ENERGY WORLD

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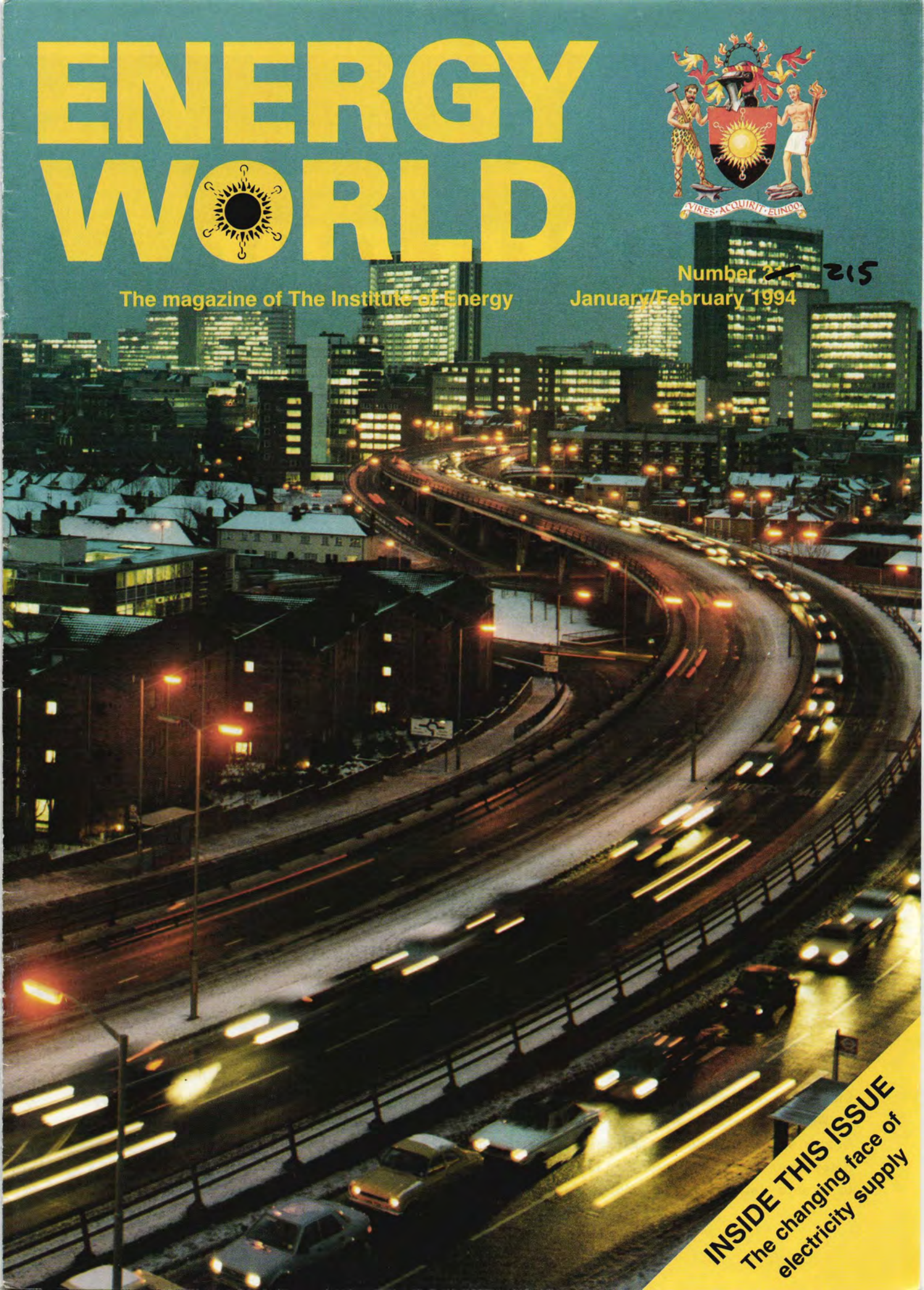

INSIDE THIS ISSUE

The changing face of electricity supply

Burn our coal and you won't catch a cold.

There is stiff competition in every market place these days. And industrial coal is no exception.

What you might be surprised to hear is that British Coal is setting the standard. British Coal's Industrial Sales Team use the most modern computer models to create tailor-made products for industrial customers. Then at new production sites, we achieve levels of blending, grading and consistency which other coal suppliers find very hard to match. It's not often you come across products with clear consumer advantages. When you do they're not to be sneezed at.

British COAL

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ENERGY WORLD

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The magazine of The Institute of Energy

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COVER

This month's cover photograph gives an example of urban lighting, with a night shot of Croydon in Surrey.

The extension of competition in the electricity supply market takes effect from 1 April 1994. Users in the 100kW to 1 MW market, typically medium-sized companies, local authorities, hospitals, schools etc, will be able to purchase electricity from a licenced supplier other than their regional electricity company.

Getting nuclear into perspective

THE PROCESS of producing electricity, so vital to our well being and future prosperity, has an impact on the environment around us, no matter what form the electricity generation takes. Over many decades the conventional process has been to burn fossil fuels, mainly coal. Even today in Britain, more than 62% of electricity is derived from the combustion of coal.

Despite considerable improvements over many years in combustion techniques, fossil fuel power stations in Britain release to the environment atmospheric pollutants as a direct result of combustion, pollutants that pose direct threats to health and the environment. Every year sees over 2.5 million tonnes of SO_2 released, while about a third of our total CO_2 emissions, together with SO_2, return to the ground, acidifying lakes and rivers as well as damaging forests, crops and the stonework of buildings.

The threat of the build-up of CO_2 in the atmosphere which may (not proven) have irreversible changes to our climate, must necessitate the adoption of energy strategies which take fully into account the total effect of the fuels we use.

Considerable changes have occurred in Britain in the last few years in the manner by which we consume our non-renewable energy sources. In electricity generation, the electricity companies are using their new found freedom from political interference by exploring all avenues for the production of electricity. However, it has to be said that many see the Company balance sheet as the top priority, although safety, and to a lesser degree, the environment feature strongly in mission statements as if to act as a sop for the public at large.

The really radical change in generation has been the opportunity to burn natural gas in CCGT stations and for ever growing numbers of CHP projects. However, the recent aspect of the 'dash for gas' campaign by many companies needs to be tempered, on two main counts. First, the debate on the wisdom of burning gas for electricity production despite the greatly increased efficiencies for the new power stations. Second, it must be remembered that gas when burnt produces significant quantities of CO_2 and oxides of nitrogen detrimental to the environment.

Under EC legislation, we have a legal obligation to reduce sulphur and nitrogen emissions to the atmosphere to specified target levels. By 1998, we are required to reduce SO_2 and NOx levels by 40% and 30% respectively below our 1980 levels, while for CO_2 emissions, no increase is allowed above 1990 levels. These are the present targets, but there appears every likelihood that the regulations will be tightened. How can these levels be achieved in the UK and elsewhere throughout the EC?

Although natural gas is a cleaner fuel to use than coal, it produces large quantities of CO_2, and some oxides of nitrogen. Natural gas is an extremely valuable resource, which has many other uses, a reason advanced by successive energy policies which, in the past, have prohibited its use in power generation. Despite the UK's proven resources of gas being limited to perhaps 40 years at most, electricity companies are utilising the fuel in order to achieve short term advantages over the use of coal and nuclear.

Burning coal for electricity generation has for so long been the accepted way but the new environment thinking coupled with the greater emphasis on the balance sheet is fast driving coal down from its foremost position. The run down of the British coal industry, and the increasing imports of cheaper foreign coal, plus the competitive market, has allowed the new generating companies to combat the market by the building of new gas-fired power stations.

We have had more than four decades of nuclear-derived electricity in Britain, all of which has proved itself to be both safe and economically justifiable. The original role of nuclear power in Britain was to fill the 'energy gap' in the mid 1950s, rather than to save consumers money. Since that time the expansion of nuclear power generation has taken place to reach its present level, whereby more than 22% of all our electricity is so produced. At the present time, nuclear power accounts for more than 35% of all of Europe's production of electricity, while worldwide, some 32 countries have over 500 nuclear units either in operation or under construction, representing a contribution greater than 17%.

The role of nuclear in the prosperity of any country relates to the underlying stability that a nuclear power plant can bring to the system network. Over the many years that nuclear power stations, Magnox and AGR have been in service in Britain, their record in performance terms has been improving year in, year out. Since privatisation of the electricity industry, that performance can be rated as second to none.

Regrettably we fail time and time again to take full advantage of nuclear power's benefits. In the autumn of 1989, the government took the decision to remove nuclear power station assets from the flotation of the new electricity companies, for short-term gain. It also did the industry no favours with the additional penalty of a moratorium on further nuclear power expansion, until at least 1994. I can recall that only a few months after the Conservative Party election victory, it was declared that ten PWRs would be built, one a year, starting in 1982. The appaling charade of the long-running public inquiry into Sizewell B, combined with government inaction, has sunk those declarations without trace. To top it all, the Trade and Industry Select Committee's recommendation in March 1993 that the nuclear review should be brought forward to 1993 was accepted by the Government, but then ignored.

Given that our nuclear industry is safe, let's get on and develop our nuclear power programme — it could be the opportunity for thousands of jobs to be created. The success of Sizewell could expand the UK's trade around the world with the skills of British engineering, so often seen as the envy of many.

Eur Ing F John L Bindon (Fellow)

Fighting the freeze

DURING the recent severe weather in the United States of America, and the resulting energy shortage, two power plants in New Jersey made significant contributions of power, while switching to kerosene fuel, and thereby freeing up much needed natural gas.

