of Energy, 18 Devonshire Street, London W1N 2AU, stating your preference to receive the Journal (please include your membership number in all correspondence).

To those outside of membership, it is available on subscription jointly with *Energy World* — price £150 (UK and overseas).

Examples of papers recently published include: *Three-dimensional modelling of the Sheffield solid-waste incinerator* (V Nasserzadeh, J Swithenbank and B Jones); *Characteristics of a fluidised-bed combustor burning low-quality lignite* (N Selcuk and Ü Kirmizigül); and *Reduction of  $N_2O$  by gas injection in CFB boilers* (B Leckner and L Gustavsson).







# Domestic hydro electricity in Yorkshire

A FEW small, isolated farms still exist in Britain. They are isolated not by lack of road access but by lack of power supply. With no option of a reasonably inexpensive connection to the mains electricity supply, they rely on road transport of diesel and other fuels to run diesel generators to provide electric light and power for appliances and tools. Anne and Bill Cowperthwaite have found the cost of purchasing and maintaining diesel generators at Tenant Gill Farm in Malham, Yorkshire, a very considerable burden to their finances.

In developing countries, the majority of rural populations live without grid electricity supply. The need for energy is as acute as in the UK, but the end-uses are different. The most important application of energy after cooking is the processing of agricultural produce. In many places, this is still done mainly by hand, sometimes by animal, and sometimes by simple water wheels.

The chance of establishing sound economic foundations for a sustainable rural community depends often on their ability to process their crops as this increased the utilised yield, covers for periods of scarcity, increased the price fetched by the produce and the bargaining power of the producer. Failing in such capacity, rural communities are vulnerable to economic decline and may start to lose their able-bodied members to the cities, accentuating their vulnerability.

A key area of development work is the improvement of rural production and agricultural processing. It is in this area that Intermediate Technology provides assistance to the local community organisations working with villagers seeking to improve their productive capacity and therefore their security.

## Water as power

For centuries, water has been critical as a source of power to process crops, in the mountainous parts of Asia. The origins of various types of water wheel can be traced back to ancient Egypt, China and Persia. Traditional water wheels markedly reduce the time and effort required for productive activities such as grain milling and oil expelling, and micro-hydro systems have further reduced the labour toll. What would take four hours to process by hand can be done in just 15 minutes, relieving thousands of women of the burden of having to get up hours before dawn in order to prepare breakfast.

While crop processing remains the primary use of hydro power, it is increasingly important

**Hydro-electric power is generated by harnessing the inherent energy in moving water and converting it to electrical energy by means of a generator. Such schemes vary from huge, capital intensive dams generating thousands of KW of power to tiny, domestic schemes which produce just enough energy to provide for the energy needs of a family. 'Micro-hydro' refers to power generation units of up to 100 KW output.**

to meet other needs, such as providing electricity for motorised tools and agricultural processing involving heating or chilling, and for domestic lighting.

This last application is considered of great value to rural communities for several reasons:

- it is often perceived as safer than kerosene lighting in kitchens and where young children are left to play;
- it is considered to lead to improved hygiene in the kitchen;
- it can assist educational activities taking place in the evening outside field labour time;
- it is considered by villagers to have high social status and modernity, so lessening the perceived backwardness of the village relative to urban life and in turn, lessening the tendency to move from village to town.

In Nepal, IT is working with a local engineering firm on the use of hydro-electricity for a further, pressing need — cooking. Deforestation is a serious problem in the country, and since 75% of the wood collected is used for cooking, the search for alternative energy sources is a high priority. Heat storage cookers save up the excess energy generated by the micro-hydro system during the day, storing enough to cook a meal in the evening. A number of heat storage cookers are currently being tested in villages in Nepal.

## Is it competitive?

Virtually all the costs of a micro-hydro scheme result from the initial capital investment. The cost of producing electricity from a micro-hydro installation is dependent on the particular site conditions (flow of water, distance from power site to village, etc) and on the type of technology used.

By using local skills and resources, the latter cost can be minimised. As a result, despite the so-called economies of scale, the investment per kilowatt for micro-hydro schemes, where local skills and materials are used, is usually below \$900. This is less than half the figure of \$1900/kW which the World Bank has calculated to be the amount required to install electricity in developing countries. The cost of micro-hydro can be reduced still further by the application of the kinds of technologies being tested at the Malham site.

For water power to be an effective benefit, it must involve machinery which is inexpensive and can be purchased and assembled by local

provincial workshops. This ensures that local people are available who understand the machinery, who can repair and maintain it, and who can supply further machines to new villages and farmers as the local demand grows. In short, the purchases and the subsequent use of the machinery must be affordable and locally sourced. Traditional wooden water wheels satisfy these criteria but are limited in source of application and cannot produce electricity.

