THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy world

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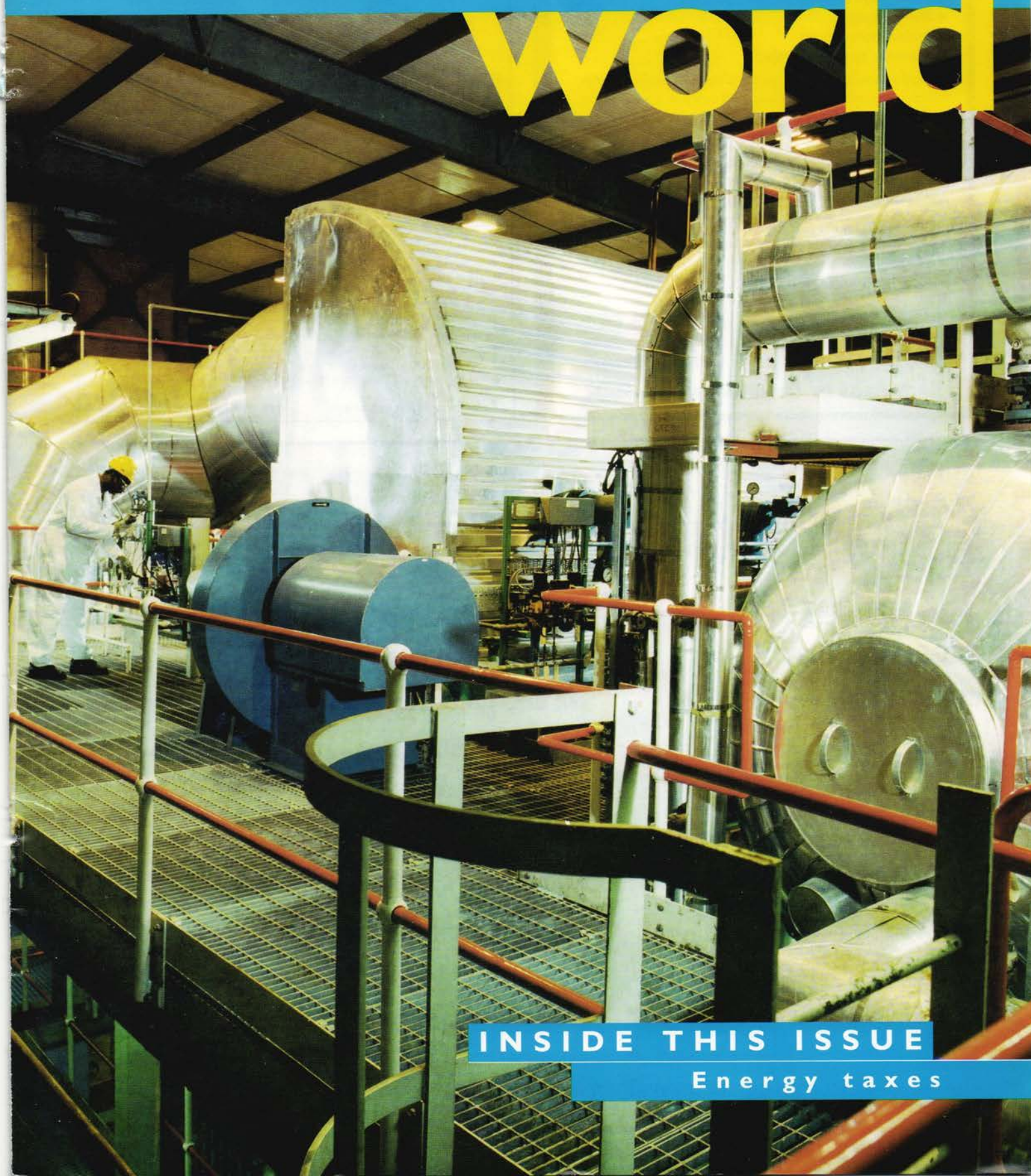

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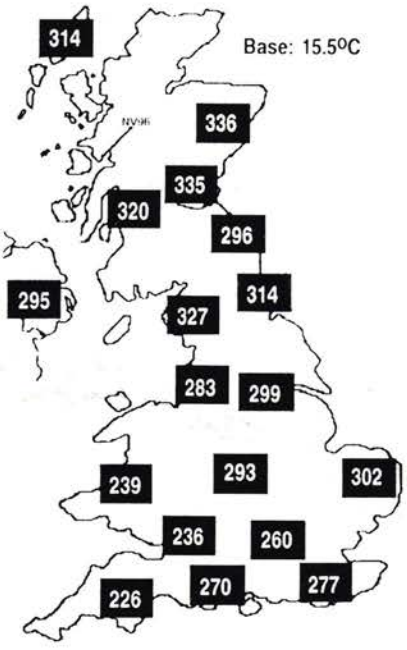
Energy taxes

DEGREE DAYS: NOVEMBER 1996

Source: **Degree days direct**



These regional figures, calculated from daily outside air temperatures, provide an index of demand for space heating over the month and thus enable excessive consumption to be detected.

A well-controlled heating system should manifest a straight line relationship between monthly fuel used and the local degree-day value; any significant deviation from this 'target characteristic' is likely to signal the onset of avoidable waste (such as a stopped timeswitch or an open isolating valve).

Readers can get more information on the use of degree days from Vilnis Vesma, 8-10 Church St, Newent, Glos GL18 1PP (01531 821350)

http://vesma.com/ email: ddd@vesma.com

ENERGY WORLD

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The editor welcomes contributions from members of the Institute, and from other readers.

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DECEMBER 1996 **Number 244**

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COVER

This month's cover shows a part of the new 16 MWe CHP plant opened in October at the Zeneca Fine Chemicals manufacturing site in Huddersfield. AHS Emstar Ltd designed and built the system, and now operates it under a fifteen year energy services agreement with Zeneca. The plant is saving Zeneca some £2.5 million a year in reduced energy costs as well as significantly reducing site emissions of sulphur dioxide, oxides of nitrogen and particulate matter - see full story next issue.

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Energy efficiency – for jobs, health and the environment

Energy efficiency does not capture people's imagination. It is spectacular only in its dullness. Just try extolling the virtues of cavity wall insulation and watch people's eyes glaze over! However, what is interesting about energy efficiency is what you can do with it. Investment in energy efficiency creates jobs, improves housing and health, benefits the environment and brings a wide range of social and economic benefits to low-income and vulnerable households. Why do we not achieve its full potential?

Energy efficiency should be a cornerstone of the Government's energy policy, moderating the effects of the falls in energy prices since privatisation. It should be the centrepiece of a commitment to sustainable development, providing an antidote to the environmental damage caused by global warming, itself principally caused by consumption of fossil fuels. It should be an integral part of Local Agenda 21 and anti-poverty strategies, demonstrating the practical action which can be taken by and for local communities to achieve social and environmental solutions to energy waste. However, the diverse benefits of energy efficiency which can be its greatest strength can also be a significant disadvantage. NEA, the national energy action charity, has seen the responsibility for funding a national home insulation programme for low-income people move from the Department of Health and Social Security, to Employment, to Energy and to Environment over a 12 year period.

Under current Labour Party proposals, a key source of funding could be the National Lottery. Whilst many people would prefer to see Lottery money improve the homes of the old and cold rather than build a new opera house, this would serve to maintain energy efficiency on the fringes of public expenditure. If a government believes in it, then let it rationalise the subject matter, create a policy framework which supports and nurtures it and provide a healthy level of resources.

At the heart of the current difficulties is the well-worn phrase, "the market will deliver". The market will not deliver energy efficiency. Competition in a domestic energy market in the foreseeable future will be based on price, price and price. The UK Round Table on Sustainable Development supports the benefits that competition can bring, but a key finding of its report on the liberalisation of the domestic energy market was that insufficient account was being taken of the extent to which environment and social objectives would not be achieved. "Market transformations" will not be achieved by hideously expensive advertising campaigns ("Wasting energy costs the earth" was never more aptly titled!) but by investment and tax benefits such as the reduction of VAT on insulation materials. The divide between VAT on domestic fuel at 8% and on insulation materials at 17½% was precisely what demonstrated that VAT on fuel was a fiscal, not an environmental, measure.

The Labour Party has made a number of taxation commitments linked to energy policy. The proposed windfall tax on privatised utilities has already been extensively reported and will fund training schemes for the young unemployed. Their election manifesto will promise to cut VAT on fuel to 5%, a move likely to cost £450 million a year. A Labour Government would also retain a 3% levy on electricity bills after 1998 to stimulate the market for "green" energy.

NEA certainly supports policies which will help elderly and disabled people, families with young children and other vulnerable consumers to reduce their fuel bills and which will create jobs. It is poor people who are in most need of energy efficiency improvements and lack the capital to invest in them. That is why NEA supports the Energy Conservation (Fifteen Year programme) Bill which would require the Secretary of State for the Environment to draw up and carry out a programme of measures over a 15 year period to provide a comprehensive package of home insulation and other energy efficiency measures covering all forms of insulation, draughtproofing and domestic heating controls.

However the reduction of VAT on fuel *per se* is in direct conflict with policies designed to tackle environment problems. Low energy prices are one of the greatest obstacles to sustainable development. I would suggest that further consideration is given to the following:

- maintain VAT at 8% but redirect the £450 million proceeds towards a large-scale national energy efficiency improvement programme to help the fuel poor;
- reduce VAT on insulation to 8%;
- retain the Fossil Fuel Levy, which fell last month to 3.7% and is due to be phased out by 1998, and also redirect the £400 million proceeds;
- specifically recognise and align the environment and social obligations of the energy regulators;
- introduce a social levy for all domestic energy suppliers to meet all the costs of supplying disadvantaged consumers and abolishing the additional costs and higher tariffs for those with prepayment meters;
- improve the housing stock using local authority capital receipts and specifying a priority for energy efficiency improvements.

These policies won't necessarily make energy efficiency interesting. But they will create a policy framework which communicates to all consumers that energy resources are to be valued and that people have a right to be warm.

Andrea Cook OBE MA
Director of NEA, member of the UK Round Table on Sustainable Development and the Department of Trade and Industry Renewable Energy Advisory Group and a non-executive Director of the Friends Provident Ethical Investment Trust.

New drillship will work in deep water Gulf of Mexico

Conoco's "ultra deepwater dynamically positioned drillship" will be able to work in water depths up to 3,000 m

Conoco and the drilling company Reading & Bates have announced the formation of a 50/50 venture to execute a $400 million, five-year drilling programme in deep water. To meet the challenges of drilling in very deep water, the new company has commissioned construction of a $200 million, dynamically-positioned drillship capable of drilling in water depths up to 3,000 m This vessel will carry the most stringent American Bureau of Shipping requirement for dynamically positioning systems, DPS-3. According to Conoco, no other drillship has been designed to such demanding specifications, providing for layers of safety and environmental management systems and backup systems of the highest standard.

Samsung Heavy Industries of Korea has been awarded the contract to construct the vessel.

Initially, the drilling programme centres on 60 high potential blocks recently acquired by Conoco for exploration in the Gulf of Mexico. Water depths range from 600 to 2800 m.

The 220 m long, double-hulled drillship has the additional flexibility to perform extended well test and includes crude oil storage and offloading capacity, provision for simultaneous drilling and testing and eventual conversion to a floating production storage and offloading vessel. The key to its deep water performance is the dynamic positioning facility in which a specialised combination of seabed and satellite positioning systems provide signals to computers that control six high-powered thrusters capable of positioning the ship exactly on target.

The vessel configuration and dynamic positioning thrusters also provide efficient propulsion for high transit speed, enabling the drillship to move between drilling locations world-wide, avoiding the cost of tow and support vessels.

Radioactive waste - lessons from Sweden and Finland

A report published by the Radioactive Waste Management Advisory Committee (RWMAC) suggests that there is much of value for the UK in the experience gained by Sweden and Finland in managing their radioactive wastes.

The report details a recent study tour of Sweden and Finland during which the RWMAC Chairman and Members visited a number of sites and discussed waste management practices with nuclear operators, regulators and Government advisors.

In Sweden, nuclear power accounts for about half of the electricity supply, with hydroelectric sources supplying roughly the other half. The nuclear contribution to power generation in Finland is little less than a third. The rest is produced by CHP systems using imported gas, hydro and coal plants. Some 10% of Finland's power requirement is imported from Russia and Sweden. The contribution of nuclear to the electricity grid supply in the UK is about 25%.

The radioactive problems in both Sweden and Finland are simpler in comparison to those in the UK:

- Both Finland and Sweden define spent nuclear fuel as a waste and intend to dispose of it in deep underground repositories. In the UK spent fuel is defined as a resource and most of it will be reprocessed to recover the unburnt fissile uranium and fissile isotopes of plutonium, for further use as nuclear fuel. In the UK the high level waste resulting from reprocessing is vitrified and will be stored for at least 40 years before being disposed of in a deep repository.
- Finland and Sweden each have two reactor types using similar forms of fuel, whereas the United Kingdom has three main reactor types all with different types of fuel.