The two plants, a 50MW installation at Newark and 100MW at Parlin are operated by O'Brien Environmental Energy, whose engine generator team were also busy helping hospitals and other institutions in the area. Generator set installations for additional power from the 100MW plus truck rental fleet that were not already shipped to California for the earthquake were rented out in New Jersey.

Cogen Europe

A NEW association created to promote the wider use of energy efficient, environmentally friendly cogeneration (CHP) schemes across Europe, has been established.

Cogen Europe is backed by national associations from six EC member states: UK the Netherlands, Spain, Germany, France and Greece. The association has received a commitment for kick-start co-financing support from DG XVII, the EC Energy Directorate.

The main areas of activity will be to identify barriers to CHP projects in Europe, and acting to reduce these at policy level; collaborating on relevant issues with other key European energy associations and industries, as well as quantifying the potential for CHP in Europe.

The development of Cogen Europe reflects the absence of clear recognition by national policy makers of the significant benefits of cogeneration schemes, be they industrial, small scale or city wide.

The European director of the UK's CHPA, Michael Brown, will act as Secretary to the new association.

First commercial methanol plant to open in Australia

METHANOL is to be produced in commercial quantities for the first time in Australia, at a $70m plant to be built by Australian company BHP Petroleum.

With an annual output of around 56 000 tonnes, the methanol research plant outside Melbourne will be small by world standards. However, it will use pioneering technology which will make it more compact and efficient than conventional methanol processing operations.

In addition the plant will make use of Australia's vast reserves of natural gas — an important factor as the country's confirmed oil reserves decline.

In the US and Europe there is already a strong demand for methanol and its derivative, methyl tertiary butyl ether, which is used as a petrol additive to increase octane and reduce toxic exhaust emissions.

Methanol is also an environmentally attractive fuel for power generation, with its lower emissions of gases which cause acid rain and contribute to the greenhouse effect per unit of power in comparison to conventional fossil fuels.

A key feature of the Australian technology will be a major reduction in the gas and liquid wastes generated by conventional plants. It will recycle most of the waste it produces, including the water and organic impurities separated by distillation.

BHP Petroleum, a major holder of natural gas reserves has spent about $12m since the 1980s on researching technologies for converting natural gas to transportable liquids, and achieving commercial viability for gas conversion products.

A new Swedish robot device controlled from a helicopter can check and repair power lines, without taking the line out of service. Dubbed 'Robhot' (robot for hotline works), the device has been developed by Swedish power transmission company Vattenfall Transmission AB, who has submitted a patent application. Of particular use for checking splices, the robot is lowered from the helicopter on a kevlar line. A fibre-optic link to the helicopter carries all the control and measurement signals, carrying out the work in a fraction of the time taken by conventional methods.

Orimulsion into Europe

A DRIVE to market the controversial power station fuel, Orimulsion, throughout Europe was launched at a seminar in Finland in early February.

The UK based company Bitor Europe gave a review of the fuel's progress and its marketing strategy to an audience of businessmen, academic and government representatives. Chief executive Dr Manual De Oliveira outlined the operation of two plants in the UK, and a further two in Japan, and told of successful trials in Germany, Italy, Portugal, USA Canada and Japan.

Expansion of Mochovce in Slovakia

THE SLOVAKIAN electricity utility SEP and Electricite de France (EdF) have ratified the articles of a joint subsidiary incorporated under Slovakian law to be known as EMO. EMO will take over the first two incomplete stages of the Mochovce nuclear power station.

EMO will be responsible for the expansion of the facility by completion of the first two stages, and upgrading them to Western safety standards.

The plant consists of four 440MW VVER 213 Soviet-type pressurised water reactors. The agreement, which covers only the first two stages, will be a showcase for similar units currently in use throughout Central and Eastern Europe.

In addition, EdF has ratified a cooperation agreement in Sofia, Bulgaria. This outlines the scope for cooperation between EdF and its Bulgarian partners, the Bulgarian Energy Committee and the Bulgarian National Electricity Corporation, over the next three years. It calls for the establishment of permanent consultative bodies and bilateral financing of priority measures to improve nuclear safety. Cooperation began in 1991.

Coal privatisation — whose authority?

CENTRAL to the government's proposals for privatising the British Coal Corporation is the establishment of a Coal Authority. An impartial body charged with the responsibility of granting licences to private sector companies, the Coal Authority would carry out responsibilities for the physical legacy of historic mining, if it has not transferred elsewhere (eg, subsidence), and providing mining information to local authorities, planning bodies, etc.

While the establishment of a Coal Authority appears to be a convenient half-way house between the interests of future owners whose main concern will be to produce coal at costs competitive with alternative fuels, and those inescapable liabilities of an extractive industry in a developed society, it became clear in the Commons debate at the Bill's second reading that a much clearer definition of the Authority's duties, responsibilities and financial structure will be necessary if it is not to become a convenient repository for any unwanted responsibilities — either from the government or the industry's new owners.

The committee stage of the Bill promises some lively arguments, and Ministers would be wise to avoid appearing to steamroller unwelcome criticism. More so than any other previously privatised industry, coal comes with a mighty baggage train of historical liabilities which have to be properly accounted for if the whole privatisation is not to sink for want of suitable benefits to offset liabilities and keep it afloat.

Observers of the coal scene have been quick to point out that apart from the physical assets of the pits, there is little on offer to attract investors who will judge the value of the industry, not by the number of nuts and bolts on offer, but on the long-term commitments of customers for the product.

And they are very thin on the ground. By the time the Privatisation Bill becomes an Act, little more than three years will be left to run of the present five-year contracts with National Power and PowerGen, the only major outlet for the bulk of the coal being produced by the remaining deep-mine pits (perhaps 15 or possibly as few as ten) which will go to make up the five competing mining areas which the Bill proposes slicing the coalfields into. This year, the take of coal by the two generators will be down to 30 million tonnes, and will remain at that level until the contracts expire. And after that? Who knows.

Not a very encouraging scenario for prospective investors who, on the other hand, may find themselves saddled with obligations for subsidence costs (historical and current), land restoration at abandoned deep mines as well as opencast sites, health and safety provisions (not the least of which might be liabilities for ongoing conditions like pneumoconiosis, industrial deafness and other hazards), a mines rescue service, new pension schemes, miners' welfare and concessionary coal, among the weighty obligations now shouldered by British Coal.

The government's present intention appears to be to minimise the Authority's role to as close to that of a single licensing body as is possible, and appears to be calculating its size and annual budgets on the basis of the number of licences issued per annum. If the contrary view prevails — and it is one supported not only by many opposition members, but also by many of the government's back benchers and city advisers — then the Coal Authority may yet emerge as a strange animal, part beast of burden, part lord of the jungle, with powers and responsibilities akin to many of those loaded by successive administrations on the old National Coal Board, yet without its ability to meet obligations through its monopoly position in the market place.

Much will be thrashed out in committee, and although Energy Minister Tim Eggar may find that his place at the table may become a hot seat, nonetheless he would be well advised to think very carefully about many of the changes that will be proposed to him if he is not to go down in history as the Minister who turned the 'ultimate privatisation' into an ultimate rout.

OFGAS backs MMC on gas tariff price formula

THE DIRECTOR GENERAL of gas supply, Clare Spottiswoode, has decided to implement recommendations of the Monopolies and Mergers Commission (MMC) on the gas tariff formula without change. The formula sets a limit on the prices which British Gas can charge domestic and smaller business customers.

In its report on the gas industry published last summer, the MMC recommended several changes to the formula to take account of British Gas' loss of market share since competition was extended to all customers using in excess of 2500 therms per annum.

Ms Spottiswoode is proposing to amend the value of X in the RPI-X element of the formula from five to four. This change is intended to strike a balance between the need of British Gas to attract capital and the interests of consumers in maintaining low prices.

It is also proposed to reduce the scope of the formula only to cover customers under the 2500 therm threshold. The price control formula is intended to be a substitute for competition in markets with a natural monopoly.

Ms Spottiswoode also intends that the formula should protect customers from the costs of restructuring British Gas.

Under the Gas Act 1986 the director general must have regard to MMC recommendations, but need not necessarily follow them to the letter. In this case it has been decided to implement them in full.

Interest low, despite awareness

A RECENT Gallup survey, commissioned by Eastern Electricity suggests that UK businesses have been slow to take up the benefits of the approaching deregulation of the electricity market.

Despite the apparent lack of interest, a high level of awareness about the extension of competition was revealed by the survey, with more than 83% of companies in the new 100kW market being fully cognisant of the changes. Of these 77% realise the changes could mean reduced bills.

Peter Bennell for Eastern Electricity said: "We expected a much lower level of awareness because so few companies seem to be exploiting the opportunity.

"We believe that many companies are staying close to their existing supplier because they are not sure how to approach the new market.

In terms of important considerations when choosing a supplier, price was ranked first by 100% of energy managers. Reliability followed a close second (97%) with good customer service in third place (89%).

The reluctance to explore the market may stem from the belief among up to 40% of those questioned that the changes involve an increased work load.

An additional factor could be that 28% of those qualifying for the market did not think they would be affected by deregulation. Some 73% claim to have been contacted by at least one of the electricity companies concerning the 100kW market.

Mr Bennell added: "Our success so far has been in signing up our existing customers. Those outside our area have been much slower to respond.

"To some companies the deregulation of the market may seem some way off, but now is the time to act in order to seek out the best deals. The contract with a supplier must be signed by 1 March 1994 to be ready when the market takes effect."

Production to resume at Clipstone

CLIPSTONE colliery, the first of 28 pits offered by British Coal to the private sector, was formally handed over in late January.

Lease and licence terms were successfully negotiated by RJB Mining plc to resume production at Clipstone, near Mansfield in Nottingham.

Production ceased at Clipstone in April 1993 as part of British Coal's closure programme. Following the Coal Review White Paper the mine was placed on care and maintenance and offered to private sector investors.