Intermediate Technology has sought over the past eight years to use sophisticated engineering methods to satisfy these criteria while also increasing the scope of application of water power machinery. The most important components of a micro-hydro system are a channel or pipe (penstock) to supply the turbine, which harnesses the kinetic power of the water falling on it. In systems producing electricity, a generator is needed to convert the mechanical energy into electricity. Although micro-hydro installations are now commonplace in many mountainous parts of Asia, they tend to be expensive to run and maintain, because they rely on imported components. However, IT has been examining low-cost alternatives which use local resources and skills.

**Motors as generators (MAG's).** Together with Nottingham Polytechnic, a method of generating electricity has been developed which allows standard electric motors to be used as electricity generators. Whereas conventional generators for hydro are specialised machines, unavailable to villagers, electric motors are relatively easy to obtain in rural areas and expertise already exists in provincial towns with their repairs and maintenance. The job of adapting motors to become 'motor-generators' is a straightforward one within the scope of provincial workshops.

**Induction generator controller (IGC).** Intermediate Technology has worked with Nigel Smith of Nottingham Polytechnic to develop an electronic controller which ensures an even and steady supply of electricity. This makes life much easier for those operating the machinery. Excess electricity is diverted to a 'ballast' load, which can be used for heating water or powering motor generators, the IGC has been tested for seven years in Nepal, where locally made units are now being made and installed on a commercial basis.





**Pumps as turbines.** In countries like Nepal, where the micro-hydro industry is well established, turbines are already produced for the local market, and sometimes for export. Intermediate Technology has devised low-cost methods of making turbines which can run MAG's, but it is also interested in adapting pumps for use as turbines in areas where pumps are familiar machinery, but which lack the capacity for turbine manufacture.

IT has been working with Arthur Williams, currently a research student at Nottingham Polytechnic, on the selection of ordinary water pumps which can be reversed to run as turbines. Instead of pushing water upwards in a pipe, they are driven by water descending in a pipe to provide mechanical shaft power.

Water pumps are found in many rural regions of developing countries. These are normally bought complete with electric motor

connected, so that the package can easily be adapted to make a complete turbine and generator set. Such a package is up and running in North Pakistan with IT's support. In all provincial towns in the area, the distribution and repair of pumps and motors is a widespread activity. There is heavy demand for electric lighting in the rural communities in the area, so the potential for micro-power is clear.

At Tenant Gill Farm an intake tank has been built into which the stream flows. The 500m long penstock (pipe) leading from the intake tank to the generator building follow the line of the original stream bed, dropping 63m in the process. To adapt to the changes in flow rates in the stream, three pumps as turbines of varying sizes have been installed. The maximum energy output is 4 kW.

The load controller diverts excess power into

two convactor heaters in the farmhouse. The smallest generator provides enough power to light the house, run the TV, vacuum cleaner and other electrical equipment. The largest pump will also power the immersion heater and washing machine. The existing diesel generator can easily be switched in when necessary.

IT is providing Tennant Gill Farm with an environmentally safe and sustainable electricity supply, while at the same time testing the viability of a technology which could help large numbers of people in developing countries. Malham is only one of a number of demonstration and training sites that IT has set up. This and other such sites in the UK, Nepal and Sri Lanka, provide important meeting grounds for engineers, research scientists and local manufacturers to share their skills and experiences. □

# EUROPEAN ENERGY POLICY

## IMPACT OF THE SINGLE MARKET

The Institute of Energy & The Parliamentary Group For Energy Studies

A Seminar on Thursday, 26 March 1992

The Church House Conference Centre, London SW1.

### PROGRAMME

09.30 Coffee and Registration

#### Welcome Address

*Robert Evans CBE*

*President, The Institute of Energy*

#### Overview of European Energy Policy and Implications for the United Kingdom

*Andrew Holmes*

*Editor, Power in Europe,*

*Financial Times Newsletters*

**Discussion \***

#### Industry Perspective

*Sir Trevor Holdsworth*

*Chairman, National Power plc.*

**Discussion \***

#### KEYNOTE ADDRESS

#### Energy Policy for the Internal Market

*Mr Antonio Cardoso e Cunha*

*EC Energy Commissioner*

*Commission of The European Communities*

**Discussion #**

#### Closing Address

*Chairman,*

*The Parliamentary Group for Energy Studies*

12.45 **Buffet Luncheon**



\* to be chaired by Professor Brian Brinkworth, Past President, The Institute of Energy.