There is uncertainty in both Finland and Sweden, as indeed there is in the UK, concerning the future for nuclear power.

- In Sweden the intention had been to shut down all nuclear power plants by the year 2010. This is now acknowledged to be in conflict with the adoption of a national energy policy which prevents further construction of hydroelectric installations and a commitment not to increase carbon dioxide emissions above the 1990 levels.
- In Finland, the majority of public opinion is opposed to the construction of new reactors although there are no strong pressures to phase out nuclear power.
- In December 1995, British Energy announced that plans to build two nuclear power stations were to be dropped on the grounds that surplus generating capacity and low electricity prices would make them uneconomic.

The RWMAC was impressed with the progress made in Finland and Sweden towards the final disposal of their radioactive wastes despite the environmental concerns and political uncertainties. A pragmatic step-by-step approach, practical organisation and open discussion have enabled both countries to take positive steps towards solving their radioactive waste disposal problems.

Power station order in Indonesia

European Gas Turbines has won an order to supply a turnkey combined heat and power plant to Asia Pulp and Paper group for their Indah Kiat pulp and paper mill in Tangering, Indonesia.

EGT's Lincoln site will supply two 4.9 MW rated Typhoon gas turbine generating sets, incorporating GEC ALSTHOM generators, waste heat recovery steam boilers, fuel gas compressors, high voltage switchgear and a supervisory control system. EGT will also supervise construction.

The plant will provide electrical power for the base load operation of the paper mill and steam for the paper manufacturing process. The plant will require little or no external power and is designed to achieve an operating efficiency in excess of 80%. The plant is scheduled to enter commercial operation by late 1996.

Shell listens at the first Brent Spar dialogue seminar

The Brent Spar platform, currently anchored in a Norwegian fjord while Shell consults on its eventual disposal

The first Brent Spar Dialogue seminar, held in London last month, drew strong attendance and an encouraging range of in-depth contributions from a wide variety of participants, according to Shell UK.

The seminar, an interactive workshop held at the QEII Conference Centre, involved 71 representatives of UK and continental European organisations in discussions and feedback to help Shell work towards its eventual recommendation to the UK Government on a Brent Spar solution. The seminar was facilitated by the Environmental Council, an independent charity which helps different interest groups work together to find common ground but takes no position itself.

Participants were selected by the Environment Council from Shell UK's contact list of organisations who have registered an interest in Brent Spar. Organisations represented included universities, voluntary, professional and industry bodies, and consumer and environmental groups.

The seminar was designed as a structured working day, enabling participants to focus on the current outline proposals for the Spar, issues and views surrounding them, and the regulatory framework for decommissioning. The format was a mixture of explanatory presentations, display material, work stations which participants could move freely around, and discussion groups facilitated by the Environment Council to encourage maximum feedback. Shell is seeking insight into many views and values.

Speaking immediately after the seminar, Eric Faulds, Decommissioning Manager, Shell UK Exploration and Production (Shell Expro), said: "We felt this was an very successful day and we are very grateful to everyone for giving their time and energy. It was an excellent chance to listen. We asked participants if we were on the right track in taking many views into account, and there was general support that we were. There was considerable support that the next immediate stage of the Spar Way Forward needs to focus on developing the technical options, and then exploring public views, values and ethics when the options are more fully developed - especially at the consultation which will be required by the UK Government."

Among the participants, Malcolm Grimston of Imperial College Centre for Environmental Technology said: We began to tease out the relationship between the best practicable environmental option criteria, and people's values. A year ago the argument was about the disposal of waste; now it is about values which people attach to these matters. I hope the argument is now going to be more upfront and honest." David Cope, UK Centre for Economic and Environmental Development, added: "It was definitely a promising day, and not a day constrained by any particular ethical perspective. As an economist I personally feel that explaining costs in decommissioning is important and must be included in the debate."

British Gas supply price control: agreement reached

Ofgas and British Gas Trading have reached agreement on final proposals for controlling prices charged to British Gas' domestic customers from April 1997 - March 2000. As a result, the average domestic gas bill will be cut by £7 in 1997/98 with further reductions thereafter.

With competition in the domestic gas supply being introduced throughout Great Britain by the end of 1998, the new control will protect customers while allowing British Gas the flexibility to introduce new tariffs to compete with rival companies.

"Today's agreement is good news for customers and good news for British Gas," said Clare Spottiswoode, Director General of Gas Supply. "While British Gas still supplies most domestic customers with their gas, the new control will offer all customers a regulated tariff which will ensure their gas bills go down by an average of 4% a year on top of the initial cut of £7. We have also given British Gas the freedom to bring in additional tariffs."

The main proposals are:

- A three year price control period.
- Continuation of the RPI-X price control on supply, meter reading and profit margins, with X set at 4.
- Full pass through to customers of gas purchase costs and transportation costs.
- Service standards to remain in place, but with an increase in the minimum compensation payment from £10 to £11.
- Ofgas will set caps on each of British Gas' existing tariffs: DirectPay, OptionPay, Standard and PrePayment. Beyond these British Gas will have the freedom to introduce new tariffs for particular customer categories.

Meanwhile, Ofgas has announced a two-stage introduction for the second phase of domestic gas competition which will enable a further 1.5 million people in south east and south west England to choose who supplies their gas.

In Dorset and the former County of Avon, competitive supplies will be available from 10 February 1997. In Kent, East and West Sussex, competition will start on 7 March 1997. The start dates have been agreed by Ofgas after consultation with gas suppliers, shippers and British Gas. More than 70,000 people in Devon, Cornwall and Somerset, where gas competition began six months ago, have already chosen to move to a new supplier.

Scouts encouraged to be friends of the environment

A new Scout award which will encourage Scout groups to become more environmentally friendly has been launched at the House of Commons. Developed by the Scout Association and the national energy efficiency charity NEA, in partnership with London Electricity and the Eaga Charitable Trust, the new Energy Efficiency Award aims to develop Scout awareness of:

- where energy comes from
- how energy is used in buildings
- how energy use affects the environment
- practical ways to make energy use more efficient.

Energy-related support material encourages each Section of the Scout—from Beaver Scouts to Venture Scouts—to take part. The activities range from an energy hunt for Beaver Scouts, using paper snakes and tissue paper draught testers to carry out a basic energy survey, to Venture Scout projects on low energy light bulbs and designing a hypothermia kit to safeguard older people against prolonged bad weather. Groups completing the award will receive individual certificates and group pennants.

HECA Action; local authorities win grants to cut energy use

Seventy local authorities have been awarded a total of £4.7 million by the Energy Saving Trust under a new programme to stimulate domestic energy efficiency schemes. Through innovative partnerships with householders and the private sector, the Trust's HECA Action Awards will stimulate a further investment of £65 million in energy efficiency across the UK.

The schemes are expected to improve comfort and cut householders' bills, as well as reduce polluting greenhouse gas emissions by 118,000 tonnes a year - equivalent to those emitted by 70,000 households annually.

One hundred and thirty-eight applications were submitted by 210 local authorities in this first year of the scheme. Of these, 34 submissions made by 70 local authorities were selected for grants totalling £4.7 million. In addition to this, the winning schemes bring private sector leverage amounting to £65 million, taking the total to just under £70 million. Moreover, all are self-financing after March 1997, so benefits to consumers should continue for several years. The initial awards range from £28,000 to just over £500,000, depending on the scope of the projects.

The winning schemes cover a wide variety of approaches to energy saving, ranging from energy advice via cable TV and the Internet, low cost loans for energy efficiency products and installations, mobile advice units for rural areas, energy advice training for primary health care and community workers, and education programmes for schools.

Robert Jones MP, Minister of State for Housing, Construction and Energy Efficiency presented the awards at a ceremony at the Banqueting House, Whitehall. Dr Eoin Lees, Chief Executive of the Energy Saving Trust said: "This competition has encouraged Local Authorities to work with the consumer to improve comfort conditions and at the same time reduce energy pollution. The aim of HECA Action is to turn good energy-saving ideas into practical solutions, and we look forward to seeing further co-operation between public and private sectors to provide all householders with long-term energy efficiency benefits."

Under the Home Energy Conservation Act 1995 (HECA), energy conservation authorities (local authorities in Great Britain and the Housing Executive in Northern Ireland) are required to draw up energy efficiency strategies for all housing in their area, both public and private sector, and to publish and submit plans to the Secretary of State for the Environment, who has set an initial energy efficiency improvement target of 30% over a 10 to 15 year period.

Designed specially to support the Home Energy Conservation Act 1995, HECA Action is a three-year, £11 million competitive award to aid local authorities in developing and implementing the energy efficiency strategies now required of them by law.

CHP moves into retail buildings

When the 100 year old Ilkeston Consumer Co-operative planned expansion of its department store complex in the centre of the Derbyshire town, CHP was chosen as the most cost effective solution to the retail centre's energy needs. The successful project is believed to be the first of its kind in a department store and illustrates how a thoughtfully engineered CHP installation can meet the heat and power requirements of a retail environment.

A Nedalo 210 kWe unit was installed along with a gas supply and pipeline to the building. The unit runs for 17 hours per day providing 3570 kWh of electricity while recovering 5672 kWh of heat energy from the engine and oil exhaust for space and hot water heating. The 100,000 square foot complex includes a department store, purpose-built travel centre and banqueting suites from the original pre-war building.

"Before the CHP installation, the store just could not be heated effectively and electricity costs were very high," explains Chris Elvidge, Deputy Chief Executive of the Ilkeston Co-op. "An estimated £48,000 per annum will now be shaved off the building's energy costs. The project itself cost around £170,000 and will be paid for through a 10 year finance lease."

Running for 17 hours a day at a 90% availability, the unit is obviously in operation for a number of hours during the evening when the store is closed down. The excess energy is not wasted. During these hours power generated by the plant is exported to the national grid and the store becomes a supplier of power.

Ilkeston Co-op's Chris Elvidge with the new CHP unit

Electricity from small power stations

A guide designed to help small power producers in the generating market of England and Wales, has been published by the Association of Electricity Producers. *Electricity Production Connected to the Local Network - a guide* will help existing power producers and those that want to enter the market by providing guidance on the commercial and technical issues that they have to contend with.

Since privatisation of the state electricity industry in 1990/91, there has been increasing interest in smaller-scale generating schemes connected to the regional distribution systems - known in the industry as 'embedded generation'. A more open market for electricity and the growth of production from renewable energy sources, such as wind, water and waste, and from local CHP schemes has stimulated this.

The Association's Chief Executive, David Porter said "We have a very open and competitive electricity market. But, it is not an easy business to be in. This guide will help small players understand how it works."

The European Commission's Draft Directive on integrated resource planning

by Joanna Tachmintzis, member of Cabinet of Christos Papoutsis, European Commission Commissioner for Energy

The European Commission's proposed Directive on the internal electricity market and electricity liberalisation across Europe (see *Energy World* 243) has crossed another hurdle since this article was written, by being approved by the European Parliament. Here, the Commission's Joanna Tachmintzis describes the Commission's plans for a directive promoting the use of rational planning techniques in the electricity and gas distribution sectors.

The internal energy market will create a completely new concept in the supply of electricity and gas - competition. You are no doubt aware of the success with the electricity liberalisation package at this year's June Council of Ministers (see *Energy World* 243). But I wonder whether any of us is fully aware of the potential and far-reaching consequences of what has been decided. The new package will usher in an era whereby electricity and gas companies will concentrate on customer retention as a cornerstone of their competitive strategy. This new concentration will present the utilities with both a challenge and a threat. The challenge will be to develop products and services which are consistent with their customer's requirements and which will retain that customer in the face of competition from other utilities. Please notice that I used the word customer and not consumer.

The threat facing the utilities is that entrenched traditional management structures will not respond to the new industry conditions and that certain utilities will bury their heads in the sand while attempting to cling to their rapidly declining monopoly mind set. As in any brave new world there will be winners and losers but it is my opinion that the winners will be those who are quickest to grasp this new customer concept.

This brings me to the central point of this article - the Commission's proposal for a directive promoting the use of rational planning techniques in the electricity and gas distribution sectors.

I would first like to examine the evolution of the proposal. During the drafting of the first SAVE programme in 1990, the Commission services examined a whole range of options for promoting energy efficiency. Among these options was the so-called least cost planning concept which presented several attractive features - principally a consideration by the utilities of least cost options including demand side management.

While we were happy with some of the features of LCP we were most unhappy about others in particular a perceived problem between the LCP concept and the emerging internal market proposals. We therefore decided that we needed to know considerable more about least cost planning before including it in any future proposal.

The first year of the Community's energy efficiency programme, SAVE, was devoted to supporting a series of sixteen integrated resource planning projects with a Community support totalling 3.5 million ECU. The purpose of these projects was to provide the utilities with hands on experience of techniques which make a direct comparison between investments in energy supply and demand side management in its largest connotation. At the same time we in the Commission would get feedback on how the concept could be applied on the ground. In the period 1992-1995, a further 20 utilities took advantage of Community support to experiment with the concepts of integrated resource planning and demand side management. SAVE contractors now include most of the large European Union utilities, although there are some notable exceptions. Our SAVE contractors meet once a year to discuss the results of their programmes and there now exists a loose sort of club where experiences can be exchanged.