Proposals from private operators to resume production at a further five collieries are at various stages of negotiation. RJB Mining has also submitted tenders to resume mining at Rossington and Markham Main collieries in Yorkshire, with competing tenders from Coal Investments plc.

British Coal and Coal Investments are also negotiating over the company's proposal to resume mining at Trentham Colliery in North Staffordshire. Proposals by Coal Investments to resume production at Coventry Colliery in the West Midlands are also being discussed.

Prime Minister John Major on a recent tour of diesel engine manufacturers, the Perkins Group, in Peterborough. Mr Major was there to present the internationally recognised quality standard ISO 9000 Series. From left to right: Minister of Health, Rt Hon Dr Brian Mawhinney MP, Tony Gilroy, Perkins Group chief executive, the Prime Minister and Myles Coleman, Perkins General Manager Manufacturing.

Review needed urgently

THE BRITISH Nuclear Industry Forum has urged the government to start its proposed nuclear review as soon as possible.

Mr Roger Hayes, director general of the forum, was responding to the Department of the Environment report on sustainable development. "Nuclear power has a central role to play in sustainable energy policy. If Britain is to maintain its position we need to start building Sizewell C and other new stations very soon."

Progress on standards' review

THE OFFICE of Electricity Regulation (OFFER) has welcomed progress made by the National Grid Company (NGC) in its review of transmission security standards.

The review was instigated by OFFER's 1992 report into the operation of constrained-on plant. This noted that the transmission system is protected against consequences of faults regardless of whether or how often such faults occur. It cast doubt on whether the high costs of this were always justified by the value customers place on the additional security, and requested a review of both operational and planning standards by NGC.

Customers have been invited to give their views on the most likely options for change. Decisions could be based on cost-benefit analysis, and operating rules relaxed to save costs where increased risks of supply failure were outweighed by the savings. NGC expects to submit its final report in March.

New role for HSE

AS FROM 1 February 1994, the Health and Safety Executive (HSE) has taken over from Nuclear Electric the UK's international reporting functions in connection with the international nuclear event scale (INES).

The post of the INES national officer will be in the HSE's nuclear safety division at its policy branch based in London.

INES was introduced in 1990 as a tool to communicate promptly and consistently to the public and the media about the safety significance of nuclear events. Those related to nuclear or radiological safety are rated at one of seven levels. The highest (seven) represents a serious accident causing a major release of radioactivity with widespread environmental effects. Events of no safety significance are rated below scale, ie at level zero.

INES was developed by an international group of experts, convened jointly by the IAEA and the Organisation for Economic Cooperation Development's Nuclear Energy Agency.

North Sea developments

A NEW gas discovery by Conoco (UK) Ltd and BP Exploration Ltd has signalled the possibility of additional gas field developments in the southern North Sea.

The discovery was made in block 49/16, a mature gas production area some 85 miles off the Lincolnshire coast, close to the Viking gas field, which has been in production since 1972.

Exploration well 49/16-11 was the first exploration well to be drilled in the area since 1973. It was drilled to a depth of 9743 feet by the ENSCO 92 jack-up rig. During tests the well flowed natural gas at a rate of 73.4 million standard cubic feet per day from the Rotliegendes Leman sandstone formation through a 96/64 inch choke.

The operator, Conoco, holds a 50% interest in block 49/16 in partnership with BP Exploration Ltd, who also hold a 50% interest.

Block 49/16 was awarded to Conoco and BP in the first round of offshore licensing in 1964.

A helping hand with electricity purchasing

A SOFTWARE package has been developed by PowerGen to help industrial and commercial energy users assess competing supply offers.

The extension of the second tier market to users above 100 kW offers the benefits of increased supplier choice, but can create complexities. Understanding the various contract and tariff styles used by suppliers, and then making accurate comparisons can be extremely time consuming.

PowerGen's Ergon 2 produces a 'like for like' comparison of supplier's quotations, and makes short work of analysing and ranking the costs of maximum demand, seasonal time of day as well as other forms of contract on offer.

Taking the mystique out of the competitive electricity market: Ergon 2 is available either pre-loaded on a Notebook PC or on IBM compatible disks. The package can access offers of supply on a single site basis or on the aggregation of all sites operated by a company, highlighting best individual buys or for the whole contract.

Controls NOx, increases efficiency

A NEW product from Stokvis has the dual benefits of reducing NOx emissions, whilst increasing efficiency in steam production, which in turn leads to a reduction in fuel consumption by up to 21%.

The EcoNOx Hydro Induction System has already been installed in large boiler plant throughout Europe, and is helping industry to meet EC pollution control legislation.

The system uses the mechanism of fuel/oil water emulsion burning, which has shown that increased heat transfer rates can be achieved, coupled with an elimination of deposits on boiler fireside surfaces.

Although most modern oil burners are efficient, they become less efficient when the demand for steam or the rate of heat transfer from the burner (combustion zone) is limiting. An excess of heat will accumulate within the burner, resulting in higher flame temperatures and free carbon deposits on the tubes. Heat transfer rate is then reduced.

The quality of atomisation and the distribution of droplets within the primary air stream are also limiting factors, making it necessary to control the secondary air supply to a minimum level. This restriction is necessary to allow complete combustion within the furnace tube, and optimum efficiency, without creating high levels of particulate emissions.

With the Stokvis EcoNOx system, water/oil emulsion burning enhances the process by improving atomisation and providing an extra source of free oxygen. The rate of combustion is increased, with a higher flame temperature, allowing a reduction of secondary air volume and minimising particulate emissions.

The atomised emulsion is in the form of water droplets whose surfaces are covered with fuel oil. On entering the combustion zone the rapid increase in temperature 'explodes' each water droplet into steam, atomising the surrounding fuel oil. The 'separated' mixture recombines with free oxygen, producing water vapour which in turn combines with carbon deposits on the boiler fireside surfaces.

The process sounds complex, but the results are clear. The overall rate of heat transfer is increased and clean surfaces are maintained thereafter. For details ring R S Stokvis & Sons Ltd, tel: 081 941 1212; or fax: 081 941 4136.

REC enters gas market

NORTHERN ELECTRIC has set up a company offering business access to natural gas.

Gas UK claims it can offer significant reductions in costs to business customers in the North East. British Gas will still be responsible for the delivery of the gas through the national gas grid, as well as for safety.

NAMAS accreditation

CRE, the Cheltenham-based energy and environmental consultancy, is the first in the UK to gain accreditation for their mobile laboratories for air pollution emissions measurement under NAMAS, the National Measurement Accreditation Service.

The aim of the accreditation exercise is to minimise disputes over sampling and analysis of air pollutant emissions and to eliminate the need for retesting due to anomalous results. This gives companies who have implemented BS 5750 or ISO 9000 the opportunity to use a quality-assured consultancy for stack emission assessments.

UK's largest 100kW deal signed

REGIONAL electricity company, Eastern Electricity, has announced a supply contract with over 500 McDonald's restaurants throughout England and Wales.

Estimated to be worth around £12 million annually, the contract is the largest and most comprehensive deal announced so far as the electricity supply market opens up to wider competition.

Eastern Electricity claim that under their 'Power-Plus' package, the tailor-made contract could save the customer a substantial sum on their annual electricity bill.

Included in the package is Eastern's Appraise 100+ software programme, to enable the customer to manage its energy consumption more effectively.

Coalite contract for BC

A £100 million coal supply deal between British Coal and Coalite was announced at the end of last year.

The five-year agreement is for 2.5 million tonnes (mt) of coal, which will go to Coalite's manufacturing plants at Grimethorpe in Yorkshire and Bolsover in Derbyshire.

British Coal's Marketing Director, Andrew Horsler saw the deal as a vote of confidence for British Coal in the industrial market.

Coalite, which employs 650 people, will take the coal — low ash 'smalls' — at a rate of 500 000 tonnes a year. The company's total output will be made from UK-mined coal.

In addition to the Coalite deal, British Coal has secured contracts in the industrial market, representing 2.5 mt per year, including some business won back from imports in the steel and cement sectors. Alcan, ICI, Du Pont, British Sugar, Castle Cement and Blue Circle have all made recent agreements.

The benefits of data collection in the new 100kW market

by Geoff Boyes

NEW developments in the way companies are able to buy electricity will enable many businesses to make considerable savings on the cost of their power and provide opportunities for better energy management, due to improved availability of information. The conditions which facilitate this were created with the privatisation of the English and Welsh electricity industry in 1990.

The long-term aim of the electricity privatisation was to afford all customers, whether residential, commercial or industrial, the choice of where to purchase their electricity. Prior to privatisation, most generation was undertaken by the state run CEGB who supplied 12 local area boards via a transmission system, known as the national grid. Under this system, consumers were bound to purchase their supply from their local area electricity board.

Privatisation split the bulk of the power generating capability between three newly-formed companies: National Power, PowerGen and Nuclear Electric. In addition, The National Grid Company plc (NGC) was formed to maintain an efficient coordinated and economical system of electricity transmission and to facilitate competition in the supply and generation of electricity. The local area boards were also privatised as regional electricity companies (RECs) and a number of them have since started to build their own power stations.

Unique experiment

No other country in the world has attempted to provide the degree of individual consumer choice proposed, so there was no experience to draw on. This meant that the introduction of the deregulated market was planned in three phases with the UK's 25 million electricity customers divided into three distinct customer categories to take advantage of the new regulations at predetermined dates.

The introduction of competition into the electricity supply market has, so far, been a complex business — probably far more complicated than anyone might have imagined, and the process is by no means complete, with competition being extended to all customers by 1998. However, there are a number of software packages on the market to smooth the transition from monopoly to competition in the 100kW — 1MW market.