# to be chaired by the Chairman of the Parliamentary Group for Energy Studies.





## The growing need for information

FOLLOWING the initial activity surrounding deregulation of electricity supply to 1MW+ consumers and the intention to extend this facility to 100kW+ users by 1994, a fundamental change has come about with respect to the way in which such customers can now perceive their roles.

Electricity has become a commodity with suppliers and large-scale users who can now become involved in negotiations which could result in benefits to both parties. As the terms on which pricing is based are dependent on many factors, the whole process of dialogue largely depends on the knowledge and skills of the purchaser. Considerable savings have been achieved by several 1MW users and, as a consequence, has led to an awareness that further economies can be made by combining efficiency of use with efficiency in procurement.

Whilst most consumers have been quick to take advantage of the various pricing deals on offer and have noted lower pricing compared to previous years, few have been able to negotiate their pricing based on the intrinsic criteria specifically relevant to the electricity supply market. In order to undertake serious negotiation with the supplier, an essential data

portfolio is required to gain full advantage of, for example, pool-based tariffs and time-of-day tariffs.

The major difficulty, from a consumer's point of view, is gaining access to such information. As any purchasing manager will agree, knowing exactly what supply is needed, when, and how much, greatly influences pricing. Modern highly cost-effective portable energy analysers offer enormous flexibility in providing data on virtually every aspect of supply utilisation. This can be presented in the form of complete plant utilisation or simply a particular point within the plant requiring investigation. One such analysis system is Elcomponent's VIP System 3 — featuring a fully integrated PC-based software package. The task of establishing demand profiles, power factor profiles, monitoring voltage stability requirements, etc, by the user is now much simpler to achieve. The latest advances in microchip technology allow complex information gathering inexpensively and with speed.

Furthermore, whether the data is required for short-term analysis or long-term monitoring, it can be obtained in a format that is most suitable for the user. Portable multi-function energy monitoring equipment is now able to measure, record and store in excess of 80

electrical parameters. In addition, a high resolution LCD display, built-in printer facilities and the ability to download information onto a memory pack for plotting adds considerably to the total solution capability of such systems.

Fixed instrumentation for panel mounting applications is also available — offering similar measurement possibilities. These are particularly suitable for zone monitoring or cost centre allocation requirements. The Elcomponent VIP D and VIP 96, for example, will interface with virtually any building management system or data network via RS232 communication whilst both types are also offered with the commonly requested pulse outputs.

As described earlier, microprocessor/memory technology has recently altered the price/performance ratio of such instruments considerably — making a likely payback period for capital investment very short indeed. Potential savings can now be realised through a combination of a much improved supply deal coupled with improved efficiency in usage — both based on gathered information.

For further information contact Elcomponent at Southmill Trading Centre, Southmill Road, Bishop's Stortford, Herts CM23 3DY. □



### For further information contact:

Professor A A M Sayigh  
Dept. of Engineering, University of Reading  
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READING RG6 2AY, UK  
Telephone: (0734) 318588  
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Facsimile: (0734) 313835

## 1992 WORLD RENEWABLE ENERGY CONGRESS

Reading, United Kingdom  
13-18 September 1992



## Stimulating

### 'General Energetics'

by Vaclav Smil

John Wiley & Sons, New York, Chichester, 1991 369pp £54.40

IN HIS preface the author comments that while there have been many books written on energy studies since the early 1970s, these have focused overwhelmingly on the supply of fossil fuels, generation of electricity, and alternative ways of satisfying future demand. Few books have provided a comprehensive coverage of energetics. This sets the scene for what is described on the jacket as "... a grand overview of energy's indispensability in natural processes and in human affairs."

Starting with a quotation from Aristotle, the first chapter examines the evolution of energetics, especially from the 18th century to the present day. Planetary energetics follow, with sections on solar radiation, radiation fluxes, the air and water in motion and the Lithosphere. A chapter on photosynthesis is followed by chapters on heterotrophic conversions and human energetics. The next group of chapters discusses man's development from the hunter-gatherer through traditional agricultures to the pre-industrial period. This leads naturally to the emergence of modern industrial society based on the fossil fuels. Population growth, energy and value, energy and the economy, quality of life and futures are also discussed. The final chapter covers energy in the biosphere and energy in civilisation.

The author proposes that a gradual transition from fossil fuels to a civilization again running on instantaneous solar flows is the most obvious solution to energy-induced global environmental threats ... but the transition will be neither fast nor easy. Over 600 reference sources are cited and there is a good index.