Having gained an experience of how least cost planning and integrated resource planning worked in practice, we decided that the concept was sufficiently attractive to draft a directive requiring the Member States to implement the concept at national level. Before commencing with the draft we carried out an exhaustive examination to ensure that the measure would be entirely consistent with the emerging market liberalisation proposals.

The draft directive itself is quite straightforward. It requires the Member States to set up a system whereby distribution utilities in the electricity and gas sector establish at regular intervals integrated resource plans. I would like to stress this point. The measure is quite deliberately aimed at distribution utilities, the entities in the unbundled scenario who have contact with the final consumer.

The second point I would make is that there is no element of central planning or conflict with the internal market proposals. The distribution utility establishes its IRP plan on the basis of its demand requirements and on the sources of supply, including demand side management, which are available to it. Planning is thus disaggregated and the integration referred to in IRP is the integration carried out at the individual distribution company level of the demand/supply scenarios. Some critics of the draft directive would have us believe that such a proposal contravenes the internal market but I defy them to demonstrate their point with examples. It is our view that instead of contravening the internal market, the IRP Directive will complete the legislation by focusing the utilities' efforts on the ultimate satisfaction of their customers' needs and not simply by supplying them with electricity and gas.

Let us move on to the second provision of the directive. Member States are required to examine whether distribution utilities follow up on the economic demand side options developed during the IRP process. There is no insistence that utilities carry out the programmes they have identified as being economical but the Member States, and possibly the utilities' shareholders, should be aware of any sub-economic decisions which are being

taken by the utilities.

The third element of the directive is that Member States should examine their legislative and regulatory framework to ensure that there are no institutional impediments to having utilities fulfil fully their expanded role of service providers. The final element of the directive requires Member States to play their role in promoting economic energy efficiency solutions to consumers.

May I reiterate some points at this juncture: no central planning, no conflict with the internal market, a total recognition that the regulatory situation in the Community is not homogeneous thereby leaving a large degree of discretion in the hands of the Member States, aimed at improving the economic efficiency and the shareholder value of utilities and very customer friendly. In effect the proposal seems to present the complete 'win-win' scenario.

Some will say such a process is already underway. Utilities already know that in the future they will have to concentrate on the customer and develop a series of services and products which more accurately reflect what he really wants from his utility. I would be the first to agree that there are utilities who are already launching restructuring programmes which will ultimately benefit their customers, their shareholders and even society at large. But there are also companies who will cling desperately to their old monopolistic strategies. The Commission has involved itself in this matter because we must march ahead together. The electricity market liberalisation proposals adopted by the Council in June will apply to all. An a la carte implementation of IRP would ultimately distort the emerging market in energy services and would produce an unequal response to our environmental concerns.

Energy efficiency could be one of the most important policies for the future of the European Community. The days of profligate use of energy have gone forever and we have made tremendous strides in improving the ways in which we use energy but there is still much more which can be accomplished economically. The market for such services within the Community is significant and this fact alone should be sufficient to attract market entrants. But consider for a moment the potential world market for demonstrated energy solution.

The European Community has played its part in creating a dynamic within the electricity and gas industries which should produce lean entrepreneurial companies. We have through our various programmes like JOULE/THERMIE, SAVE, ALTENER and SYNERGY, given entrepreneurs the opportunity to develop, with Community financial support, the novel technologies and advance energy solutions to tap the energy efficiency potential. We have endeavoured to co-operate with European industry to develop solutions aimed at contributing to several major policy objectives of the Community.

The draft directive on IRP should be seen as a continuation of this effort. It is our open minded contribution to the debate of the future of the utility industry in Europe. The IRP draft directive alone will not achieve our energy and environmental goals but it will at least open some doors in the minds of utility executives and stimulate a discussion on the strategic direction. The combination of industry solutions to our energy and environmental challenges and the Commission's modest proposal on IRP could open the door for many entrepreneurs to penetrate new markets.

Demand side management and energy services in the US

by James B Sullivan PhD, US Agency for International Development and President, World Energy Efficiency Association

Following the previous article on IRP in Europe, James Sullivan describes recent US experience. The article presents an overview of demand side management trends in the US electricity industry. It presents levels and trends in utility expenditure for DSM programs, results of recent industry surveys and analyses. It also describes recent developments in California that may portend DSM developments elsewhere. This and the previous article are based on papers delivered to a recent conference on demand side management.

Most observers in the United States would agree that DSM is undergoing a generational shift, from a regulatory driven mechanism to solve defined social objectives, to a device to improve the competitive advantage of utilities and others providing energy services to end users.

As practised until now, DSM programs were designed as utility programs to improve end use efficiency. In the early 1980s, the California Public Utilities Commission led the way in requiring utilities to implement DSM programs. The rationale behind first generation DSM was that DSM can be used to save energy at a fraction of the cost to generate it. Utilities could therefore use DSM to reduce their total energy costs.

First generation DSM programs include a wide range of technology options, financial incentives and marketing strategies. Programs include energy audits, information campaigns, time-of-use rates, demonstration projects, advertising, information and other mechanisms designed to shift, reduce or grow demand. DSM has been considered to be "public good" or socially driven and as such has tended to be non-price based. Debate lingers on their cost-effectiveness but it is generally agreed that they have not performed as well as they were originally expected to.

Following those California beginnings, in the late 1980s State and federal rulemaking triggered explosive growth in DSM programs. Utility expenditures increased from $873 million in 1989 to $2.5 billion in 1992 to over $2.8 billion in 1993. In 1993 utilities reported to the Energy Information Administration (EIA), part of the US Department of Energy, that they expected their expenditures to increase to about $3.8 billion by 1997. That growth, however, is not taking place.

In 1994, the year for which at present we have complete and reliable data, expenditures

flattened, actually declining by 1% to reach $2.22 billion, down from $2.72 billion the year before. In December 1995, the EIA estimated that total utility costs for DSM would decrease 4.5% to $2.6 billion in 1995 and to $2.5 billion by 1999.

Moving towards competition

There is little doubt that the US electricity market is moving toward a more competitive future, but how soon the market will get there, and what effect this will have on DSM, in unclear. However, some trends are clear:

- The wholesale power market is becoming increasingly competitive. In many States, when a need for new resources is identified, the competition among utility and non-utility plants, utility demand-side management programs and DSM programs provided by energy service companies is fierce. Many utilities have instituted integrated resource planning programs which attempt to weight the costs and benefits of all available resource options - both supply and demand - and many are using competitive bidding processes to acquire new resources.
- Large electricity consumers, mainly industrial customers, are pressuring utilities to reduce their prices. Industrial customers have many options for meeting their energy needs, including self-generation, cogeneration, fuel switching, and relocation. Utilities are also taking steps to reduce costs and increase competitiveness, such as consolidating with other utilities, reducing staff, and buying out uneconomical contracts with non utility generators.
- States are taking a variety of approaches to test the competitive waters. Many, often through the use of IRP programs, are continuing efforts to open wholesale markets to all resource options. The Federal Energy Regulatory Commission (FERC) is contributing to the effort through its implementation of the 1992 Energy Policy Act, which gives FERC the authority to order owners of transmission capacity to provide services to all requesters.
- Michigan and California have taken even more aggressive steps to open both wholesale and retail electricity markets. In Michigan, regulators have decided to test open retail competition in a small experiment, allowing the customers of the State's two largest utilities, Detroit Edison and Consumers Power, to purchase power from other utilities or non utilities for up to 60 megawatts of capacity. Regulators in California have stepped away from other States by proposing to give all customers access to any electricity supplier. Their proposal contains a timetable for moving from traditional franchised cost-of-service regulation to performance-based regulation, with all consumers being able to choose their suppliers by 2002.

With these steps towards competition, the future of regulatory driven DSM remains murky. A number of issues involving retail wheeling, stranded assets and other issues have yet to be resolved. Most utilities believe that rebate type DSM programs will continue, and that they will evolve into a more price based form, although how quickly is not clear.

Second generation DSM

The expectation in the United States is that DSM become more customer driven and will be used by utilities to provide their customers with least cost energy services. New programs will not only achieve energy efficiency, but promote economic productivity and environmental quality as well.

The rationale for utility energy efficiency programs in competitive environments includes arguments that DSM can:

- provide value added service to customers willing to pay for efficiency,
- create opportunities for increasing sales by offering products and services such as electro-technologies, building services, brokerage and cogeneration,
- increase customer satisfaction, and
- build and protect a customer base.

Common expectation seems to be that industry restructuring will virtually eliminate traditional incentives for utility DSM programs, such as cost recovery and share-holder incentives. Rebate type programs would be eliminated. In the transition phase, this opinion is that overcapacity will lead to low market prices, which will discourage customer investments in energy efficiency. The combination of reduced utility interest and little customer interest in energy efficiency may stimulate government intervention.

The California example

One can get a better understanding of how DSM might evolve by looking at recent developments in California. Two of the three largest investor owned utilities are located there, the environmental movement is very active, and the California Public Utilities Commission (CPUC) and state government is particularly innovative. California's utilities have served as a model for early DSM programs and have continued to be trend setters on DSM issues.

In September this year, California's Governor signed Assembly Bill (AB) 1890 into law. The legislation legislated December 1995 proposals by the California Public Utilities Commission to restructure the electric industry and promote competition. The bill includes a number of elements that offer quite radical change:

- Larger customers will be able to competitively "shop around" and purchase electricity on the open market. Ultimately, all electric consumers in California will be able to choose their own provider of electric generation.
- January 1, 1998 is the target date for large customers to begin competition; residential customers will be able to choose their suppliers by 2002. Renewable energy is given an advantage in that any consumer purchasing power produced from renewable sources may do so after January 1, 1988.
- Utilities will have just over five years to recover those costs that the utilities entered into in the past, back when they had an obligation to provide electric service to all customers and which may not be economic in the competitive marketplace.
- The new law creates two new institutions, a Power Exchange that will act as a market place in which electric generators and suppliers will compete to meet customer's needs for electric energy, and an Independent System Operator to coordinate the scheduling and dispatch of electricity, and to ensure the reliability of the electric system.

Specifically regarding DSM, the new law mandates that local distribution service include a separate rate component (earlier called a public goods charge, PC) to fund among other things "cost-effective" energy efficiency and conservation activities. In 1998, the fund would amount to $228 million from the three utilities - San Diego Gas and Electric, Southern California Edison, and Pacific Gas and Electric Company. (In 1994, these three utilities spent $332 million on DSM programs, so the legislated figure amounts to a reduction by about one-third).

While this efficiency prescription may appear to perpetuate the traditional, regulatory type of DSM, its purpose is to move toward a more competitive position. The funds remain regulated by the Public Utilities Commission, and the CPUC has stated a competition oriented goal of achieving "market transformation." The CPUC's Energy Efficiency Working Group defined market transformation as: *publicly funded market transformation activities are designed to achieve long lasting changes in the structure or operation of the market by reducing market barriers to the adoption of cost beneficial energy efficiency measures to the point where further public intervention is no longer appropriate in that specific market segment.*

The Working Group goes on to explain that the concept of market transformation is controversial and it has been difficult to reach a consensus. This makes it more difficult to estimate the impact of this legislation on utility DSM expenditures. Also, there is consensus that some energy efficiency barriers may be intractable and hence will require continuous public intervention.

Taxing energy – the options

by Matthew Taylor, energy and environment spokesman for the Liberal Democrats

Each and every one of us has a need for energy, but of course no-one consumes energy for its own sake. What businesses and consumers need are energy services such as heat, light and power. The key question that we must ask is whether these energy services can be delivered satisfactorily through the current operation of the market. In other words, can the market as it is structured at present deliver environmental sustainability if left to its own devices?

I believe not, and this is why a reform of the tax system is so crucial, switching the burden of taxation away from employment and income and towards pollution and resource use.

In all OECD countries over the past twenty years, the tax burden on labour has greatly increased yet on the use of environmental resources it has fallen. This distribution of the tax burden has led to increased unemployment and environmental degradation.

It has made sense for businesses to invest in low-taxed, energy-consuming capital equipment - instead of labour. Businesses that need to invest heavily in people are disadvantaged by the tax system - whereas over decades government has helped energy intensive capital investment, often replacing jobs with machines.

By shifting the tax burden from things we want more of, like jobs, to things we want less of, like pollution, we will protect the environment, create new jobs and encourage new green industries - which tend to be more labour intensive. Recycling, for example, is ten times more labour intensive than landfill,

Two views on the need for energy taxes were given at a conference organised by the Parliamentary Renewable and Sustainable Energy Group in October. It is perhaps a little early to be recording the views of politicians ahead of the general election, but here, Matthew Taylor, the Liberal Democrat's energy and environment spokesman, advocates the introduction of a carbon tax. Below the Jim Potter, director of the Sheffield Insulation Group and long-standing advocate of energy efficiency technologies gives a view from the industry.

and our proposed programme of insulating low income homes in the UK could create 50,000 jobs.