In the first place 4500 electricity users with an average demand of greater than 1 MW were given the option to be classed as second tier customers. A second tier customer being one who elects not to purchase from their host REC, but to deal with one of the other licensed electricity suppliers, those customers who decide to stay with their host REC are referred to as first tier customers. At present there are approximately 1500 sites where users have exercised their right to buy competitively as a second tier customer and, as a result, many make considerable energy cost savings.

The second phase of the plan dictated that by April 1994 this right would be extended to users with a maximum demand in excess of 100 kW and finally to all UK customers, including residential, by 1998.

On the 1 April 1994 this extended second tier market will include over 50 000 sites at 27 000 companies which have a demand between 100 kW and 1 MW. Industry experts predict that around 15 000 of these will take up the option in the first year.

The definition of a 100 kW site is that their highest demand in three different months under normal operating conditions in the past year, must have been above 100 kW. In practice, eligible companies are most likely to be businesses which have an annual electricity bill of greater than £10 000. Users can also gain an indication of eligibility if they have the type of meter which measures maximum demand. They will almost certainly be eligible if they have a metering system incorporating a voltage transformer.

The author

Geoff Boyes has over 20 years experience in the electronics and instrumentation industries. Following his graduation with an honours degree in Physics from London University, he spent a year on the Marconi company's graduate training scheme at Chelmsford. He then joined Marconi Radar Systems as an electronics engineer, where he worked on a number of civil and military systems, specialising in the data processing and data acquisition aspects of radar systems.

After a spell with Electroplan, an instrumentation and test equipment company, he joined the UK division of Bell and Howell, where he was responsible for marketing real-time process control computers.

He joined the US-based semi-conductor manufacturer Analog Devices in 1975 and was initially responsible for one of the first generation microprocessor-based data acquisition systems. He then became the marketing manager of the company's UK division in 1984.

For the past seven years he has been with industry consultants EML and has recently taken a particular interest in electricity privatisation and energy matters.

Geoff has written widely about many aspects of the electronics and instrumentation industries and is the author of two fairly esoteric reference books.

If they meet the 100 kW criteria, second tier users will be able to purchase their electricity from any licensed suppliers. To be a licensed supplier a company has to be a member of The Pool. Conceptually, The Pool is a set of commercial arrangements for the wholesale trading of electricity on a half-hourly basis. Energy transferred in and out of the Pool is monitored by accurate meters at its commercial interfaces.

Licensed suppliers may be generators, manufacturing companies or independent traders as well as the traditional suppliers, the RECs. In practice however, some suppliers have been more anxious than others to promote themselves as second tier suppliers, those on the eastern seaboard of the country being the most active.

In addition to purchasing from a supplier, it will be theoretically possible for second tier customers to purchase directly from the Pool. However, in order to purchase from the Pool, a supplier licence is needed and it is unlikely that companies, other than those with a large number of sites using in excess of 100 kW will take advantage of this option. However if a first or second tier customer using more than 100 kW wishes to have their supply costs related to pool prices they are able to negotiate a pool-related contract with their suppliers. Such contracts give companies the opportunity to take advantage of favourable price fluctuations and reduce the risk to the supplier.

One of the obvious questions when considering investigating second tier supply is why should it be possible to buy most cost effectively from one supplier than from another? In practice, the answer is that it depends on the volume and predictability of the users demand and the skillful buying policy of the supplier. So, customers with high constant loads will be able to negotiate good rates as will those which have a large number of sites, such as multiple retail outlets, as the sum of their load is high.

The key questions which any customer investigating second tier supply is bound to ask is what savings can be made? Unfortunately, there is no simple answer to this, as it depends on many factors such as average maximum demand, demand profile, number of sites and predictability of demand.

It obviously makes sense to stay with a current supplier who is giving good service, and in the new, more open market, your host REC may be able to offer you a new supply contract that is advantageous to both parties. Some RECs are providing incentives for their customers to stay with them, offering to cut existing customer's bills by up to 8%, sometimes backdated as a loyalty bonus.

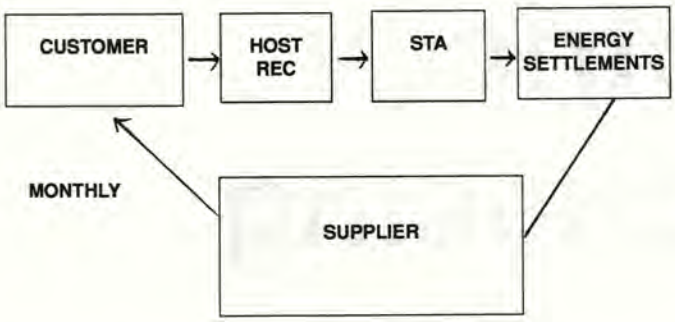
A customer wishing to take advantage of the extended second tier electricity market will, as the first step, need to arrange for the installation of a specially approved meter and communications link. The new style meters, known as 'code five' meters, measure electricity usage every half hour, and can be read remotely at any time.

Code five metering systems are installed at sites with a demand up to 1 MW. For those sites with a demand of 1 MW or above different meters will be fitted. For demands between 1 MW and 10 MW a code three metering system will be used, for demands between 10 MW and 100 MW a code two metering system is needed, and for demands in excess of this a code one metering system is required.

The customer has freedom of choice over where and how to obtain their meter. Some suppliers lease them or offer lease purchase agreements, or the customer can elect to purchase outright. But the installations and maintenance must be carried out by an approved Meter Operator.

The Meter Operator is appointed by the customer and is responsible for the care and maintenance of the metering system, in order

Software programmes can prove to be an important tool for the validation of electricity bills.



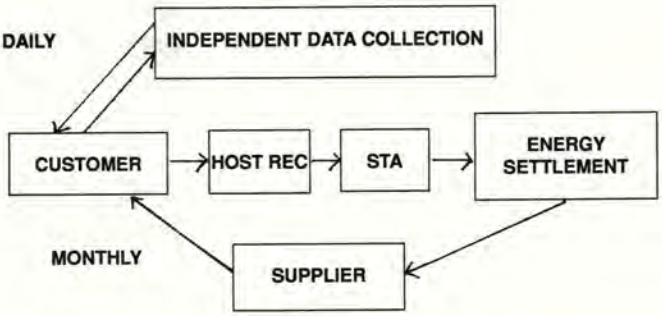


Fig 1:(left) Normal data flow; Fig 2: (right) Data flow if an independent data collector is used.

that accurate electricity consumption data is recorded. In addition, the Meter Operator will ensure that the meters are correctly calibrated, undertake registration of the system, keep records and provide the necessary communication links.

Second tier agent

The half-hourly information collected from the user's site is required for the calculation of pool payments by Energy Settlements and Information Systems Ltd, a company appointed by the Pool as Settlements Systems Administrator (SSA). Energy Settlements have in turn appointed an agent to collect, process and transmit the data — this agent is UKDCS Ltd (UK Data Collection Services Ltd) who are also known as the second tier agent (STA).

Generally speaking the communications link with the STA will be by means of a PAKNET radio network. However, the meter operator could also arrange for the information to be transferred via other communications links such as the public switched telephone network (PSTN) or private networks. Interestingly, the cost of providing the communications link will not be directly charged to the user; it will be paid for collectively by all the 100 kW suppliers, who will recover it from the customer.

All of the RECs are offering a meter operator service, although a number of independent companies have also entered the market, many of these are independent of all communications systems suppliers and meter manufacturers. They provide users with impartial advice on the most suitable metering system for their site, supplying metering systems on a contract that passes ownership of the metering system to the customer when the contract period is complete.

Information flow

Data collection services compliment meter installation and operator services, giving users daily access to their half hourly demand data for energy management or accounting purposes. The benefits a customer will get from this service are illustrated in Figures 1 and 2.

Figure 1 shows the normal information flow between a second tier customer and Energy Settlements. In this case, information is routed from the customer's meter to a regional centre run by the host REC then on to the STA which passes it to Energy Settlements. The information is subsequently passed to the supplier who then offers it, often on a disk, to the customer. However, this means that the customer generally does not have access to a particular period's usage information until half way through the following month.

Figure 2 shows the data flow if data collection service is used for collection and onward transmission to the STA. The difference here is that the customer receives the demand information every day and it is the same data used by Energy Settlements for its settlements activity. Not only does this allow costs to be identified as they are incurred, but the data can also be used to check the invoice when it arrives. Furthermore, the information can be used for other bill and energy management purposes using one of the many software products available on the market.

Significant savings

Customers who are not planning to join the second tier market and choose to remain with their host REC on a Pool-price related contract may still be able to take advantage of the benefits available from the installation of a data collection system. New code 5 meters will be required to enable the host REC to calculate the customer's bill. The meter may be installed by any approved meter operator or the host REC. Subject to agreement by the host REC, a data collection system can be used by the customer to access his half hourly demand data. This data can be used with proprietary bill management software for bill checking, bill prediction and also for energy management purposes.

Some companies which have taken this step are now making significant savings on their electricity costs simply by having access to real time demand data and being able to relate these to Pool pricing.

The information is generally presented in easy to use graphical or tabular formats showing the half hourly demand data from individual meters, total loads and maximum demand. The user interface is security protected by a password system so that only cleared personnel may access the information. Most such software is menu driven and simple to operate, allowing users to switch between displays, and facilitates general ease of operation.

The electricity consumption information gained from such systems can be invaluable for assessing the feasibility of entering the second tier market. The actual usage data can be entered from the disk supplied by the supplier or direct from the customer's own data collection system, the latter providing a truly independent validation.

These systems provide graphical representations of electricity usage which can be easily printed out for report purposes. Should discrepancies appear between the electricity cost as calculated by the supplier and that calculated by the system, the software allows the cause to be easily identified.