A wide variety of reader should enjoy this work, especially those involved in the interdisciplinary teaching of energy and the environment, and the associated

social, political, legal and economic issues. There is a rich source of material for seminars scattered throughout the text. Smil draws freely on other authors for some of his more philosophical comments eg ... "Greater energy use does not create superior quality of life ... Higher energy use does not promote social stability ... Economic security comes when nations do not live beyond their means ..." (shades of Dickens, Soddy and even Margaret Thatcher here!). A stimulating read.

*Dr Cleland McVeigh*

## International comparisons

### 'Mine Productivity'

by Matthias K Hessling

IEA Coal Research, London, 1991  
103 pp £60.00 IEA Coal Research  
member countries; £180.00 non-member countries.

VERY little data is published on the detailed performance of mines in any country. For obvious reasons, most mining companies treat the data on their operational practices as commercially confidential. Even when data is published, it is usually not possible to make any exact comparisons because the basis for measuring factors such as labour productivity varies widely.

A new report from IEA Coal Research attempts to provide a consistent comparison for 25 mines (14 underground & 11 surface) in several key countries. The author has made corrections in the various labour inputs for overtime and the employment of contractors' employees. He has also attempted to establish the reasons for variations in productivity.

While the mines were kept on an anonymous basis it is easy to identify the two UK deep mines described in the text as Thoresby in Nottinghamshire and Silverwood in South Yorkshire. Thoresby is the best mine in UK and Silverwood has recently produced some very cheap coal — so the reader should wonder whether these two mines are a representative sample of the UK industry.

One important deficiency in the text was the absence of the key parameter of machine

running time. This undoubtedly accounts for a large amount of the productivity variation among the deep mines. It would be interesting to find out whether machine running time was recently as stagnant in other countries as it has been in the UK.

In conclusion, I believe that this report should prove to be of great value to anyone interested in comparing international mining activities.

*Andrew W Cox*

## Recently published

### CIBSE Applications Manual AM6: 'Contract Energy Management'

The Chartered Institution of Building Services Engineers, 1991, £31.00 (£15.50 for CIBSE members).

### 'Project Management sourcement'

The Institution of Mechanical Engineers, 1991, £25.00 (plus postage).

### 'Electrical Power Utilisation — How to Achieve System Performance'

ERA Technology Ltd, 1991, £85.00.

### 'The Economics of Large Diesel Engines for Electricity Supply'

by Dr Richard Willis  
I M Feeney, 1991, £225.00.

### 'Wind Energy Development and the Landscape'

Countryside Commission, 1991, 22pp, £3.00.

### MSI Databrief: 'Electricity Supply Industry: UK'

Marketing Strategies for Industry (UK) Ltd, 1991, 92pp, £170.00.

### Meeting the pump Users Needs'

Proceedings of the 12th International Pump Technical Conference, Elsevier, 1991, 589pp, £80.00.

### 'Who's Who in Science in Europe'

Longman, 1991, 2745pp, 4 vol set £520.00, Vol 1 available separately at £185.00.

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## Energy from waste

Sir,  
I would like to pass on my thanks through the medium of your letters column to Mr Loram for his comprehensive assessment of 'Energy from waste' in the September issue of *Energy World*.

This form of electricity generation is beginning to be recognised, if somewhat belatedly, as being a crucial part of the energy/environment equation.

As the article points out, the economics do not show any great advantage, but the true cost of the landfill option for waste disposal cannot be measured in purely financial terms. This aspect needs to be borne in mind by those responsible for the use of public funds, when energy from waste schemes are being considered.

There is one minor point on which I should like to take issue, and that concerns the economics of large plant. Installing a larger than necessary plant because it has a lower unit price per kW is a specious argument. What matters to the owner is the payback period or a positive net discounted cash flow. This will

inevitably be worse for a more expensive plant.

There might be an argument for a larger plant, if fuel were limited and a higher price for units sent out was available for only part of any 24 hrs. I did not understand this as being the point in the article, however.

**P H Spare (Fellow)**

Darenham, Cheshire

## Tunnel visit a 'tonic'

Sir,

I would like to express my appreciation to the London and Home Counties branch of the Institute of Energy for arranging a visit to the Tunnel Refineries site at Greenwich, London. There was a very high take up of places on the trip, and in spite of a few transportation challenges (the river boat broke down!), the event proved very interesting.

Visitors witnessed a highly pro-active approach to energy conservation, with massive requirements for steam and electricity being

met by a purpose-built plant, located right in the middle of the load. This excellent use of state of the art technology came about when Emstar Ltd (then a subsidiary of Shell) put up a package that included design, installation, commissioning and finance. Now the client, Tunnel Refineries, will benefit from increased reliability and reduced costs; and Emstar will benefit from demonstrating the savings which can be made. In the long term we all benefit by the careful husbandry of precious natural resources.