However, our key policy in this area is the phased introduction of a carbon tax. We can only create a long-term incentive to save energy and switch to less polluting forms if there is a long term incentive to do so. The revenue generated will be recycled into the economy via cuts in other taxes, with an overall positive economic impact. The key point is not raising taxes, but changing taxes.

Indeed we will combine this policy with an overall cut in fuel bills for the poorest households, by helping pensioners and low income families use less energy and get a warmer home through insulation. This is the purpose of our investment in the work of the Energy Saving Trust in energy insulation.

In the past we have said that carbon tax would be adopted in the context of an EU wide proposal. However, that is increasingly unlikely to go ahead in the short term.

Providing a gradual approach is taken, we believe Britain can gain both environmentally and economically by now going ahead with a carbon tax, alone if necessary. Four other European countries have already done so, without limits either on their citizens or their industry - the Netherlands, Finland, Norway and Sweden.

Indeed, there is no evidence that higher energy prices need be detrimental even to the competitiveness of relatively high energy using industries. Japan has energy prices 49% higher than the UK, Germany's energy prices are 41% above the UK. But the result has not been to make them uncompetitive; it has been to make them use energy more efficiently.

The aim of a carbon tax is to create the expectation that energy prices will rise, so that energy conservation becomes a powerful incentive for designers, manufacturers and consumers. The tax raised would be used to cut other taxes - VAT and employers' national insurance contributions, leaving most people better off and creating extra growth in the economy and in jobs. At the same time, renewable and sustainable energy sources become relatively more attractive, since they remain untaxed.

A hypothecated levy on fuel

by Jim Potter, director of the Sheffield Insulation Group and vice chair, Association for the Conservation of Energy

There are now few people who do not accept that Government should in some way of another intervene in the energy market. Since the late 1960s Part F of the Building Regulations has been concerned with the proper use of energy in the home. Indeed I would say to you that if the Building Regulations did not require buildings to be built with a reasonable level of energy efficiency I would not be standing before you now. My company would not be the size that it is and the building market left to itself would, I have no doubt, be building buildings with energy efficiency levels well below current standards and I am afraid that people would still be buying them or renting them.

So there is nothing new in intervening in energy efficiency markets and, even before the arrival of new liberalised markets, intervention by Government in the energy efficiency market was necessary. And liberalisa-

tion is not going to help, indeed it is positively going to hinder because the price of fuel has been falling and will continue to fall for some time as a result of the market liberalisation. When prices fall the incentive to be more efficient also falls - DTI figures show that a 10% fall in price results in a 1% - 2% increase in use.

There are some who say that a true energy efficiency market will develop which will obviate the need for Government intervention in the long term. That will not happen. Why? Because no private company or private individual is going to take action which reflects the need for conservation, for social equity or the true external costs and because it has been shown time and time again that even on an efficiency basis many actions which are in the national interest are not taken within the private liberalised market.

I challenge anyone to name me more than one oil supplier, whether for domestic heating oil or for petrol, both of which have been liberalised fuel markets for the last 40 years, who has given them any energy efficiency advice let alone suggested to them that they should buy an energy efficiency product which would result in them purchasing less fuel from that supplier. It is just not going to happen.

So I believe we have a crisis on our hands. The external costs of energy cannot get much smaller, indeed they haven't got far to go now unless we cut out coal altogether. Concern about CO_2 level effects on climate change continues to grow and consumers are going to be less and less interested in doing anything because prices are falling. Society, led by Government has no option other than to intervene. The only questions are: how and to what extent.

Governments can intervene in three ways - legislation, finance and exhortation - the familiar stick, carrot and tambourine. I think all are agreed that a cocktail is the best solution and indeed there are many minor measures that could be taken, all of which would add up to a significant but inadequate effect, for example:

- more comprehensive exhortation through greater support for the growing network of local energy advice centres,
- legislation requiring an energy survey and rating to be provided with any domestic property when it changes hands,
- removing the financial anomaly whereby fuel only carries 8% VAT but the means of being efficient with that fuel, saving it such as with insulation materials or thermostatic valves for radiators, carries a 17½% VAT.

However, these are just flea bites when one views the totality of the energy market with sales of £54 billion and a combined market capitalisation of the fuel industry exceeding £200 billion.

The problem has partly been recognised and addressed in the transport industry. Petrol and diesel are heavily taxed, a tax which probably goes quite a long way to reflecting the external costs of the motor car which of course covers not just particulate and gaseous emissions but also noise and the social cost of road building and maintenance. Indeed, in the last few years the Chancellor has gone further and has specifically stated that tax on motor fuel will continue to rise at a greater rate than the level of inflation.

Now there are alternatives to the motor car - we do have public transport. However in the domestic arena there is only one way to heat and light our homes and that is to buy our own fuel. So I would suggest that three things need to happen.

First, there should be an energy efficiency levy on all fuels used for heat, light and power other than transport, that this levy should be open and transparent and, as with the tax on transport fuel, increased each year for some time to come at a level greater than the rate of inflation.

Second, this levy should be a hypothecated levy, it should be specifically recycled into energy efficiency investment. On the social equity side we already have the excellent model of the Homes Energy Efficiency Scheme and to address the conservation, efficiency and environmental aspects we have the model of the Standards of Performance.

If you assume a figure of 1p per kilowatt hour for the external cost of electricity and 0.1p per kilowatt hour for the external cost of gas, a levy of that order would raise around £4 billion per annum. I give you that figure not because I am advocating that that should be the figure but to give you an idea of the order of magnitude that we should be playing with in contrast to the wholly inadequate levels that have occurred so far.

I have no doubt that the HEES scheme would be able to adequately cope and indeed have an on-going demand for a level of investment some three times greater than at present. The Standards of Performance are currently only applied to properties with electric heating - under 8% of all properties nationally and even there, although the easy ones have been done first, the surface has only been scratched. It would therefore be wholly feasible to envisage a programme substantially larger than at present and entirely justifiable of efficiency and environmental grounds.

If we add in the many other programmes of advice and financial incentive which have already been proved to be efficient and environmentally cost beneficial I would like to see an annual programme of £1 billion within the next three years. Even that is only a third the cost of one nuclear power station, it is only 3% of the total turnover of the electricity and gas industries and represents considerably less than the money already being raised by the Exchequer through VAT on domestic fuel.

The third action is of a legislative nature. The fuel industry regulators OFFER and OFGAS should be required to implement a pricing regime which allows fuel utilities to enhance their profits from monopoly activities by selling less fuel rather than more. With that in place as a final key I believe that we will also have a strong private sector, as well as public sector backing for the improvement of our national energy efficiency.

Consumers are willing to pay for a green energy future

A MORI opinion poll has shown that most consumers want "green" electricity and support the idea of it being partly funded through their electricity bills according to the House of Commons All Party Parliamentary Renewable & Sustainable Energy Group.

According to the survey, 66% of the British public think that some or all of the existing nuclear levy should be switched to fund green energy rather than phased out simply to reduce bills. One in three thinks that the entire levy - previously 10% of electricity bills - should be retained to fund green energy in Britain. One in five say they are prepared to go still further and spend an average of £64 extra per year on green electricity if the electricity companies offer them the option. In total this amounts to a huge new market for green energy companies.

"The British people don't want the lowest possible bills if it means more pollution and global warming" said Frank Cook MP, chair of the Group, "They want a green energy future, and, if necessary, they are ready to pay for it."

The conventional oil production peak – 5 or 20 years away?

by Roger Bentley, Reading University

Most geologists agree that the world has used nearly half its conventional oil, and, under the 'depletion profile' argument, must fairly soon see a decline in production. The key questions are:

- When will this decline take place: is it in 5 years or less, as Campbell and others think probable if the Middle East does not co-operate in maximising production; or is it in the 20 to 25 years that some of the oil majors say they expect?
- What will be the impact of the decline: rather little, as other energies expand to fill the gap; or a repeat of the '70s, with oil price shock and world recession?

Before addressing these questions, it is important to acknowledge that most people involved in the energy field do not see the situation in these terms at all.

Most I have spoken to say: "The world has kept finding oil as demand has risen - the reserve to production (R/P) ratio has stated at '30 years for 30 years'; and with an R/P now of 42 years we face no problems until well into the next century." Moreover, some think that the oil companies slow the search for oil once the R/P ration is above 30 years, so there must be a lot more out there to find. Many also caution that the alarm: 'the oil is running out' has been raised in error often before, most recently in the 1970s.

These viewpoints are logical enough, but fail completely if one recognises that the geologists have been consistently estimating the ultimate for conventional oil at around 2,000 Gb since the late 1950s. (The ultimate is what geologists estimate as the total amount of oil that can be recovered, whereas reserves, very broadly, are reported figures of oil whose location is known). It is a remarkable testimony to the pioneer analysts that the estimates of ultimate, made when less than a quarter of this had been found, are still generally valid now that over three-quarters has been found.

The situation is summarised in Figure 1, where we see how the world looked in 1950, 1970 and today. It is clear that '30 years for 30 years' has been a remarkable achievement when set against rapidly rising demand, but in fact offers little comfort for the future. Likewise, the 1970s, when less than quarter of the ultimate had been *used*, was not the point to expect to oil to decline, though it did wake up the US to the fact that their production had already peaked (excluding NGLs, in 1971).

June's issue of *Energy World* (No 240) included a major series of articles on *The future of fossil fuel resources*, with articles by the Chairman of the Institute's International Committee, Professor Peter Dunn of Reading University; Hans DuMoulin of ETE 21; consultant C J Campbell; Shell's J S Jennings; and J F Kenney of the Russian Academy of Sciences.

The different views expressed have triggered much response from some of the original authors and others. First, Roger Bentley - a colleague of Professor Dunn's at Reading - tries to summarise both the areas of difference and common ground held; on page 13 C J Campbell responds and BP's David Jenkins joins the debate.

So now let us return to our two questions:

1. The date of the conventional oil peak

The technical issues to resolve this question include:

(a) The definition of conventional oil

Despite the ambiguity of oil types and data, most geologists see it as a powerful simplification to be able to class oil as conventional or non-conventional. There is clearly a great deal of the latter, and the important questions are how quickly it might be brought in, and at what price. Campbell, at least, sees non-conventional oil as largely slow and difficult to extract, with long depletion profiles that will help the tail of the conventional but do little to counteract the peak.

(b) The resource base

Campbell has an ultimate of 1750 Gb, BP geologists variously 1800 to 2000 Gb, USGS 2300 Gb (thought by many to be over-optimistic, as it ignores technical and economic constraints), and Shell a published figure of 2600 Gb (where the latter almost certainly includes a substantial amount of heavy oil).

Campbell draws to some extent on Petroconsultants database, and makes judgements about median probabilities. He points out that even if there is more out there, the low find rate (now only 5.7 Gb/yr) means large yet-to-finds cannot delay the peak. This, however, leads directly to the controversy about:

(c) Field uprating.

Stated field sizes do increase over time, and this causes much confusion in the analysis. Petroconsultants and others backdate upratings to the original date to try and winkle out what is really new, but others criticise this for then missing future upratings of today's fields. Campbell replies that one has to know what one is talking about. USA uprating is to do with strict SEC reporting rules, FSU uprating to a state monopoly viewpoint, Middle East uprating to earlier under-reporting and later to over-reporting for quota reasons, and most fields to a U-shaped function of size against time that reflects views from the exploration geologist, the initial reporting and the final production. He maintains his 1750 Gb ultimate builds in what seems reasonable to allow for uprating, for example, by increasing FSU, USA and UK reserves by 25%, 30% and 240%, respectively, above O&GJ figures.

(d) The depletion profile

Clearly, 'decline from the mid-point' is a simplification, though apparently a powerful one. BP have faith that better extraction methods can flatten the right side of the bell curve. However, Campbell/Laherre do a lot of detailed modelling, and maintain they have a global view. What is certain is that field and basin depletion profiles need a detailed look, with heavy and lighter oils being treated separately. Here discussion, if commercial interests allow, might find a consensus.

2. The impact of the decline in conventional oil

The size and nature of the impact of the decline of conventional oil depends on what rate, and at what price, other energies can be brought in. These include tertiary recovery, very deep or distant oil, other oils, gas, and coal (in the West at least, this means clean coal), etc.

Some analysts think price solves everything, and in one sense they are right. But the main points here seem to be:

- The geologists say price is not going to find much more conventional oil, and what it does find cannot come on stream quickly.
- Price can certainly pay for enhanced recovery, but this is partly what the discussion is about: the decline of conventional oil is the decline of oil that is cheap to produce where

one well can tap a large and quickly flowing reservoir. Enhanced recovery needs a lot of infrastructure, works on fairly small volumes, and is generally energy intensive. The use of steam injection, miscible flood and other technologies will certainly increase, but these cost money, and this is what is being predicted: that future energy will be more expensive. As importantly, enhanced recovery and heavy oil are both slow ways to get at oil, and cannot help much in the short term.