Other software modules are available which allow contract assessment by potential 100 kW second tier users, enabling them to compare the contracts offered by the various suppliers.

For many, 1994 will be a watershed for the UK's electricity industry, and an acid test for the success of privatisation, has hitherto been restricted to a relatively small number of users. The big test will come when 53 000 additional customer sites fall into the new extended second tier category, and it is clear that the major factor determining customer acceptance will be the metering and data collection systems available and the additional benefits which they will bring. ❑

Electricity purchasing

*by Peter Woodhart**

Still confused about the arrangements for the extension of competition into electricity supply to 100 kW customers? Here the author of a guide on the subject gives a brief resume of the new second tier market.

ALL ELECTRICITY supply industries, throughout the world, perform four basic business activities — generation, transmission, distribution and supply, although the different industry structures often blur this apparently simple statement.

The privatisation of the UK electricity supply industry (ESI) in 1990 introduced limited competition in two of these areas — generation and supply to major electricity consumers. Since transmission and distribution are natural monopolies, these activities do not have direct competition and the Office of Electricity Regulation (OFFER) led by Professor Stephen Littlechild, simulates competition through price control mechanisms, and the publication of inter-company comparisons. Electricity transmission in England and Wales is managed by The National Grid Company and distribution by the 12 regional electricity companies (RECs). As often is the case — arrangements in Scotland and Northern Ireland are handled somewhat differently.

In generation, the state-owned Central Electricity Generating Board (CEGB) was broken up into four separate companies — National Power, PowerGen, Nuclear Electric (which remained in public ownership) and the National Grid Company, responsible for long distance, high voltage transmission. The National Grid Company is currently owned by the 12 RECs in England and Wales. The three generating companies now compete with each other, and other companies, to supply the new electricity pool and from the outset, in the case of National Power and PowerGen, to major consumers directly. Nuclear Electric has also recently been awarded the appropriate licence so as to be able to supply customers directly. The RECs are also able to build and operate, or have equity stakes in, new generating companies, and the three Scottish companies, Hydro-Electric, Scottish Power and Scottish Nuclear, also generate electricity. Some electricity is imported from the French state-owned electricity company, Electricite de France (EdF), via a cable under the English Channel.

In supply, all electricity consumers with a peak demand greater than 1 MW are able to shop around to any of the new RECs, the major generators, Scottish companies and other new players in this market. The competitive electricity market was initially restricted to around 5000 large UK consumers. Under circumstances where an organisation elects to obtain its electricity supply from a company other than the local REC, the electricity is distributed to the customer in the usual way, but the local REC then charges the competitive supply company for the use of its 'wires', or distribution network. For an electricity supplier to operate in this competitive supply market requires a second tier supply licence (granted by OFFER). It is not possible in this short article to explore the reasons why a second tier supplier can sometimes offer lower prices than the local company, but the market evidence is that this is very possible and some large customers have achieved savings of 10% and more.

All change

In Scotland and Northern Ireland, the situation is different. Following privatisation, Scotland was left with two vertically integrated electricity companies and a single nuclear generator, which, like Nuclear Electric, remained in the public sector; and Northern Ireland has several small generators and a single company responsible for transmission, distribution and supply.

In April 1994 the rules change again. From this date, any consumer with a peak demand for electricity greater than 100 kW at a single site will be eligible to join the new competitive electricity supply market. Peak demand is defined as the average of the highest three months during the previous 12 month period, and usually requires special metering to be installed.

These changes to the franchise threshold will permit a further 45 000 organisations to seek new supply agreements from either their local company or a competitor, and thereby have the potential to reduce electricity costs and gain other service-related benefits. These new organisations will include small to medium-sized industrial sites, commercial properties, hospitals, universities, colleges, large schools, local government, hotels, farms and many others. Anyone with an annual electricity bill greater than around £10 000 (lower in some cases) will be able to buy their electricity from the competitive market. In 1998, all restrictions will be lifted and all customers will be able to buy competitively.

However, the new arrangements are not entirely straight forward, and to clarify the situation an independent *Guide to Electricity Purchasing* has been published. The new competitive supply opportunities bring both advantages and disadvantages, and those organisations who are not experienced in this area will benefit from the information contained in the guide.

The publication contains a foreword by Tim Eggar MP, Minister for Energy, together with contributions from OFFER, meter manufacturers, and one of the major electricity companies. The guide also contains the results of interviews with existing 1 MW consumers and gives advice to consumers new to this market on how to go about buying electricity in the new competitive environment. The guide has recently been reprinted due to popular demand, and now includes the latest information on second tier suppliers, such as Nuclear Electric's entry into the second tier supply market.

● *Copies of the guide are available from Peter Woodhart Associates, price £28, plus £2 postage, from PO Box 177, Staines, Middlesex TW18 1BW. Tel: 0784 461879; fax: 0784 453132.*

*Peter Woodhart Associates

Serving the gateways to the world

by Richard Gardner

In March 1993 London Electricity acquired the electrical distribution networks at London's major airports in a £90 million deal with BAA. Heathrow, Gatwick and Stansted together require the equivalent electrical demand of a city the size of Cambridge, and Heathrow alone handles some 45 million people a year — more international passengers than at any other airport in the world. Richard Gardner reports on how the new management team has faced up to the challenge.

There is no doubt that the innovative agreement reached last year between BAA and London Electricity was a very good deal for both parties. For the airport management it removed a non-core activity which required specialist skills and manpower resources in order to support several complex and constantly evolving electricity distribution networks. For London Electricity it brought a very dynamic and highly valuable slice of new business within the regional electricity companies' (RECs) non-regulated portfolio, creating almost perfect synergy with its mainstream core activities.

For the staff it has been an exciting and challenging transition, broadening the career prospects of those ex-BAA specialists who were previously 'niche' operators in an aviation-orientated business. Those who have come in from other posts within London Electricity have found their new role a fascinating introduction to a really exciting environment. As for the customer ... well, according to London Electricity Services Managing Director, Ron Barnes, the whole exercise has been carried out with no visible change at all, apart from the emergence of a smart new LES logo on an increasing number of new signs and service vehicles dotted around the airports. The high degree of industry experience and local knowledge enjoyed by the new management has ensured that the service has continued uninterrupted, with no discernable settling in period as far as the outside world is concerned. In view of the complexity of the task, this must be seen as no mean achievement.

How did the new organisation set about taking over from the well-established BAA personnel, and what exactly has been taken over? Ron Barnes is particularly proud of the way his new team has come together from previously separate companies. "We did not buy a business on 25 March 1993. We bought revenue earning assets. We had to set up a new management team and create a business around those acquired assets. We also had to achieve a seamless handover for the benefit of all airport users and customers. As we are now approaching our first anniversary, I can say that all our initial targets, both operational and financial, have been met."

Most of the existing BAA personnel transferred to LES, and only a few elected to be transferred to other BAA departments. Some staff agreed to temporary secondment to LES as new replacements from LE familiarised themselves with the task in hand. Brian Gaffney, electrical construction engineer,

The new management team drew staff from both BAA and London Electricity.

The author

Richard Gardner is an independent consultant and writer specialising in transport and technology. He started his career with BAA public relations and has been closely involved with aviation and transport ever since. After a period of working in the Government Information Service, he was a consultant to the European Airbus programme. Other major clients included THORN Automation industrial products and THORN EMI Electronics. More recently he has working with London Electricity as the RECs take steps to implement the latest expansion of competition policy into the 100 kW market.

kept his existing job, but moved across to LES from BAA. "I think the key to our success has been the total commitment everyone has made to the new organisation," he told Energy World, "At all stages we have had real enthusiasm and a feeling that we are building something together. The staff have adopted new LES procedures and I can honestly say that everyone is keen to show that our business can be further improved as time progresses. A big advantage of employing most of the present team has been the continuity of teamwork and maintaining our contacts with BAA and other airport customers. This, combined with our knowledge of the existing network means we are well-placed to oversee the new investments and improvements that are taking place to upgrade systems and construct new facilities. This has enabled us to make a growing contribution to the various development plans and new projects that are underway wherever you look."

Planning

Brian Gaffney regularly attends meetings with BAA project teams who are planning for new terminals and other facilities. It is essential that the electricity distribution requirements are taken into account at the earliest stages, or development work could run into serious difficulties when construction begins. It was pointed out that within the Central Terminal Area at Heathrow, for example, it was impossible to excavate so much as a cubic metre without disturbing power lines, cables, ducts and pipes. The task of recording every single cable and circuit diagram is immense. Thousands of circuit drawings have been inherited from BAA and all information is gradually being computerised. Every sub-station, switchgear, transformer and cable run must be checked with available records, with any changes double-checked and recorded. Because of the high profile nature of the main airport business, it is essential that a secure and well maintained supply is provided to all customers, ensuring there are a minimum of electrical distribution failures.

Distribution

Under the terms of the BAA acquisition London Electricity purchased the external high and low voltage electricity distribution systems of the three London airports. London Electricity Services is now responsible for the operation and maintenance of these systems and an annual fee is currently being paid by BAA. As electricity demand grows, with the expansion of airport business, LES will benefit through additional fees and also as a result of making improvements to the efficiency of the operation. Already there is evidence of LE's strengthened negotiating power obtaining new equipment and services at better rates than was previously possible. In addition, LE can draw on a wealth of experience in the efficient running of distribution networks and LES, as a subsidiary of LE, has ready access to this knowledge and network of contacts. Distribution of electricity to two million Londoners is, after all, LE's core activity, and such practical changes as more flexible working agreements in LES are merely an extension of proven business practices. There is therefore no risk element involved in introducing many of the improvements.

At Heathrow a visit to a substation can involve a ten mile round trip.