Let's hope others will follow this excellent example. This is the sort of tonic this country needs at present.

**J E Carter (Member)**

South Croydon, Surrey

**The editors welcome letters for publication from readers. However, correspondents are requested to keep their letters as short as possible, up to a maximum of 500 words. This will enable the views of as many readers as possible to be published.**



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**Please Phone the Information Officer, Linda Norbury,  
on 071 580 7124, who will be happy to assist you**

Searchers are charged according to the time spent online and the number of items printed, both of which vary with the database searched. There is a minimum charge of £25. A service charge is made of 20% for non-members and 10% for members of the Institute.





## Offshore trip for 'Young Engineer'

SEVENTEEN-YEAR-OLD Anthony Halford's first helicopter flight will be to an unusual destination Chevron UK's giant Ninian Central oil and gas production platform in the North Sea approximately 100 miles east of the Shetland Isles.

Anthony's visit in November is his prize as national finalist and runner-up in the annual 'Young Engineer for Britain' awards which were presented by the Prime Minister in September at the National Westminster Hall in the City of London.

The competition is organised by the Engineering Council to encourage young people to undertake engineering project work and to strengthen links between education and industry. The environment was highlighted in this year's competition. Anthony, who attends The Sweyne School in Essex, invented a device that automatically supplies food to fish in an outdoor pond at least twice a day whilst the owner is on holiday.

The Ninian Field is operated by Chevron UK Limited. It came on stream in December 1990, and production currently averages 100 000 barrels of oil per day. When it was towed to its location by five ocean-going tugs, the 620 000 tonne Ninian Central platform was the largest man-made object ever to have been moved.



Photo by courtesy of Chevron UK Ltd

From left to right, Christopher Halford, and his son 'Young Engineer' Anthony Halford, with offshore installation manager John Nielsen, on Ninian Central Platform.

## Leaflet Campaign

THE Engineering Council is targeting a leaflet campaign at the 235,000 engineers and technicians on its register in the United Kingdom to encourage them and their employers to take part in continuing professional development (CPD).

The campaign promotes a brochure, *Continuing Professional Development — the practical guide to good practice*, produced by the Council,

to help chartered engineers, incorporated engineers and engineering technicians and their employers to reap the benefits of CPD.

The Council's national system for CPD calls on engineers and technicians, in partnership with their employers, to carry out a planned programme of CPD. It will enable individuals to update and develop their knowledge and skills and help industrial companies to improve their performance.

The Engineering Council is promoting CPD because it believes it contributes to business performance, individual career advancement, the image of the profession and international competitiveness. CPD's aims for engineers and technicians include: updating their technical competence; gaining awareness of commercial subjects; and developing communication and management skills.

Support for the national system has included £450,000 funding from the Department of Education and Science Professional Industrial and Commercial Updating (PICKUP) initiative.

For a free copy of *Continuing Professional Development — the practical guide to good practice*, write to The Engineering Council, 10 Maltravers Street, London WC2R 3ER enclosing an A4 34p sae.

## Boost to WISE campaign

OPPORTUNITY 2000 is a campaign in which a significant number of employers have joined together to commit themselves to goals and action plans to increase the employment opportunities for women at all levels within their organisations by the year 2000.

The goals set by the companies encompass a range of practical steps depending on the particular circumstances and needs of each business. They include: encouraging women returners; increasing the representation of women in key areas; building equal opportunity objectives into management appraisal processes; board-level, senior and line management training programmes; attitude surveys among staff; and regular reporting of progress in annual reports.

Companies are encouraged to look wider than the immediate workforce. Some have set goals to influence the wider community, for example by establishing links with schools to promote careers in traditionally male sectors.

For seven years, The Engineering Council has been working at ensuring that women are able to be an integral part of the profession. The Council's Women Into Science and Engineering (WISE) campaign was launched in 1984 jointly with the Equal Opportunities Commission to change the attitudes of young people, parents, teachers and the general public to the value of engineering and its suitability as a career open equally to both men and women.

"No one was naive enough to expect the culture change to take place overnight", said Mr Denis Filer, FEng, Director General of The Engineering Council. "however, seven years later, some encouraging progress has been made with the number of young women

studying engineering in higher education having risen from seven per cent in 1984 to 15 per cent now."

He said that every year since 1989 there had been female students on all university and polytechnic engineering courses.