As far as the other energies are concerned, the world moved to oil because it was the cheapest option to the final user, and so we should expect the alternatives (with the exception of combined-cycle gas for electricity generation) to be more expensive.

It is possible that 1973 was a major turning point in the history of mankind over the last century or more: being the date at which energy ended a long period of declining real costs (Figure 2), and started to rise. In general, falling energy costs leads to increases in the standard of living. If the world's standard of living is to continue to improve, this must now come from other drivers: innovation, market size, energy intensity, etc., and do so in the face of an upward trend in energy costs.

I think the impact of seeing one part of our fossil patrimony start to decline may be severe. I do not know if there will be significant oil price increases, but it is salutary to remind ourselves of the effects of the 1970s oil price shocks. Those triggered major world-wide inflation and a severe recession lasting at least ten years. Arguably the effects are still with us, in the company downsizing and unemployment levels we see today. Additionally, Third World debt started on today's scale, as international institutions encouraged potentially prosperous, but poorly managed, economies to borrow to cover fuel bills, and to re-cycle petro-dollars. Lesser effects included the introduction of the 55 mph speed limit and the CAFE requirement on automobile production in the USA; and daylight saving time in France.

More parochially, in the UK it can be argued that the oil price shocks led to the fall of the Labour government (as efforts to contain inflation-triggered wage demands led to the 'winter of discontent'); and that the high interest rates imposed by both parties as they struggled to bring inflation under control led to the demise of many UK companies due to the cost of existing borrowings.

These are severe effects, and we ought to think ahead if they may repeat. Whether government needs to be involved, or market response will be adequate is open to discussion, though many feel markets are poor at handling a depleting resource. In any event, the decline of conventional oil needs looking at, and the difference between a peaking date within 5 years, and one in 20 years, is significant.

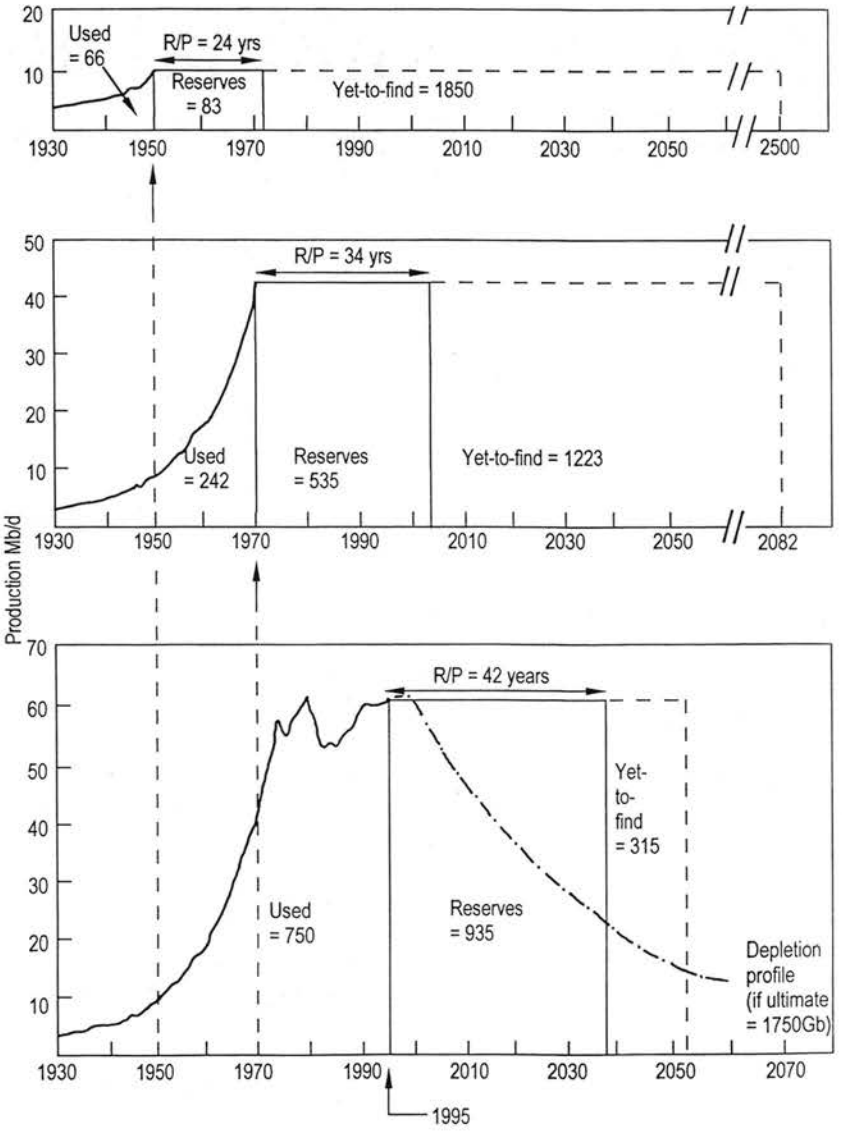

Figure 1 World oil production, reserves and yet-to-find in 1950, 1970, and 1995

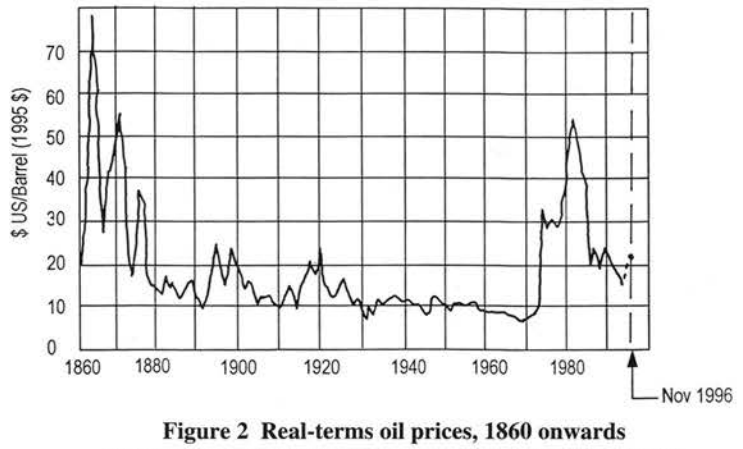

Figure 2 Real-terms oil prices, 1860 onwards
(Source: *The BP Statistical Review of World Energy, 1996*)

Notes:

1. The yet-to-find has been calculated by subtracting cumulative production plus reserves from an assumed ultimate of 2000 Gb.
2. Data are somewhat approximate, and do not include NGLs, heavy oil or tar sands etc. (Exclusion of NGLs may make these numbers not match those reported elsewhere.)
3. It is important to understand that an R/P ratio gives *no indication* of the real production profile: for conventional oil, the latter must always start to decline from somewhere near the midpoint. For instance, the chart for 1995 includes the predicted decline taken from one of Campbell's scenarios, based on an ultimate of 1750 Gb.

More agreement than divergence of view

by C. J. Campbell, consultant

I read with great interest the article by Jennings of Shell that followed mine (*Energy World* June 1996, No 240), and also took note of the two graphs on page 6 (one from Shell and one from MacKenzie). What struck me was not the divergence of view but how close they actually are. Some of Jennings' messages are to be found between the lines, but it seems to me they are there to be deciphered if you know what to look for:

- He almost says it all when he explains that the industry is now searching for and developing smaller and more difficult reservoirs. That is precisely my message, but translated into amounts it means there is much less left to find and produce: the pace is slowing.
- He emphasises the change of ownership, saying that the majors are down to 12% (my number was 7%) but he may include gas or have a better number. What is the inference from that? Surely: that the new owners will exert a greater control - again my thesis. He is mistaken however to say that the shocks prompted the search for the North Sea, Alaska etc: they were *found* before the shocks.
- He confirms that the world is now largely explored and no major new provinces can be expected. Exactly so: the inferences for supply are obvious.
- He says there will be enough for all for the next few decades. In a sense yes, but it is almost all in the hands of the five Middle East suppliers. One may question if they will provide it least of all at low prices. He speaks of excess capacity for 10 years: again where? In the Middle East.

Later he moves on to welcome alternative energy sources. If we look now at the Shell graph on page 6 it seems to have oil peaking around 2020. That could be if the Middle East opens up to the maximum. I don't think it will, but who knows. I would have it peak around 2000 due to much higher prices imposed by the Middle East when they get control of more than 30% of the market, in which case it would deplete at a slower rate and last longer. I think gas will peak around 2020, as apparently does Shell. But the amazing figure of this graph is the extraordinary growth in alternative energy. Solar multiplying many-fold from 2030 over a few years. Good! I know nothing about how feasible it may be to provide all this alternative energy, but I don't dispute the need for it one little bit.

Jennings does not say what ultimate he assumes nor how it is distributed. But on page 6 you quote a Shell number of 2,600 Gb. This implies about 1000 Gb yet-to-find. With a current falling discovery rate of 7 Gb/year it is going to taker an awful long time and an astronomical number of wells. It does not make sense in relation to Jennings' comments about all that is left to find is in small and difficult reservoirs. It is probably a number taken out of context, especially when you take into account the different depletion pattern of non-conventional oil. This 2,600 Gb number would have to include a lot of heavy oil: but it is produced only slowly and will have a minimal impact on peak production or the radical price increase.

Technology and heavy oil will delay peak

by David Jenkins, Chief Executive Technology, BP Exploration Operating Company Ltd

The subject of fossil fuel resources is one that I have followed with varying levels of interest over the past twenty years and my views have evolved considerably during that period. I have moved from the camp of the pessimists more towards those of the optimists.

So although I agree with Dr Campbell's 'peaking' analysis I expect that to occur considerably later in the first half of the 21st century i.e. more in line with Jennings' view.

There are two aspects:

- Technology really is making a difference, both in finding and recovery. The latter is the aspect that matters in this debate and I agree with Campbell the impact issue is in the "when". Alaska provides an interesting variant on the normal Bell curve with technology-driven reserves growth a key factor in extending the Prudhoe field plateau and slowing the overall production decline.
- Heavy oil. Dr Campbell feels this will not be significant but I am much more optimistic. It is noteworthy the recent announcements of major new investments, made whilst the industry is working to a $16 oil price norm. Again this is driven by technology but we should not underestimate the importance of the simple improvements in efficiency that in the past six years have allowed the industry to achieve a 30-50% benefit to performance.

The biogenic:abiogenic debate has been around for some time. I need to update my sources, but my recollection from the mid 1980s is that the characteristics of crude oil are very compelling evidence for an organic origin. Lateral migration from adjacent sediments into the fractured basement reservoir, has in all examples we looked at, provided a perfectly logical explanation for those accumulations.

Renewables - about to make a major contribution?

by Geoff Loram

An IBC conference on renewable energy held in London last month raised as many questions as it answered, says Geoff Loram in this, the first half of a two-part report. With a title: Renewable Energy Sources: a major contribution? it would be a reasonable measure of the conference's success if it came up with the answer.

The two papers on policy which opened proceedings were very nearly the same paper written by authors with different viewpoints. That from Martin Alder of the Renewable Energy Company gave a fairly detailed account of that policy and its effects to date through the privatisation of the electricity supply industry and the NFFO process and went on to look at the market now available outside the NFFO scheme as seen by a small generator already operating in it. Dr Catherine Mitchell of the University of Sussex's Science Policy Research Unit approached the subject in a more academic manner and was more concerned to have Government policy perpetuate the subsidies for renewable energy after the demise of the NFFO scheme.

Both papers opened with an analysis of the NFFO scheme to date and both authors agree that the scheme has been broadly successful. Both, somewhat surprisingly, think that the Government's target of 1,500 MW in place by the year 2000 will be met. Mitchell talks much of 'over-subscription' in NFFOs 3 and 4 but applies the term to the amount of capacity initially bid for, which is incorrect. They would only be genuinely over-subscribed if bids that met the convergence level set had to be rejected. Since the scheme is way behind schedule for reaching 1,500 MW, it must be presumed that the authorities would have accepted all valid bids that came in below the set level.

There are two ways in which initial bids fail to become completed projects: firstly, those which, for one reason or another, don't have the right economics to be competitive. Then there is failure to complete some of the contracts that were obtained; the varied reasons for this are succinctly put by Mitchell: *"OFFER is responsible for vetting NFFO applications through the 'will secure' test. However, in many ways it is rather lax. Applicants do not need to have a fuel source for their plants (eg biomass or waste); nor do they have to have planning permission or finance in place. It is clear that within a system based on competition and as uncertain as the NFFO is, it would be extremely onerous for the developers to meet these various requirements. Yet, there will always be over-subscription while the application requirements are so lax. A preferable system would seem to be one of increased certainty and more stringent application requirements. Moreover, this would reduce OFFER's involvement."*

Readers may recall that in April 1995 (*Energy World* 227) I put forward the idea of fixed tariffs to deal with that last point. I was assured by the DTI that tariffs were considered for NFFO 4 but perhaps it is not surprising that the complete redesign of the scheme that this would have involved led to the idea being rejected. However, fixed tariffs could still be the answer post-NFFO.