Despite the fact that the acquisition took place during one of the worst periods of economic recession this century, the international civil air transport industry has continued to grow in terms of aircraft movement and passengers and cargo handled. The downturn in growth is seen by all aviation economists as a temporary phase, and varies considerably from region to region, but traffic has not actually declined and is forecast to expand at a cumulative annual rate of around 5% over the next fifteen years.

Expansion

Heathrow is bulging at the seams, and is thought likely to increase its electricity requirements by 70% by the turn of the century. There are several major expansion programmes underway to cater for additional aircraft parking areas and to deal with the use of ever-larger aircraft. As terminals are extended to give more room for 'interlining' (transit) passengers, to give just one example, there is a need to upgrade the electricity distribution networks and to make sure that installation and servicing of equipment is coordinated with the rest of the construction programmes. At Heathrow's Terminal One there is a new substation being constructed within the new building to be used for transit passengers. Leases for new substations need to be agreed with BAA prior to work commencing to ensure all the legal and technical aspects are complied with.

The projects determine the levels of investment and general activity. Of the current figure of some £2 million capital expenditure, the majority is earmarked for Heathrow, where it is undoubtedly needed most. Gatwick has also seen rapid expansion in recent years, and Stanstead is in many ways the showcase example of a high-tech 'designer' airport, ahead of current capacity, but no doubt well placed for future traffic expansion.

For those staff who have arrived from other locations within LE, working at the airports has brought new disciplines and special needs. The maintenance teams must have access to their network facilities which are scattered over dozens of square miles, at each airport. Some equipment is 'airside' — ie, in the operational aircraft manoeuvring areas beyond the customs and security barriers — and some are 'landside' within the airport boundaries which tend to have more open access. Radio contact is essential when engaged on these mobile duties and there are very strict operating rules and regulations which all 'airside' personnel must comply with for safety reasons. All staff have to have security clearance and special passes.

Size

For most LES newcomers the prospect of driving around the vastness of 'airside' Heathrow is pretty awesome at first, with its low horizon and maze of perimeter roads, taxiways and runways. The sheer size of the place might mean that a visit to a substation can involve a round trip of ten miles from the headquarters building on the North Side, so scheduled maintenance and equipment inventory and circuit checks have to be well planned to avoid much wasted time in transit, double tracking to a location, or simply get-

ting lost! With so much construction work underway at different airport locations, it is not always too obvious where the electricity distribution facilities are to be found. The need to visibly check out all these sites to confirm ownership of certain assets, and to compare findings with what is on record, and marked on maps and diagrams, is an aspect of the programme that has absorbed much effort over the first year. It is likely to remain an on-going requirement in the years ahead as modifications are made and as new fittings replace old. But it should get much easier once the computerised data-recording system is fully up and running.

Within LES the new management is bringing in more sophisticated test equipment, and the organisation now has to comply with LE's stringent safety rules. Training ranks high in importance and the specialist nature of the work, compared to more general airport activity, no longer presents an administrative challenge, for the management, as it is dedicated to the business of electricity distribution. Because LES can benefit from all the advantages of belonging to the much larger LE parent organisation, the overall service it offers the airport users is of the highest standard. This paves the way for profitable business as the economies of scale generate a momentum of their own. It might be surprising to learn that LES has a staff of just 30 at present. This includes a few remaining secondees from BAA and LE.

The network

The HV/LV airport networks are all underground. The acquisition last year did not include runway lighting, landing and taxiway systems and fixed ground power for aircraft, for which BAA continues to have responsibility. The thousands of street lights throughout the airports are also served by the LES-run networks. Included are compounds, 170 substation buildings, over 1000 switchgear units and 800 HV/LV transformers and nearly 660 km of HV cables plus maintenance vehicles and associated specialised equipment.

The administrative buildings are leased from BAA and at Gatwick comprise offices in the historic 'beehive' structure, which was, in pre-war days, the world's first circular 'island' terminal design, complete with telescopic covered loading bridges. Today it is isolated from the operational airport by the A23 Brighton Road, but nevertheless provides the local LES team with a popular and unusual base.

Altogether the three airport sites have an aggregate demand of 96 MVA. There have been no increased customer charges resulting from the new arrangements and BAA's direct relationship with its customers, such as the airlines, baggage handling companies, retailers and other service companies, continue as normal.

Because of the greed service standards set out in the LES/BAA contract, it is clear where progress is expected in the future. In the simplest of terms, London Electricity Services must provide for security of electricity supply to BAA within strict CAA-imposed guidelines. This means that the structure must be maintained to the highest possible standards and improved in line with evolving needs. On the basis of what LES has achieved so far, in less than twelve months, it looks as if they and BAA are set to continue a highly beneficial partnership in the years to come. ❑

Chernobyl: a hard road from past to future

by Yuri Alexeichenko

In 1992 *Energy World* published an article on the after effects of the Chernobyl accident in the former Soviet Union, based on a report by the IAEA. It seemed the aftermath was not as serious as had been feared: a view challenged here by an author from Belarus — the country which has suffered most as a result of the accident in 1986.

An article in *Energy World,* March 1992, by Norman Worley presented the West's view of the Chernobyl accident and its aftermath. The article was based on the information contained in reports of several international organisations, such as IAEA, WHO and UNSCEAR. The general tone was that the situation now is 'not as serious as has been sometimes feared', and that all necessary steps had been taken to minimise radiation risks and environmental damage.

Mr Worley's account of the accident and the immediate recovery and cleaning work occupied the major part of his article, and I have nothing to add to that. However, his assessment of the environmental effects and radiation hazards and the current state of health of the population seem to be at odds with that of Belarusian and Ukrainian doctors and experts. Their findings, based on primary sources, are almost unknown in the West.

In this article I intend to present the views of these Belarusian scientists, and to explain the gap between Russian national and international experts. I would also like to convey a little of public opinion in Belarus, which accumulated 70% of the radiation from Chernobyl's Reactor 4. To the ordinary people, Chernobyl is not merely history, but is with them today. The accident's consequences are far from over and done with.

Immediately after the accident, the USSR government had to make a scientific assessment of possible effects and how to deal with them. A team of experts from the Institute of Biophysics, part of the USSR Ministry of Health, headed by Professor L Ilyin, put forward the idea of 'safe living' in the contaminated areas, along with health forecasts which remained unchallenged until 1989, due to government and media pressure.

Their forecasts were established on the belief that low doses of radiation are practically harmless to humans. In addition, it was considered that the health of people in regions with higher radiation levels would have to receive an additional 350 mSv on top of the normal lifetime dose (based on a 70 year lifespan), before any effects would be felt. An extra dose of 5 mSv per year had been previously established as a limit for workers within the industry, and this was used by the Moscow experts as a criterion in their assessment of the hazards for all the population: including children, the old and the sick.

The 350 mSv limit mainly took account of the impact on health of caesium isotopes, and included a set of restrictions on food and day-to-day activities in the fall-out zone to avoid exceeding this dose. Mr Worley detailed these measures in his article, and came to similar conclusions to those of Prof Ilyn's team on the likelihood of radiation-induced cancers, leukaemias, infant deformities and genetic effects in the contaminated territories. Prof Ilyn's team spent a lot of time fighting 'radiophobia', and using the media to calm the population, instead of taking practical prophylactic measures.

It is now evident that the Moscow experts were not independent, but pursued the interests of the establishment. Ilyn's findings were officially acknowledged, and a campaign of misinformation based upon them was launched. Independent research activities were prohibited in the contaminated areas, in particular the collecting and use of medical statistics. Moscow's assessment was accepted and endorsed by international bodies, such as the IAEA, with no information from alternative sources.

An alternative prognosis was established, however, by Belarusian and Ukrainian scientists and academics such as E Konopla, Prof N Burlakova, Dr R Honcarova, Dr A Lyutsko, Prof N Kartel, V Shevchenko and many others. These people began their research shortly after the accident, and have continued to collect data, despite a security ban and the obvious hazards to their own health.

Unlike Moscow, the Belarusian scientific community has stressed from the very beginning the unique character of the Chernobyl

The author

In 1987 on graduation with honours from the Gomel State University (Belarus), Yuri Alexeichenko began his career as a teacher of political history and social sciences at the Gomel Polytechnic Institute.

He has become a postgraduate student at the Institute of Sociology of the Belarusian Academy of Sciences since 1991. Mr Alexeichenko's research project is devoted to the comparative study of engineering graduates' professional training and behaviour in Belarus and Britain. This academic year he continues his research work at the Graduate School of the University of Warwick.

Yuri Alexeichenko is a current collaborator for the Gomel Sociological Centre ORACUL. He was involved in the range of projects on studying the socio-psychological consequences of the Chernobyl disaster.

The author would be grateful for comments and research suggestions, which should be sent to the following address: Department of Sociology, University of Warwick, Coventry CV4 7AL.

disaster, due to the contamination of vast territories and radiation levels equivalent to that from 250 Hiroshima bombs. A significant percentage of the fall out consisted of long-lived isotopes (caesium — Cs134, Cs137; strontium — Sr90; plutonium Pu238, Pu240, Pu241; radiocarbon and so on), whose decay has seriously increased the level of exposure for the 2.5 million people living in the contaminated areas. Modern medicine was used to dealing with cases of an extreme and immediate nature, but unfamiliar with cases of people exposed to low levels of radiation for decades. External exposure is inevitably aggravated by radionuclides in the food chain, in the water supply, or inhaled as 'hot particles'. This was largely ignored by Prof Ilyn's team, as was the impact of short-lived isotopes (I131 for example) and the synergic effects of radiation, industrial and chemical pollution.