The activities initiated and developed by The Engineering Council are now far-reaching, covering the following groups: girls and women themselves; staff in primary, secondary, further and higher education; and employers.

Five Wisemobiles — teaching and exhibition vehicles — tour schools and provide practical experience of technological equipment to help girls develop greater confidence and in the Young Engineers for Britain annual competition the Council presents a WISE award for the best project entered by a girl or team of girls. Three guidance booklets entitled "Engineering and Equals" set out the key factors to encourage women into science and engineering, provide examples of good practice and give a checklist for action.

## No shortage of talent

*The following is taken from a speech by the Prime Minister, the Rt Hon John Major MP, when he presented the awards at the Young Engineers for Britain competition, organised by the Engineering Council and held in September at the National Westminster Hall, in the City of London.*

IN YEARS gone past, over generations, I feel we have been less good than some of our main competitors at getting enough of the best young people into engineering. And the reason for that is one I feel deeply about myself and have touched upon on many occasions. It is that instinct embedded deep in our culture that previously tended to disdain industry and give more kudos to classical education than to technological education.

So we are seeking and finding new ways of meeting the demand for technical education. City technology colleges are proving their popularity, at least three applications for every single place that becomes available. And there could I think be no clearer illustration of two things. First the vast reservoir of people who understand the importance of technology education. And secondly the vast number of our young people who have an aptitude and an interest in that form of education and who wish to pursue it.

There can in a competition like this only be one winner at the end of examining all the entries. But what I have read already of the entries illustrates very clearly to me that there is a dazzling array of skill and talent that the young people have brought here today to this particular competition and I offer them the warmest congratulations for everything they have achieved in getting here today.

The word "engineering" comes from the same word meaning "ingenious" or "creative". That applies to everyone who is here in this final. That ingenuity, that creativeness is what we will build on in the years to come if we are to deliver and build the prosperity that I would like to see us achieve in this country.





## January 1992

### **IChemE Research Event**

Symposium and recruitment fair, 9-10 January, UMIST.  
Details from Richard Marshall, IChemE, 165-171 Railway Terrace, Rugby, Warwicks CV21 3HQ. Tel: 0788 578214, ext 255

### **Electricity purchasing strategies towards 1994**

Conference, 15-16 January, London.  
Details from Profex, Buckingham House, The Broadway, Stanmore, Middlesex HA7 4DP. Tel: 081 954 9546; fax: 081 9545772/081 420 7365.

### **Is the regulatory and fiscal regime's influence on gas prices harmful to the environment?**

Talk, 21 January, Royal Institution, London.  
Details from Lewis Tozer, 9 Rose Dale, Orpington, BR6 8LD. Tel: 0689 856500; fax: 0689 852806.

### **Gas transmission systems planning and design**

Short course, 27 January-7 February, Salford, UK.  
Details from The University of Salford, Centre for Natural Gas Engineering, Brindley Building, Salford M5 4WT. Tel: 061 745 5213; fax: 061 745 5454.

### **Industrial gas utilisation**

Short course, 27 January-7 February, Salford, UK.  
Details from The University of Salford, Centre for Natural Gas Engineering, Brindley Building, Salford M5 4WT. Tel: 061 745 5213; fax: 061 745 5454.

### **Energy in the 21st Century**

Conference, 28-29 January, London.  
Details from Amanda Wright, IBC Technical Services Ltd, Gilmoora House, 57-61 Mortimer Street, London W1N 7TD. Tel: 071 637 4383; fax: 071 631 3214.

### **5th External Wall Insulation Association seminar**

Seminar and exhibition, 30 January, London.  
Details from the External Wall Insulation Association, PO Box 12, Haslemere, Surrey GU27 3AH. Tel: 0428 654011; fax: 0428 651401.

## February 1992

### **Flow measurement**

One-day course, 10 February, Leeds, UK.  
Details from Mrs Dianne Taylor, Dept of Fuel and Energy, University of Leeds, LS2 9JT. Tel: 0532 332511; fax: 0532 440572.

### **Natural gas supply planning engineering and economics**

Short course, 10-21 February, Salford, UK.  
Details from The University of Salford, Centre for Natural Gas Engineering, Brindley Building, Salford M5 4WT. Tel: 061 745 5213; fax: 061745 5454.

### **Temperature measurement**

One-day course, 11 February, Leeds, UK.  
Details from Dianne Taylor, Dept of Fuel and Energy, University of Leeds, LS2 9JT. Tel: 0532 332511; fax: 0532 440572.