Martin Alder, in presenting a graph demonstrating that the prices paid for renewable energy under each of the three NFFO tranches had fallen consistently, made the following comment: *"This trend has been encouraged by the nature of the changes in the NFFO contracts, the competition for contracts, technology improvements and the official doctrine of convergence to the market price. We can see that the four technologies shown here have moved a long way towards the goal of convergence. There is a strong desire in official circles to see this trend continue - I am confident that it will but cost reductions will need to come from equipment manufacturers and technological improvements and these may not be readily available to the more mature technologies"*. He goes on: *"A major problem for the renewables industry at the moment is that electricity market prices are falling. Average Pool prices on current trends are set to fall to 1992 levels of around 2.2p/unit; this a 6% reduction from last year. In addition the levy is being reduced by 60% which all means that target market prices have been moving away from us - making the prospects of life after NFFO that much more difficult."*

Now he is in the business of selling electricity which I am not, but I think he is taking too simplistic a view of Pool prices. I have been monitoring the Pool prices for the past 10 months and found some interesting results. Although I don't have accurate figures, I am able to make a reasonable estimate that the average price over all days of the period is indeed about £22.5/MWh; however, the accurate figures for all weekdays is £27.6/MWh. But more to the point the average price for the period 0800 to 2300 on weekdays is no less that £35.25/MWh and this, of course, is the period when the great bulk of electricity is used. Indeed the demand weighted average of Pool Purchase Prices for 1995/6, that is for all hours of generation, was £28.85 (Pool Statistical Digest). An interesting aside is that average price for the weekday daytime as quoted above is almost identical to the price for the same period derived from the tariffs under the Energy Act 1983, so the current buying price for power has dropped by the fall in the value of the £ in the past 13 years.

Martin Alder's thesis was that renewable energy schemes ought to try and exploit the fact that they are likely to be 'embedded' supplies though, since there is no savings in the structure of the distribution system, savings are mainly in transmission losses and will not be very great. He had hopes that customers would emerge who were prepared to pay more than the basic price for their electricity if it was renewable but admitted that, at the moment, price was the only criterion in a fiercely competitive market. Perhaps the most interesting message to come from this paper is that renewable energy is now being traded commercially, albeit in small amounts, outside NFFO and the Pool and that Mr Alder, as one of the traders, expects to see the market expanding in the future.

Whilst Martin Alder made a rather ritual reference to that old war-horse 'externalities' and seemed to accept that the Government's policy on that score was unlikely to change, Dr Mitchell deploys a forthright and extensive argument that the present policies will have to change when the NFFO scheme expires, if not before. Whereas Government policy is to try and get renewable prices down to the market level - whatever that is -

she calls for renewed support and in particular wants what she refers to as 'the costing methodology' to be entirely changed. She, like Alder, asserts that if the renewable energy source is embedded the power produced has a greater value because of the avoidance of transmission losses. This is surely calculable and the argument would carry greater weight if a typical example showing significant savings were given. Anyway it is not an argument for supporting renewable energy - only for embedded energy however generated. Another reason why she deems renewable energy to have a higher - but unquantified - value is, she says *"small scale or renewable generation can improve power quality (which is an overall term to cover outages, voltage variations, length of interruptions and so on)"*. There are those on the practical side of the business who might argue that such considerations are more likely to be a weakness than a strength.

Unfortunately your scribe was unable to attend the first day of the conference and did not hear Enzo Millich of the European Commission give his talk, the most important part of which appears to be a statement of the aim to double renewable energy's share of European energy production from the current 4% to 8% by 2005.

Mr John Battle MP, Shadow Minister for Energy then gave his view, that the Government had not done enough to promote renewable energy. He said that Labour were committed to increasing the proportion of energy generated by renewables from the 2% target set by the present Government today to a five-fold increase to 10% by 2010 and then on to 20%. Well, that's definite enough but considering that the current issue of the Electricity Pool's Statistical Digest reveals that last year, of the total power generated, all existing hydro-power only contributed 0.77% and 'others' - which can be assumed to be renewables - a mere 0.32%, and considering that the design, funding, planning and construction of a major installation takes 4-5 years, that is some commitment to undertake. But there is, of course, a general election coming up!

Mr Battle criticised the low level of support for renewables in the UK as holding back the establishment of a competitive renewables industry. Why, he asked, were the turbines for the wind farms in Yorkshire made in Scandinavia and Germany and not in the highly skilled turbine factory in his own Leeds constituency which makes turbines for combined cycle gas generators? (Could it be that they were just totally different technologies?) Mr Battle concluded: *"If renewables are viewed more positively and pulled from the margins of energy policy, we can both secure new markets for the British power engineering industries at home and abroad and reduce one of the world's fastest growing sources of environmental pollution simultaneously. What is needed is vision and political will."* And, one might reasonably add, a lot more help from Gordon Brown than he is likely to get. It is good to know the Labour Party's heart is in the right place but it is evident that we will have to await their gaining power and getting to know a bit more of what they are talking about, before we know what their policies will really turn out to be.

Planning matters

Unless one was actively engaged in the planning process one might be forgiven for thinking that there was not much new to be said at a conference, but the County Planning Officer for West Sussex, Mr John Kilford, gave a very good paper explaining in detail the Government planning policies and how local authorities implemented them. It is clear that things have changed considerably over the past decade.

Whereas a decade ago the planning process was very largely concerned with development control, the Government's approach these days is very much more proactive and aimed at guiding and encouraging the right sort of developments in the appropriate circumstances. This is done through the medium of the County Structure and Local Development Plans and the Policy Planning Guidance Notes (PPG) which are issued to help formulate those plans and guide their implementation. Renewable energy now has its own PPG 22 and there are several other PPGs which have a bearing on the subject. Mr Kilford said that Government's approach to Planning is firmly based on its commitment to the principles of sustainable development as set out in "Sustainable Development: the UK Strategy (1994)", which recognised the important role of the planning system in achieving sustainable development.

The paper explained the responsibility that local authorities had to encourage and make provision for the various renewable energy technologies in their development plans. There is now a large body of carefully considered advice to planning authorities on all relevant aspects of the different renewable energy technologies to assist them in coming to the right decisions. This will have one beneficial influence that it would have been undiplomatic for Mr Kilford to mention. If all the aspects, good and bad, of a proposal have been carefully examined and assessed in accordance with the guidance and the development plan and granting of planning consent is recommended by the officers, is more difficult for the politicians to refuse the application just because it may be unpopular with their local voters. They will know that the refusal is likely to be overturned on appeal and, if the Chief Officer is worth his salt he will tell them that they have to defend their refusal themselves as he has already given his professional advice.

Policy overview

The starting point must be the EU target of 8% of energy generation from renewables by 2005. Can it be achieved? The answer is obviously a resounding "No chance"! Such a sweeping statement needs detailed justification and here are some of the reasons.

First and foremost, the timescale; it may be possible to reach the target eventually but not in nine years. Remember that a large part of the existing 4% is hydro and that has already been heavily exploited and any serious new addition would take a long time to build. If hydro is not going to be doubled - at least not in that timescale - then the others must be more than doubled. The two major sources of renewables other than hydro are waste and wind, of which wastes - that is all wastes not just MSW - has probably the largest potential in practical terms. But energy-from-waste plants have a five year gestation period and, since there is no surge of projects in sight, that means that it is unlikely that anything like the required amount will be built by 2005. Wind is also unlikely to make up the deficit. Denmark is aiming to double its wind-power but Germany is showing signs of saturation and is reducing support. France is showing no interest and is unlikely to with EdF still firmly nationalised and heavily based on nuclear power, whilst trebling the UK and Dutch production would not make a tremendous difference.

Another reason why the target will not be met is economic. By definition any electricity supply system that has enough reserve power to be assured that the lights will keep burning at the right voltage and frequency, is oversupplied. So any renewable energy must either be economic, subsidised or forced into the market by legislation. The UK has the nearest thing to an open market, with the earnest intention that it should be completely open in 1998, but, although some renewables are on the brink of being commercially competitive, it is hard to envisage them capturing a significant share of the market on purely commercial criteria for some time yet. If you force renewables onto the market by legislation in the way that the Danes and Germans have done, it has the same economic effect as subsidies - someone has to pay. Now subsidies either put up the PSBR, which will not be acceptable as countries struggle to meet the Maastricht conditions for EMU, or they will put up the cost of power which, in turn will put up the cost of living and industrial costs which will be equally unwelcome.

So my prediction is that reality will soon catch up with the political rhetoric that inspired the targets and we shall hear less about them as time goes by.

Integrating low energy use into design

Energy efficiency and environmental problems specific to inner city developments have been addressed by Michael Hopkins and Partners, architects in the design of the new Parliamentary Building in Westminster, London. Initial designs for the building included some highly innovative aspects, not all of which have survived into the construction phase. Here, the architectural philosophy is discussed.

Hopkins and Partners have completed the design for the New Parliamentary Offices Building in Westminster, London, a site of national importance. The clients wanted a very energy efficient building that would to set an example for future projects. The architects carried out many studies on which types of energy efficient features would be suitable, most of which were incorporated into the building, which is currently on-site.

The brief was for offices and select committee rooms for 210 Members of Parliament. A requirement was that the building should have a design life of 120 years. The site is problematic because it is surrounded by polluted, noisy streets. Some sides of the building are overshadowed by surrounding buildings.

The architects assessed how they could best exploit low-grade cooling from ground water, and make maximum use of fresh air and daylight - which they believed to be the most appropriate energy strategy in the UK climate. They explored wind energy for night-time cooling and the natural buoyancy of air to assist with the ventilation of the building, together with roof mounted photovoltaic panels as an energy source. A network of ducts are visible on the external elevation and large chimneys project on the skyline, these are the circulation systems for the ventilation and cooling of the building.

According to the design, rotating cowls on the chimneys orientate themselves towards the prevailing winds. The wind is scooped into the lower part of the chimney which is raised up above the turbulence of the roof. The air is fed down through ducts inside the building. It is introduced into the floor structure between the raised floor and the upper surface of the concrete slabs, and precools the upper surface of the concrete slab and the underside of the raised floor before entering the room. It is drawn through the occupied space and then exhausted via facade ducts to the roof. At the top of the building the ducts are combined within the roof structure. The air paths converge at the base of the chimneys and pass through a thermal wheel where heat is recovered before they are exhausted at the top of the chimneys.

The triple-glazed facade assembly is ventilated by the same system. Ventilation air is taken in at the foot of the window and exhausted into the ducts through the top, gathering heat from the dark blinds which absorb solar gain. The ducts increase in size as they rise up through the building collecting exhaust air from the rooms and windows.

Photovoltaic cells on the roof generate electricity which is used to power the fans that exhaust air on the other (shaded) side of the building - 80% to 85% of the energy received by the cells is given off as heat which is used to assist the buoyancy system in the solar chimneys.

The construction system plays an integral part of the building's environmental system, providing important thermal mass. Walls are made of dense concrete with a very fine finish. The exposed concrete ceiling slab is a massive store that absorbs heat from the room during the day and discharges it again at night.

"Daylight is an important contributor to energy efficiency particularly for office buildings because, as well as its high electricity consumption, artificial lighting involves heat gains which then have to be coped with by the ventilation system," says partner John Pringle.

In addition to housing the air extraction element, the light shelf bounces light off the ceiling into the back of the room and reduces glare during the day. At night, as the light level drops outside, light fittings inside the light shelf come on. The low-grade cooling sources include fresh air and ground water. The water is taken from 60 m under the ground and used in its raw state, avoiding the need for CFC-based refrigerants.

The combination of these strategies would result in buildings that consume close to zero energy.

Underlying and supporting the design process was the need to test and analyse proposals. "We carried out much theoretical analysis," says Pringle. "As part of our research work within the European Commission JOULE 2 project we could carry out quite elaborate computational fluid dynamics studies to model the behaviour of the ventilated facade, the movement of air through the rooms and the capacity of the slab as a heat store and thermal buffer. After that we carried out physical experiments on a prototype, in a PASSYS test cell and in a monitored building under laboratory conditions. That enabled us to test how these things actually work in buildings as real building assemblies rather than artificial computer models. We got interesting results which we then fed back into the original design tools and gained a lot of confidence about the way the systems would work."

Having carried out laboratory experiments, the architects then assessed how these innovative systems could be integrated into the building using real materials and construction techniques, using a site mock-up. A prototype section of the wall was installed in a monitored office building to assess its performance in real-life situations with occupants and realistic building construction.

Sadly, although most of the energy-efficient features discussed here were used in the final building, the wind-assisted ventilation and photovoltaic cells were not.

Pringle has hopes for the future now that there is a greater public awareness of environmental issues. "I expect the workplaces in the future will be more responsive to the environment outside," he says. "You will also see buildings becoming much simpler. In the past a lot of workplaces had air conditioning which made them totally independent of the climate. What we will see is all the traditional paraphernalia - lightweight ceilings and partitions and fairly trivial things that you find in a lot of buildings - being stripped back and air systems that are much more natural and inherently energy-efficient. This should result in a simpler architecture with less gadgets, less mechanical devices and a better relationship with the outside world."