The Belarusian scientists' research data, along with their daily communication with the population of the fall-out zone had provided sufficient grounds to doubt the forecasts of Prof Ilyn's team. As a rule the population failed to follow the elaborate restrictions on food and outdoor activities, for purely practical reasons. Imported products were scare, and their own contaminated land remained their major source of food. Planned regular health checks failed to materialise, as did checks on agricultural production. Farmers worked in fields contaminated with radionuclides, and the public did not stick to the radiation security rules laid down for professionals in the industry, before the accident.

Furthermore, agricultural activities in the fall-out regions assisted in spreading the contamination. Radioactive dust raised during ploughing or harvesting is easily carried to clean territory, and radioactive cattle fed on clean fodder for a few weeks before their slaughter on uncontaminated land still left radioactive dung.

A further hidden danger lay in the recommended methods of dealing with food from contaminated areas. Milk and meat from fall-out zones was added to food produced in clean areas, ensuring the products had so-called 'acceptably low radiation levels'. This 'mixed' food was distributed all over Belarus, and consequently the whole population became exposed to internal radiation, which tends to affect different organs, such as the liver, and has an unpredictable impact on both personal and genetic health.

The situation was aggravated by a lack of qualified staff and specialist equipment, such as badges for measuring the levels of different isotopes. In such conditions it was impossible to prevent people from receiving doses in excess of their recommended lifetime limit, both inside the fall-out zone and throughout Belarus. The whole nation faced the problem of survival. Recognising the grave nature of this threat, the Belarusian scientific community, supported by their Ukrainian colleagues, rejected Prof Ilyn's recommendations, and set about making their own.

The Belarusian recommendations are based on the premise that people's everyday life is incompatible with rigid restrictions on day-to-day activities. Therefore the population must be relocated, away from the areas with 'acceptably' low levels of radiation, where ordinary human activity, such as farming, walking, picking wild berries and mushrooms, presented a danger to health. The decision on where to relocate these people must be made on the basis of radiation levels of all the main isotopes (Cs137, Sr90, Pu238, Pu240, Pu241), and other unfavourable environmental factors should be taken into account. A list of suitable areas was drawn up on the basis of these requirements.

'Radiophobia'

Great efforts were made to convince the authorities to acknowledge the proposals, and to undertake the necessary steps. But during the three years following the accident, the government remained unwilling to accept their proposals. The accumulated data was dismissed as either statistically insignificant, or attributed to psychosomatic 'radiophobia'.

However, the Belarusian scientists did receive support from opposition movements, such as the Belarusian People's Front, as well as from the public, who faced the consequences of Chernobyl every day. Meetings, demonstrations and one-day strikes were organised all over the republic, demanding that the Belarusian scientists' findings be recognised, and necessary steps be taken to alleviate the effects of the aftermath, and officials guilty of spreading misinformation be prosecuted.

Under such pressure, the authorities in Belarusian SSR refused to fulfil orders from Moscow. In October 1989 the USSR Supreme Soviet adopted a state programme, based on the findings of the Belarusian scientists.

Having encountered strong opposition to their original findings, the USSR government began to seek support among those international organisations which had previously endorsed their proposals. The most 'obedient' foreign advisers were invited to examine the effectiveness of the health measures taken in contaminated areas. It was hoped that their authority would help save face for the Soviet establishment, and dismiss the increasingly convincing arguments of the opposition.

The first team to arrive in the fall-out zone were from the World Health Organisation (WHO). In autumn 1989, escorted by representatives from Prof Ilyn's team, they spent a fortnight visiting affected regions of Belarus and the Ukraine. Commenting on this visit, Dr Alexander Lyutsko of the International Higher Radioecology College in Minsk, asserted that the WHO experts "did not make any surveys by themselves, whereas they did make calming statements." All attempts by the Belarusian team to draw the attention of the WHO team to their own findings proved fruitless. The conclusions of the WHO team echoed those of Moscow and the nuclear establishment, and a new misinformation campaign was launched in the official media.

In 1990 the IAEA survey team began work in Belarus. In his article, Mr Worley referred to the 'inevitable constraints' on their work, but to understand the divergence between Belarus and the world's scientific communities, it is vital to scrutinise all the difficulties and problems encountered by the IAEA experts.

In my opinion, the main constraint was the real status and purpose of the IAEA. According to V Rich (author of *Clouds of Witness* in Index on Censorship) "contrary to popular belief, the IAEA is not an independent monitoring organisation. The delegations of which it is comprised represent the governments of member states. It can inspect only those nuclear facilities which member governments invite it to inspect, and can receive information about a member state *only from the government of that state.* It is not allowed to take cognisance of other sources of information, however well authenticated. Moreover, its sole purpose is to promote the peaceful use of nuclear energy."

This explains why the top-level international survey team had ignored the data collected by the Belarusian scientists during the five-year period of their radiation monitoring, and based its study on the official statistics and reports put forward by the Moscow experts. Their own research capabilities were limited by a lack of money and resources. And even the results of those relatively sparse medical checks undertaken directly by international experts were influenced by supporters of the 350 mSv limit.

A high proficiency of the Soviet medical establishment in the business of falsification and misinformation is well known in the former USSR. It can be illustrated by the following example. Prof Ilyn informed the international scientific community that potassium iodine tablets were distributed to 5.4 million people immediately after the accident, to block radioactive iodine. This statement was repeated in Mr Worley's article, but was nothing more than a deliberate falsehood. Thousands of Belarusians are able to confirm that after 26 April 1986 the measures were not taken, in order to avert panic. A week later tablets were distributed in a few settlements, but the delay had already caused harm to health.

According to Kartel *(Biological and Radioecological Aspects of the Chernobyl accident consequences)* this is one small link in a chain of lies constructed around the accident and its aftermath. As a result, the IAEA's report, published in May 1991, was very close to the original findings of Prof Ilyn's team — already rejected by the Belarusian people, scientists and authorities. The USSR-wide survey of public opinion about Chernobyl, conducted by the Gomel Sociological Centre ORACUL in October 1991 registered a strong disappointment in the IAEA's findings. Over 75% expressed their disagreement with the conclusions. Belarusians now seek stable and intensive international cooperation to alleviate the consequences of Chernobyl, which represent a serious threat to the future existence of the Belarusian nation.

Chernobyl has introduced into the lives of all Belarusians constant worry about the health of themselves, their children and relatives. 75% of participants in the ORACUL survey indicated that their state of health was affected by the disaster's aftermath. This correlates with the data of Belarusian scientists and doctors involved in the health monitoring, both in the pre-Chernobyl period, and since the accident.

Three-fold increase

In 1991 the Belarusian Ministry of Health reported that in the five years since the accident total morbidity rate for the republic had increased three-fold. They had not detected any specific diseases caused directly by low radiation doses, but had observed a gradual effect on on the human immune system.

A rapid increase is now being registered in the number of psycho-neurologic and endocrine pathologies, heart-vascular and stomach-intestinal diseases, cancers and leukaemias. This pattern is particularly discernable in groups such as recovery workers and people evacuated from contaminated areas, particularly those involved with farming.

According to the latest available information (April 1992), 279 people from these categories have been officially recognised by Belarusian medical organisations as casualties of Chernobyl's aftermath. 20 of these are considered 100% disabled, 259 were classified as invalids. Since these figures were released it is believed that an upward trend has continued.

A considerable increase in thyroid pathologies is the direct result of the failure to implement preventative measures. According to Dr T Belookaya, Chairman of the Belarusian Committee 'children of Chernobyl', the frequency of thyroid cancer among the adult population is rising markedly. In 1987-88 the number of cases was in single figures, by 1990 this had risen to 42. The development of hypothyreoses is more common in children, as their susceptability to radiation is nine to 12 times higher than that of adults. The result of hypothyreoses is that all thyroid cells die, and the gland is unable to produce the necessary hormones, disturbing metabolic processes throughout the body. At an early age it can distort physical and mental development. More than half of all the children examined by the Belarusian doctors in the post-accident period had some changes in their hormonal status.

Deputy director of the Belarusian Radiomedicine Research Institute, Dr Astakhova, reported the following facts to an international symposium in Minsk in October 1992. In the five years before the disaster, seven operations for thyroid cancer were carried out on children throughout the republic. From 1986 to 1992 there were more than 130 such cases. In addition, the development of the disease appears to have become more rapid, making it even more dangerous.

Post-accident medical statistics, particularly from the contaminated areas, show an intensive rise of tumour incidence far beyond the rising trend in cancer occurrence registered before the disaster. According to a report by Dr O Shumilov from 1986-88 there were 210 cancer cases per 1000 citizens in the Khoiniki district (one of the most affected in the Gomel region); 275 cases in 1989 and 337 in 1990.

The negative impact of Chernobyl radiation on genetic health is confirmed by the data of researchers from the Institute of Genetics and Cytology of the Belarusian Academy of Sciences. They found the frequency of chromosome lesions in cells of plants and animals in contaminated regions between five and 10 times higher compared to the control regions.

These findings correlate with statistics of congenital deformities among babies born in the fall-out zone during the post-accident period. In Gomel region the frequency of infant deformity increased from 5.6% in 1986 to 9.2% in 1990. The contribution of congenital anomalies to the incidence of infant mortality in Belarus grew from 25% in 1985, to 31% in 1989 — 62.5% in the Khoiniki district. Children born in 1987-88 in the contaminated regions are weak, susceptible to infection, and have poorer general development in comparison to children from 'clean' areas. Among 'Chernobyl babies' one can hardly find a child with the normal phagocytic activity.