### **Managing Energy with a PC**

Workshop, 11 February, London.  
Details from Seminars Secretary, Mid Career College, PO Box 14, Cambridge CB1 5EN. Tel: 0223 88016; fax: 0223 881604.

### **Advanced Energy Waste Detection with a PC**

Workshop, 12 February, London.  
Details from Seminars Secretary, Mid Career College, PO Box 14, Cambridge CB1 5EN. Tel: 0223 88016; fax: 0223 881604.

### **Improved technologies for the rational use of energy in the iron and steel industry**

Seminar, 11-13 February, Birmingham, UK.  
Details from Mr Simon Burgess, ETSU, B149 Harwell Laboratory, Oxfordshire, OX11 0RA. Tel: 0235 821000; fax: 0235 433131.

### **Expert Systems in the Energy and Environment Protection Industries**

Talk, 18 February, London.  
Details from Lewis Tozer, 9 Rose Dale, Orpington, BR6 8LD. Tel: 0689 8523806.

### **Control of emissions from coal combustion**

Seminar from Mr Simon

Burgess, ETSU, B149 Harwell Laboratory, Oxfordshire OX11 0RA. Tel: 0235 433131; fax: 0235 433131.

### **Plasma Technologies: Environmental and Manufacturing Opportunities**

Conference, 19 February, London.  
Details from The Institute of Physics, Meetings and Conferences Dept, 47 Belgrave Square, London SW1X 8QX. Tel: 071 235 6111; fax: 071 259 6002.

## March 1992

### **Expert systems in the energy and environmental protection industries**

Talk, 12 March, London.  
Details from Lewis Tozer, 9 Rose Dale, Orpington, BR6 8LD. Tel: 0689 856500; fax: 0689 852806.

### **Safety of electrical equipment in potentially explosive atmosphere**

Three-day training course, 17-19 March, Chislehurst, Kent, UK.  
Details from Sira Communications Ltd, South Hill, Chislehurst, Kent, BR7 5EH. Tel: 081 467 236 ext 373; fax: 081 467 7258.

### **3rd International Conference on Desulphurisation**

Details from IChemE Conference Section (Des III), 165-171 Railway Terrace, Rugby, Warwickshire, CV21 3HQ. Tel: 0788 578214; fax: 0788 577182.

### **Electrical Power Utilisation — from concept to commissioning**

Conference & exhibition, 25-26 March, London.  
Details from Angela Barkes, Conference Organiser, ERA Technology Ltd, Cleeve Road, Leatherhead, Surrey KT22 7SA. Tel: 0372 374 151, ext 2313/2288.

### **European Civil Engineering after 1992**

Conference, 26-27 March, Luxembourg.  
Details from The Conference Office, Institution of Civil Engineers, 1 Great George Street, London SW1P 3AA.

### **Alternative technologies and energy conservation**

National Lecture, 30 March, London.  
Details from Continuing Professional Development Dept, IEEIE, Savoy Hill House, Savoy Hill, London WC2R OBS. Tel: 071 836 3357; fax: 071 497 9006.

### **4th Conference on Petroleum Geology of NW Europe**

30 March-1 April, London.  
Details from Conference Associates & Services/PGE, Congress House, 55 New Cavendish Street, London W1M 7RE. Tel: 071 486 0531; fax: 071 935 7559.

### **CHP Powering the Future**

Conference & exhibition, 30-31 March, Stratford Upon Avon, UK.  
Details from Chris Hancock, CHPA Conference Organiser, RGO Exhibitions and Publications Ltd, Oakapple Cottage, Furnace Lane, Broad Oak Brede, Nr Rye, E Sussex, TN31 6ES. Tel/fax: 0424 882702.

### **The Crystal Ball Conference**

31 March-2 April, Auckland, New Zealand  
Details from The Conference Company, PO Box 90 040, Auckland, New Zealand. Tel: (0064 9) 36 1240; fax: (0064 9) 360 1242.

## April 1992

### **The Rational Use of Energy and the Environmental Benefits**

Conference, 1-3 April, Strasbourg, France.  
Details from Frau A Bohnen, Graf-Recke-Str 84, Postfach 101139, D-4000 Dusseldorf. Tel: +49 211 6214 583. Early registration to Conference Office, Watt Committee on Energy, Savoy Hill House, Savoy Hill, London WC2R OBU. Tel: 071 379 6875; fax: 071 497 9315.

### **IoE South Coast branch Golf Tournament**

2 April, Portsmouth.  
Details from Dr Mike Purvis, tel: 0705 842329.

### **Sustainable City**

Forum, 2-5 April, Brighton, UK.  
Details from The conference Co-ordinator, Lewis Cohen Urban Studies Centre, Brighton Polytechnic, 68 Grand Parade, Brighton BN2 2JY. Tel: 0273 679179.