The project is one of a number of buildings using renewable energy, and energy-efficient building components described in a new book European Solar Architecture published for the European Commission by the Energy Research Group, School of Architecture, University College Dublin, Clonskeagh Drive, Dublin 14. Tel: 01 269 2750. Fax: 01 283 8908.

Global warming: threat or smokescreen?

Environment Briefing Papers 1 & 2, published by the IEA Environment Unit, Institute of Economic Affairs, 2 Lord North Street, London SW1P 3LB

A healthy scepticism about the motives driving the worldwide lobby which supports the global warming movement emerges - rather unexpectedly - from the first Environmental Briefing Paper published by the unit set up within the Institute of Economic Affairs, the right-wing think tank which has informed so much of Government thinking in recent years.

Roger Bate, who heads the IEA Environment Unit, has looked closely at the policies emerging from the IPCC since the Brazil summit and finds discernible evidence of human, vested interests on the climate documents which form the basis of policy decisions so eagerly adopted by highly developed Western countries.

He believes that sound science has been crowded out of the global warming debate; that political and economic vested interests have seen their opportunity and grasped it with both fists. He takes the view that the problem becomes extremely disturbing because policies based upon unsound science may do more harm than good, a view which members of the Institute of Energy might embrace.

As an example, consider the consequences of policies premised on the need to reduce emissions of greenhouse gases arising from human activities. These would require a significant cut in fossil fuel consumption from which would follow increases in the prices of most carbon-based fuels. This would cause great hardship for the world's poor - directly because of the rise in the costs of heating and transport, and indirectly because many energy-intensive companies would go out of business thus swelling the ranks of the unemployed. At the same time the wealthy Èlite would make sure they were exempted from the effects of such a policy through state support via subsidies and regulation.

Bate underlines what has been frequently pointed out by numerous independent climatologists: the planet has so far responded with a remarkably low sensitivity to a 50% increase in the concentration of greenhouse gases. Earth's environment is remarkably robust and ultimately self-adjusting. At the very least this does not suggest urgent action for significant limitations on energy consumption. Energy producers might be wise to investigate new production technologies and the advisability of fuel switching, but until the science of climate change is better understood, government action should be limited to correcting distortions of the market.

Though not apparently an overt conspiracy theorist, Bate points to the present interaction between academics, funding agencies, environmental advocacy groups, and politicians and quotes H L Mencken, the great American political commentator, who explained that "the whole aim of personal politics is to keep the populace alarmed (and hence clamorous to be led to safety) by menacing it with endless series of hobgoblins - all of them imaginary." Global warming may not be an imaginary hobgoblin, says Bate, but catastrophe scenarios probably are.

That could explain why representatives of all nations are signed up to a treaty which obliges them to meet unattainable carbon dioxide emission targets; why they are likely to make those targets yet stricter; and why they will impose poverty-inducing restrictions on their citizens. And yet the issue is simply characterised:

- We don't know that the world is definitely warming, given recent satellite data.
- If the world is warming we don't know what is causing the change - man or nature. It has warmed and cooled many times in its long history.
- We don't know whether a warmer world would be a good or a bad thing.

Policy cannot, of course, be based on science alone; the world is not simply a rational machine. But if policy is to be based on science at all, that science must be sound. The IPCC report is not sound science and the policies flowing from it are not sound policies, Roger Bates concludes.

In what appears to be a belt-and-braces exercise, the Institute's second Environment Briefing, by John Palmisano, accepts that government's generally get their way if they have vested enough reputation to get policies through, and calls his paper 'Establishing a market in emission credits: a business perspective'.

In the absence of definitive answers to whether global warming is occurring and if so will the effects be good or bad, the world's policy makers are busily devising mechanisms to limit greenhouse gases. John Palmisano's paper introduces a concept called joint implementation, which recommends the creation of a market in which emissions could be traded off between organisations and even nations. Although it would not be an entirely unfettered market, it could potentially lower the costs of complying with the energy reductions and admissions targets now being widely actively promulgated by IPCC nations.

Peter Heap

Controlling global warming

'Global Warming: A guide to market-based controls in the energy sector', by Ian Fells and Lisa Woolhouse is available for £195 from FT Energy Publishing, Maple House, 149 Tottenham Court Road, London W1P 9LL

At the recent meeting of the parties to the United Nations Framework Convention on Climate Change in Geneva, the United Kingdom was among those countries advocating further commitments by industrialised nations to reduce their emissions of greenhouse gases. The UK was able to take this proactive stance because we are on target to fulfil the present objective of reducing emissions to 1990 levels by 2000 and reasonably sure that emissions will continue to fall in the years immediately after 2000. However emissions of greenhouse gases have fallen largely because of the continued replacement of coal for power generation by natural gas, with its lower carbon content, and this is a once-for-all benefit.

Similar problems underlie the response of other countries to the international pressure, as embodied in the Climate Convention, to calls to reduce greenhouse gas emissions. Industrialised countries have accepted the need for action, but present policies do not lead to a continued reduction in emissions. Hence the interest in possible new policies of a wide variety and with different political implications, of which suggestions for a tax on carbon have perhaps been the most widely publicised.

Ian Fells and Lisa Woolhouse have studied proposals for a variety of market-based controls on the energy sector, summarising different approaches and discussing their likely effectiveness and their public and political acceptability. Emission charges, such as a carbon tax or a combined carbon/energy tax, subsidies and tradable permits are examined, using the UK energy market as an example, and using a computer model to assess their success in reducing CO_2 emissions.

The report discusses the changed perception of the relation between man and the environment and different ways in which environmental effects could be brought into the economic equation using models of the UK energy market. The benefits which would be obtained by taxes on carbon and/or energy are shown to be limited because of the inflexibility of the road transport sector and because of overall implications for taxation policy. Emission tradable permits are expected to have some merit, but only if applied to

primary fuels or to large energy users. The promotion of energy efficiency improvement is recognised as a problem area and is seen as requiring Government action including financial incentives as well as such schemes as the labelling of appliances for their energy efficiency and environmental performance.

Special consideration is given to the transport sector and it is concluded that no one policy will limit CO_2 growth. The use of the market mechanism alone would not be sufficient, regulation also has a part to play. For a major change to be brought about, a fundamental change is required in government policy to impose regulation and to invest in public transport.

J S Harrison

The politics of climate change

'Global warming and global politics', by Matthew Paterson. Routledge, 1966

The title of this book may be somewhat misleading. The first few chapters attempt, and succeed well, in placing global warming in a historical context: who said what and when about it, what was discussed at various conferences throughout the world, and what those conferences are purported to have achieved. But the main bulk considers a number of political theories and their relevance to the issue of global warming, with the emphasis very much placed upon the theoretical aspects. Global warming is merely the vehicle for political analysis, so anyone wanting a good read on the greenhouse effect itself will be disappointed. For example, it may be important for some to argue whether it is reasonable to regard the US as a hegemon in the case of global warming, but this is not for the lighthearted, although the analysis throughout is powerful and well supported.

It develops into a discussion document considering the application of neorealism, neoliberal institutionalism and historical materialism to global warming, and the more cynical will not be surprised to learn that it is the latter that provides a better description of past actions and political decision making processes! Once this has been deduced, however, little time is spent upon actually applying historical materialism to future scenarios, whether in the short or long term, which is a shame. Indeed, it is only in the conclusions that this issue is addressed.

As the author admits, this book began life as a PhD thesis and it shows. It is full of quotes, references, acronyms, and a bibliography fit to impress any external examiner, the majority of which tend to interrupt the flow of all but the most conscientious reader. It comes across as an academic treatise, although the title might appear to attract a broader audience, and it will probably appeal most to those of a like minded disposition working in the same field.

Dr C J Marquand

Energy policies of the West

'Energy Policies of IEA Countries: 1996 Review' by the International Energy Agency, published by the Organisation for Economic Co-operation and Development (OECD), 1966

Every year, the International Energy Agency not only reviews the energy policies of all its 23 member countries, but also analyses a number of them in depth. In 1966 it was the turn of Canada, France, the Netherlands, Portugal, Spain, and Sweden to be subject to greater peer group scrutiny. Whilst the more detailed reports are published separately, this volume contains a summary of the findings together with a summary of the standard annual reviews of the other 17 states. And a most useful book it is too for all those seeking a reference text with information about the energy strategies of some of the wealthiest nations in the world.

Included by way of an introduction is an overview which concentrates upon the more recent energy market and policy developments of the IEA members. Particular attention has been paid to restructuring in the electricity and gas sectors where regulatory reform is being undertaken in an effort to induce more competition. Generally the IEA seems pleased with the way that individual countries ore implementing their 1993 'Shared Goals' agreement by way of opening up their markets in order to achieve energy security and economic growth. A further aim is environmental sustainability and here there is less satisfaction. Indeed it is projected that energy related CO_2 emissions will rise to 11 billion tonnes in the year 2000, 10% above the 1990 level stipulated as a target. There is doubt expressed about the effectiveness of voluntary actions and some suggestions are made for improvements.

All in all, a very worthwhile annual series which is full of well organised and easily digestible data of value to any organisation with an interest in this field.

Dr C J Marquand

Electroheat – a comprehensive treatment

'The Foundations of Electroheat – a unified approach' by A. C. Metaxas. Routledge 1996

Electroheat is a wide ranging subject involving many techniques and extensive applications in industry. As a result few text books exist which attempt to present a coherent and integrated approach to the subject considering it as an academic discipline in its own right. This book is therefore very welcome

It is based upon a series of lectures given by the author at the Engineering Department, Cambridge University and provides a solid foundation of principles upon which the individual subject areas are considered with a comprehensive and detailed description of relevant industrial applications.

The book comprises four main chapters: Electromagnetic Heat and Melting, The Ionised State, Heat and Mass Transfer and Industrial Applications. These are interspersed with chapters on Materials and their Properties, Applicators and Sources for Electromagnetic Heating, Other Applications of Electrotechnology and Computers in Electroheat. This approach can cause some difficulty in understanding the relationships between the topic areas and this clearly demonstrates the fundamental difficulty in presenting a unified approach to the subject. The author, however, is to be commended upon having achieved a most satisfactory solution.

The fundamental principles of the electromagnetic heating of slabs, billets and induction melting are well presented with the theoretical basis clearly described. The ionised state is considered in similar depth with laser systems, ac and dc arc furnaces, plasma torches, electron beam systems and radio frequency heating all covered comprehensively. Heat pumps, infra-red heating, induction drying, uv energy systems are similarly described. The supporting chapters on materials, expert systems, neural networks, software systems for electroheat are comprehensive and up to date.

The book is well written, clear and relevant with the final chapter devoted solely to industrial applications. There are copious references and many relevant problems with solutions.

The book is a valuable addition to a subject in which few such comprehensive and detailed treaties exist. It will form an important text book for undergraduates and a reference item for practising electroheat engineers.

G R Jordan

Environment Agency chief addresses CEA presidential lunch

Lord Ezra, President of the Combustion Engineering Association hosted the annual President's Luncheon at the House of Lords this month.

In his Presidential address Lord Ezra reviewed the current energy situation against a background of a lifetime spent in the industry. He saw the Association's members facing a complex and ever changing situation; on the one hand they were subject to market forces - industry wanted an adequate supply of fuel and power at low prices - but on the other hand they were told that there should be restraints to avoid climatic changes engendered by global warming; the two did not go together.

The guest speaker was Ed Gallagher, Chief Executive of the Environment Agency, which, he said, had been described as a 9,000 strong, gold plated quango. He naturally disagreed with that, for a start they employed 9,500, who were all very busy, while he was an engineer with an industrial background. The Agency had four functions: the first of these was regulatory and their responsibilities ranged from Sellafield to sewage, from BSE to BATNEEC; they had people working on flood prevention and boffins playing with mathematical models. This was the first time, anywhere, that there was a single agency safeguarding all three elements of the environment, air, land and water.

They also had a deregulation function which was important - though not always popular with the environmentalists - and he gave the example of a scrap dealer picking up a load which included a car battery. The dealer could pass on the battery, worth about 50p, for recycling but it was classed as 'special waste' so he needed to get a licence to move it; naturally he was not interested and the battery was likely to end up in the nearest hedge. The agency had altered the regulations so that up to five batteries could be handled at a time without being classed as 'special waste'.

Reflecting on the Agency's role as both regulator and deregulator, Mr Gallagher said that they had to try and put into practical terms whatever was implied by the currently fashionable phrase 'sustainable development'. But how did you make a balance between environmental and other needs? Cost/benefit studies were fine but not always practical. Trying to put monetary value on ideas and concepts was difficult. Logically you could say that making biscuits in the south of the country and transporting them to the north whilst at the same time biscuits were made in the north and transported to the south would cause avoidable pollution; but this conflicted with market economics.