# INSTITUTE OF ENERGY CONFERENCES



The following programme is currently being organised by The Institute of Energy.  
**For further details please contact Judith Higgins, The Institute of Energy.**  
**Tel: 071-580 0008, Fax: 071-580 4420.**

## 1992

26 March                    **Institute of Energy and Parliamentary Group for Energy Studies  
Joint Seminar  
EUROPEAN ENERGY POLICY — Impact of the Single Market**

14 May                    **Institute of Energy Annual Conference  
ENERGY IN THE SINGLE MARKET**

14 May  
(evening)                    **Institute of Energy Annual Dinner Dance**

## *Proposed Programme (titles to be confirmed)*

1992                    **Energy, Transport and The Environment  
The Electricity Supply Industry  
The Future of Coal**

1993                    **2nd International Conference on  
Ceramics in Energy Applications**

## **Conferences co-sponsored by The Institute of Energy**

### 1992

26/27 March                    **Green Buildings: Design, Construction & Servicing**  
**Contact:** Diana Bell, Construction Industry Conference Centre  
**Tel:** 0602-436439   **Fax:** 0602-436440

20 May                    **Coal, New Standards, New Challenges**  
**Venue:** Cavendish Centre, London W1  
**Contact:** David Suthers, CEA   **Tel:** 0685-879119

14-17 June                    **ECO WORLD '92**  
**Contact:** ASME  
**Tel:** (212) 705 7148   **Fax:** 705 7143

14-16 September                    **Electrical & Control Aspects of the Sizewell B PWR**  
**Contact:** Sheila Griffiths, IEE  
**Tel:** 071-240 1871

### 1992

22-23 March                    **Third International Conference on Desulphurisation**  
**Contact:** IChem E **Tel:** 0788 578214 **Fax:** 0788 577182



YOUR INVITATION TO

# EUROPEAN ENERGY POLICY IMPACT OF THE SINGLE MARKET

Organised by  
**The Institute of Energy**  
in association with  
**The Parliamentary Group for Energy Studies**

**26 MARCH 1992**

**Venue**

**The Church House Conference Centre,  
Dean's Yard, Westminster, London SW1.**

The seminar is designed to highlight current and intended EC Energy Policy, its likely impact, and early experiences. It will bring together legislators and energy professionals to consider the following questions:

- The policy, in respect of all fuels and their channels of distribution
- Implications for the UK and its current geographical isolation from mainland networks
- Fears and early reactions, from both suppliers and users
- Development of the single market and milestones for achievement
- Outstanding areas where agreement has yet to be reached, and potential to influence further change
- The future scene considering supply/demand constraints and aspirations and the need to meet environmental objectives
- Energy taxation, intermediate goals.



Andrew Holmes



Sir Trevor Holdsworth



Antonio Cardoso E Cunha

**PROGRAMME**

- 09.30** Coffee & Registration
- 10.00** **Overview of European Energy Policy & Implications for the United Kingdom**  
Andrew Holmes  
Editor, *Power in Europe*,  
Financial Times Newsletters
- 10.35** **Discussion\***
- 10.50** **Industry Perspective**  
Sir Trevor Holdsworth  
Chairman, National Power plc
- 11.20** **Discussion\***
- 11.45** **KEYNOTE ADDRESS**  
**Energy Policy for the Internal Market**  
★ Antonio Cardoso e Cunha  
Energy Commissioner,  
Commission of the European Communities
- 12.15** **Discussion#**
- 12.30** **Closing Address**  
Alex Eadie BEM JP MP, Chairman,  
The Parliamentary Group for Energy Studies

**Discussion Chaired by:**

- \* Professor Brian Brinkworth, Past President of The Institute of Energy and  
# Alex Eadie BEM JP MP, Chairman of The Parliamentary Group for Energy Studies.



**BOOKING FORM: European Energy Policy - Impact of The Single Market**

Title.....Initials.....Surname.....  
Company/Affiliation.....  
Address.....  
.....Postcode.....

Telephone.....Fax.....Contact.....

**FEES**

*Please note that all fees include the cost of the buffet luncheon.*

☐ **MPs and Peers are welcome to attend the seminar and buffet luncheon FREE of charge.**

☐ **MEMBERS:**

of PGES or Institute of Energy £70.50 (inc. VAT)

☐ **NON-MEMBERS:**

of the organising societies £94 (inc. VAT)

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*Please complete the booking form and return it with your remittance to:*

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