A third function was one of communicating with and educating the public and industry; here a good example of what could be done was the Aire and Calder Project. This project involved the pollution control bodies of the day, which now form the agency, who with the help of some outside funding, targeted industrial companies in a relatively small area and helped them to introduce waste saving and pollution saving schemes. As a result eleven companies were saving £3 million a year between them; one major company running a state of the art plant around the clock brought it to complete halt for 45 minutes just to be able to thank the workforce for their efforts personally.

The Agency's fourth area of responsibility concerned new legislation. EU legislation was not always well thought through and the Agency had to interpret and apply it as sensibly as possible. There were constant changes taking place in the energy field, to which the CEA made its contribution, and the rate of pace of change was very challenging.

Those who are likely to be on the receiving end of the Environment Agency's ministrations may well be thankful that it is led by such a positive, down to earth and practical character as Ed Gallagher.

1927-1997 70 years of Setting the Standard

We will continue to serve and maintain the standards of our profession and further the interests and well being of all our members as we go forward into 1997 and towards the millennium.

The Institute of Energy would like to wish its members around the world a very happy and prosperous new year and hope that you will celebrate with us 70 years of professional excellence.

Our 70th Birthday will bring new and exciting initiatives, new goals, events and the re-design of energy world -

so watch this space!

Special General Meeting

NOTICE IS HEREBY GIVEN that, immediately preceeding the meeting of the Council of the Institute of Energy, which is to be held at 11.00 am on Thursday 13 February 1997, at 18 Devonshire Street, London W1N 2AU, a Special General Meeting will be held to consider and, if thought fit, to pass the following special resolution, of which special notice is hereby given:

THAT the bye-laws of the Institute be amended as shown in the schedule below, subject to the President and Executive Secretary being jointly empowered to accept such amendments as the privy Council may require.

Dated this 22nd day of November 1996
By Order of the Council
J E H LEACH
Executive Secretary

Schedule of Bye-law amenments to be considered at a Special General Meeting to be held on Thursday 13 February 1997.

Bye-law 7
In the second paragraph of this Bye-law, delete all and substitute:-
"non-corporate members in the grade of Associate Member may use after their names the designatory letters AMInstE."

Bye-law 17
In 17(b) of this Bye-law, delete all and substitute:-
"that he has had such training and experience as may be approved by the Council."

The Institute of Energy

Presidential officers and honorary officers 1997/98

The undermentioned have been elected by Council to take office following the annual general meeting on 8 May 1997.

PROF J H CHESSHIRE to become president; **DR P J MULLINGER** - honorary secretary; **M B PITTWOOD** - honorary treasurer.

Election of Council 1997/98

Following the AGM, the undermentioned will retire and are not eligible for re-election:
H ETHERINGTON, PROF J S HARRISON, A J MINCHENER, DR M R PALMER, D SUTHERS

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

Any three Corporate or Associate Members may also nominate in writing an Incorporated Engineer to serve on Council. 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 preferable earlier. (Members are not, however, permitted to join in the nomination of more than three persons an any one year.)

Benefits of Membership of the Institute of Energy

Your subscription to the Institute allows us to develop many products and services for your continuous development as a member of the energy profession. **Your subscription is an investment in yourself.** See why from the many benefits we already provide:

- Immediate access to all our publications: Energy World magazine (10 issues per annum) and the Journal (4 issues per annum)
- Opportunities to meet other members through Branch & National meetings/conferences from all levels and activities within energy technology
- Significant member discounts on published conference proceedings and reduced fees for national conferences, seminars and workshops
- Irrespective of grade, entitlement to receive the same benefits from Institute services as all other members
- The opportunity to follow a programme, 'ContinuingProfessional Development'
- Opportunities to join Special Interest Groups relevant to your own interests or indeed start your own group if it does not presently exist
- The Institute of Energy provides a qualification assessment leading to incorporation in the register of members. Registration onto a consultants database which is sourced by external organisations looking to place contracts etc
- Awards are made for outstanding contributions to the science and practice of energy technology
- With national and international recognition membership to the Institute of Energy can assist in career progression. It represents a recognised level of achievement
- The benefits of advanced knowledge of products and services such as TEMOL and the Energy Efficiency Training Series
- Participating at committee level permits meeting with policy makers and leading personnel in associated fields
- Designatory initials after your name depending upon the grade you apply for
- Membership of a smaller, more personal and friendly energy engineering institution
- Provides opportunities for promotion/contacts within ones own chosen industry
- Participation in Engineering Council & Engineering Forum activities. Interface with other professional institutes
- Above all The Institute of Energy is THE organisation for those in the energy business to communicate with each other through a central professional body and learned society to the benefit of its members – THAT MEANS YOU

New Members

Fellow

James Cochrane Bodles, (transfer) Nigen, N. Ireland

Members

Christopher Boyd, (transfer) Rendel Palmer & Tritton Consulting Engineers, Glasgow
Timothy Edward Dixon, ETSU, Coal Technology Dept, Oxon
Nicholas David Reid Gardner, (transfer) Base Load Systems Limited, London
Philip Raymond Healey, Shetland Islands Council, Lerwick
Michael James, Crown House ETS, Manchester
Neil David Jones, Beveridge Associates
Ulysses Ma, (transfer) Etsu, Oxon
Alastair James Nicol, (transfer) Rendell Palmer & Tritton, Glasgow
James Robert Patterson, (transfer) Linden Consulting Partnership, Essex
Eduardo Luis Urinovsky, Hoare Lea & Partners, Dorset
Paul Robert Webber, (transfer) Troup Bywaters & Anders, London

Associates

Francis Anthony Foxen, Butler & Young Associates Surrey
Malcom Andrew Lugton, Malvern Technology Limited, Essex
James Lynch, Ove Arup Partners
William Joseph Murphy, Pipex Ltd, Surrey
Donald John Taylor, Royal Marsden NHS Trust, Surrey

Graduates

Gilles Charbonnier, Blyth & Blyth Associates, Edinburgh
Ronald Magnus MacDonald, McKinnon & Clarke Ltd, Stockport
Peter Ashley Clifford Varley, (transfer) GEC Marconi, Addlesbone

Group affiliate

Office for the Regulation of Electricity & Gas, Belfast

EVENTS

January 1997

UK-Continent Gas Interconnector
Conference, 13-14 January, London, £799 + VAT
Details from SMi, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

Ultra low NOx turbine conversion
Short course at the University of Leeds Department of Fuel and Energy, 13–16 January, Leeds
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

Executive Development Week for the Utilities
Interactive seminars, 13-17 January, Manchester, £3300
Details from Learning in Business Ltd, tel: 0181 944 9030, fax: 0181 944 0434

Restructuring in the electricity industry: 1998 and beyond
Conference, 16 January, London, £530 + VAT
Details from Brenda Ribero, Economist Conferences, tel: 0171 830 1116, fax: 0171 931 0228

Third party access in European gas
Conference, 23-24 January, London, £899 + VAT
Details from SMi, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

Combustion Instrumentation and Control
Short course at the University of Leeds Department of Fuel and Energy, 27-31 January, Leeds
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

Air conditioning - ten years on
Conference, 30 January, London, £220 + VAT
Details from Mid Career College, tel: 01223 880016, fax: 01223 881604, e-mail: midccoll@uk.pi.net

Pricing, hedging, trading and risk management of electricity derivatives
Course by the Risk Publications Group, 30-31 January, Houston
Details from Risk Publications, tel: 0171 487 5326, fax: 0171 486 0879, e-mail: 100726.60@compuserve.com

February 1997

Executive Development Week for the Utilities
Interactive seminars, 3-7 February, Amsterdam, £3300
Details from Learning in Business Ltd, tel: 0181 944 9030, fax: 0181 944 0434

Strategic energy planning
Conference, 4 February, Warrington, £445 + VAT
Details from AiC Conferences Ltd, tel: 0171 242 2324, fax: 0171 242 2320

Piping design, analysis and fabrication
Course, 10-12 February, The Netherlands
Details from The Centre for Professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

Fired process heaters
Course, 17-20 February, The Netherlands
Details from The Centre for Professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

The new energy market - opportunities and challenges in 1998
CHPA National conference, 18-20 February, Brighton
Details from Pamela Rudolph, tel: 01403 785409, fax: 01403 786189

Monitoring and targeting to achieve saving on energy cost
Conference, 24 February, Warrington, £445 + VAT
Details from AiC Conferences Ltd, tel: 0171 242 2324, fax: 0171 242 2320

Executive Development Week for the Utilities
Interactive seminars, 24-28 February, Bristol, £3300
Details from Learning in Business Ltd, tel: 0181 944 9030, fax: 0181 944 0434

Finding your way through the energy management maze
Interactive workshop led by ETSU, 25 February, Warrington, £300 + VAT
Details from AiC Conferences Ltd, tel: 0171 242 2324, fax: 0171 242 2320

Managing costs, data and processes in metering & billing in utilities
Conference, 27 February, London, £695 + VAT
Details from AiC Conferences Ltd, tel: 0171 242 2324, fax: 0171 242 2320

Spot & futures gas markets
Conference, 27-28 February, London, £799 + VAT
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

March 1997

CFD in engineering design
Short course at the University of Leeds Department of Fuel and Energy, 3-4 March, Leeds
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

Executive Development Week for the Utilities
Interactive seminars, 10-14 March, Dublin, £3300
Details from Learning in Business Ltd, tel: 0181 944 9030, fax: 0181 944 0434

The future of the UK gas industry
Conference, 11-12 March, London, £934
Details from Business Seminars International Ltd, tel: 0171 490 3774, fax: 01424 773334

Microwave and radio frequency heating
Course, 17-18 March, Cambridge University
Details from Dr A C Metaxas, tel: 01223 332680, fax: 01223 332662, e-mail: acm@eng.cam.ac.uk

Heat exchangers
Course, 17-21 March, The Netherlands
Details from The Centre for Professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

Power Generation & Maintenance 97
Exhibition, 18-19 March, Glasgow
Details from Nicky Molloy, FMJ International Publications Ltd, tel: 01737 768611, fax: 01737 761685

April 1997

Gas turbine technology
Course, 2-4 April, The Netherlands
Details from The Centre for Professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

Industrial air pollution monitoring
Short course at the University of Leeds Department of Fuel and Energy, 7-9 April, Leeds
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

et/er 97
Exhibition covering energy resources and environmental technology, 8-10 April, NEC Birmingham
Details from ticket hotline, tel: 0181 910 7840, fax: 0181 910 7989

Diesel particulates and NOx emissions
Short course at the University of Leeds Department of Fuel and Energy, 14-18 April, Leeds
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

Understanding heat treatment
Course, 15-17 April, Birmingham, £735
Details from the Wolfson Heat Treatment Centre, Aston University, tel: 0121 359 3611, fax: 0121 359 8910

May 1997

Advances in computational heat transfer
International symposium, 26-30 May, Cesme, Turkey
Details from Dr Faruk Arinc, tel: +90 312 210 1429, fax: +90 312 210 1331, e-mail: arinc@metu.edu.tr

The World Sustainable Energy Trade Fair
Exhibition and conference covering renewable energy, waste-to-energy and sustainable transport, 27-29 May, Amsterdam
Details from European Media Marketing Ltd, tel: o171 582 7278, fax: 0171 793 8007, e-mail: emml.demon.co.uk

The Third International Conference on

COMBUSTION & EMISSIONS CONTROL

11 & 12 June 1997, Bath, UK

ANNOUNCEMENT

The Institute of Energy is running the third in the series of these highly successful conferences. This conference will improve on the success of its predecessors, by expanding on the topics and by introducing new and innovative knowledge to the equation. The conference will act as a forum for discussing the state of the art technology and experience as well as to explore innovative research leading to further developments.

The following areas plus many other subjects will be covered:

- ***Power Generation***
- ***Gas Turbines***
- ***Process Industries***
- ***Biofuels***
- ***Refueling options***
- ***Pollutants***
- ***Industrial Experience of new Combustion Systems***
- ***Novel Combustion Systems***

EXHIBITION

The Assembly Rooms in the centre of Bath are ideal to house a large exhibition, the airy Georgian surroundings give delegates plenty of room to browse, providing exhibitors with an excellent environment to address the delegates. Those interested in exhibiting should contact Louise Collins at The Institute of Energy on (+44) (0)171 580 0008.

LOCATION

The idyllic historical setting of Bath will enthuse any delegate who attends the conference. Discussions on the latest technology and expertise will take place ironically in the beautiful historic setting of the Pump Rooms, beside the Roman Bath, adding an interesting perspective.

Tuesday, 10 June	*(evening)*	**Pre-conference reception & Exhibition preview**
Wednesday, 11 June	*(day)*	**Conference Sessions & Exhibition**
	(evening)	**Conference dinner,** ***to be held in the Pump Rooms***
Thursday, 12 June	*(day)*	**Conference Sessions & Exhibition Close of Conference**
Friday, 13 June	*(day)*	**Technical Visit (Optional)**

If you would like to receive further information on this conference or the Institute of Energy, please contact us at 18 Devonshire Street, London W1N 2AU. Tel: 0171 580 0008, fax: 0171 580 4420.

the institute of energy