It is now quite clear that the medical and biological consequences of the Chernobyl disaster are far more grave and complex than originally thought. Detected changes in the morbidity rate are not only attributable to the impact of radiation, however. According to the conclusions of the Belarusian scientists it is necessary to consider the effects of a complicated 'Chernobyl factor'. This includes chronic exposure to low level radiation, both external and internal; the influence of heavy metals (iron, cadmium, tellurium, lead etc), which increased in the fall-out zone as a direct result of the reactor-suppressing activities; the contamination of water and agricultural products with nitrates and pesticides, which significantly intensify the impact of radiation, along with some other components which are the subject of further study.

An element of the Chernobyl factor must also be the high incidence of psychosomatic disturbances among the population — four to five times higher than in control zones. Fear of radiation, lack of regular food and medical checks, together with mistrust of official information and an absence of definite ecological forecasts are the main reasons for this deterioration in mental health.

Having taken all of the above into consideration, the Belarusian authorities planned to relocate more than 200 000 people, in addition to those evacuated a few weeks after the accident. Although assessed as an 'unwise' decision by international experts, it was welcomed in the affected regions. An adopted state programme to alleviate the Chernobyl aftermath includes a set of steps on socio-economic issues, health and legal protection, preventing the consumption of contaminated food and promoting 'green' agricultural technologies. The programme also establishes a network of diagnostic centres, including mobile ones, and the construction of hospitals and rehabilitation centres, particularly for mothers and children.

But despite the programme, the bulk of the population remain pessimistic. The ORACUL survey revealed that only 8% thought the situation had changed for the better, while 30% felt things had got worse. 60% detected no change. This pessimism is not ungrounded, as fulfilment of the programme is seriously hampered by economic difficulties.

Compensation

The Belarusian authorities have proposed that the damage caused to the republic be compensated for by the former USSR Ministry of Atomic Energy, the direct owner of the Chernobyl plant at the time of the accident. At present, the assets of the Ministry are divided between Russia, Ukraine, Kazakhstan and Uzbekistan. Each republic should part compensate Belarus, where not a single atomic plant is situated. But the independent ex-members of the USSR appear reluctant to listen to Belarusa's lawful claim. As a result there have been no new rehabilitation centres or sanatoria for children built in the republic, despite the fact

that existing centres only cater for 30% of the affected children from the fall-out zone. Some research projects have been stopped, whilst others are approaching an inevitable cessation.

An additional serious problem is the status of the Chernobyl plant. The defects in the concrete shielding around Reactor 4, mentioned by Mr Worley, have inevitably increased with time. Clefts in the sarcophagus are now reported to cover 1200 square metres, and to be letting in water.

The remaining reactors also give cause for concern. On 11 October 1991 a fire started in the turbine hall of Reactor 3. It was quickly extinguished, and no new release of radiation occurred, but the incident proved to many that the continued use of a seriously damaged nuclear plant is inadmissible. The Ukrainian government has taken the decision to decommission the power station, but demand for electricity and financial problems mean this could be a long way off.

Whilst grateful for any humanitarian action , Belarus is currently looking for more effective, stable and long lasting international assistance and cooperation. This would include Western investment in the republic's economy, aimed at overcoming the economic crisis, which is the main hindrance to the implementation of the Chernobyl programme — Belarus' only chance of coping with the problems brought about by the greatest ecological catastrophe of the 20th century. ❑

CONFERENCE REPORT

Making Energy Privatisation Work: The Future of Regulation

by Johanna Fender

THE INSTITUTE OF ENERGY'S most recent conference took place in November of last year at the Queen Elizabeth II Conference Centre in London. In his welcome address, Institute President Prof James Harrison commented that sufficient time had elapsed since the establishment of regulatory regime for observers to stand back and take a good look at how the system is working.

The morning session,which included contributions from Cedric Brown of British Gas and David Jefferies of the National Grid Company, was chaired by the Professor of Energy Policy at Imperial College, London, Professor Nigel Lucas. The afternoon session was chaired by Ian Powe of the Gas Consumers' Council, and speakers included Richard Caborn MP and Lady Wilcox of the National Consumers' Council.

The opening address was given by Energy Minister, Tim Eggar MP, who began by addressing the criticism that his government has no energy policy. "The proponents of that view must themselves be lost in some timewarp ... because they appear unable to view energy policy in terms other than the collectivist, the centrally-planned and the interventionist." Mr Eggar's reply to his critics was, of course, that his government's policy is market-led, an answer seen by many as an admission that indeed, there is no government energy policy. He justified his stance by saying: "when it comes to the kind of long-term forward look inherent in planning energy investment, they (governments) always get it wrong." Not that private companies seem especially skilled themselves at long-term planning.

Regulation has proved to be one of the thornier problems associated with the privatisation of the utilities in the UK. Deregulation is often cited as the ultimate goal, but in the meantime, who regulates the regulators?

Mr Eggar was highly critical of past energy policy: "Political interference, allied to market monopoly, gave the nationalised monoliths little incentive to think commercially or innovatively." This leads inevitably, he argued, to higher prices to the consumer. He went on to give an example of one such 'monolith': the CEGB. Their monopoly led to a lack of innovative drive within the industry, he claimed, which coupled with their conservatism (he emphasised the small 'c'), inhibited developments such as the move into power generation from natural gas in CCGTs. Without these gas-fired power stations the UK would have difficulty in meeting emissions targets to help combat global warming, and yet Mr Eggar was sure that without privatisation not a single CCGT plant would even be at the planning stage in the UK by now.

As a shameful example of centrally planned energy policy Mr Eggar cited "the economic and environmental shambles of much of Eastern Europe."

Having explained what it didn't consist of, the Minister stated that his government's policy was set out in the Coal Review White Paper. He summed it up later in a three-point list: "encouraging competition among producers and choice for consumers; ensuring that consumption is not subsidised, ie that consumers pay the full cost of the resources they use; and bringing the discipline of the capital markets to state-owned industries by privatising them." So now we know.

Towards the end of his address Mr Eggar turned to the subject of regulation. His justification for this apparent contradiction in his policy was simple: "Markets are not always perfect, and in the short term, as we move from the old system to the new, we have had to devise mechanisms to smooth the transi-

tion." This explained another contradiction: the Fossil Fuel Levy, due to be phased out in 1998, and of course the Non-Fossil Fuel Obligation, which he justified in terms of the environmental benefits brought about by renewables. "I should reiterate that these provisions are not permanent — they are merely to allow time for adjustment to the new situation." By implication, regulation itself was seen as a temporary, adjusting measure.

Following a brief question and answer session, the morning's chairman, Prof Lucas, gave a brief description of the Institute's motivation in deciding on this theme for a major conference. The UK's experiment in privatising the energy industries has put them in the front line. The purity of the idea seems at odds with the need to regulate, which itself can introduce distortions into the market. And left to itself, he pointed out, the market would exclude the nuclear option — a decision which may be regretted by future generations. As chairman, he felt the distinguished panel of speakers demonstrated the importance of the subject, as did the distinction of the delegates, he added.

Other speakers that morning were Max Herbert of National Power, Malcolm Chatwin of Yorkshire Electricity and Alan Marshall of Associated Gas Supplies, who all together gave a highly comprehensive picture of the suppliers' perspective.

An open forum session preceded lunch, which was followed by a number of papers from the consumers' perspective. Lady Wilcox began the proceedings, with no apologies for her slant in favour of domestic consumers, she set about discovering whether the market does indeed operate in the interest of the consumer, as the Minister had earlier asserted.

Regulation, Lady Wilcox noted, was not the 'light touch' that had originally been envisaged, nor are its terms of reference entirely clear. "With so many competing interests and issues, it's hardly surprising that debates about the future of regulation quickly stray into a swamp of esoteric arguments that leave the interests of ordinary people right out of the equation. Without wishing to cause offence ... energy policy is too important to be left entirely to conflicting views of different economic schools."

The question of fuel poverty featured high of Lady Wilcox's list of priorities — a subject which had failed to come up in the morning's session. "Fuel poverty is NOT a marginal issue" she asserted most forcefully, making it clear that a large proportion of the population was affected. It was not up to the fuel industries to bear the costs of this fuel poverty, but it "should be... funded as a matter of *public* policy".

On the performance of privatised industries so far, the consumer doesn't appear to have greatly benefited from the changes.

Minister for Energy, Tim Eggar MP, who gave the conference opening address (left), with Professor James Harrison, President of the Institute of Energy (right).

David Jefferies CBE, Chairman of the National Grid Company, gave an excellent paper on the nature and evolution of regulation in the energy industries. He foresaw a time when the industries involved and the regulatory system would converge.

The OFGAS stand in the exhibition area summed it up: Choice — a whole new board game. (above)
(Below right) The debate continues over coffee: President-elect of the Institute of Energy, David Jefferies CBE (right) discusses issues raised in the previous session with conference chairman Professor Nigel Lucas, of Imperial College.

"Look what has happened in telecommunications. Domestic users have been the last to benefit — and recent price cuts don't yet go far enough."

In a reference to the recent MMC report on the gas industry, Lady Wilcox foresaw a bleak future for the consumer: "An even greater disadvantage looms ... the prospect that competition could itself lead to higher prices." The MMC report suggested that consumers should bear an 'appropriate proportion' of the restructuring costs in the break-up of British Gas. "What this really means is that low users of gas — who tend to be on low incomes — will be charged even higher prices. Charges for people using below 100 therms a year could double, according to British Gas' own estimates."

Whilst not against privatisation in principle, Lady Wilcox pointed out that competition is only of real value if it benefits the consumer.

Other contributions to the afternoon session came from Ian Blakey, Chairman of the Energy Intensive Users' Group; John Dorken, deputy director-general of Gas Supply; Richard Morse of the Kleinwort Benson Group; and Richard Caborn MP, chairman of the Trade and Industry. Ian Powe brought the conference to end with his concluding remarks. ❑

● *Proceedings from the conference are available in a loose leaf binder, price £20. Available from Louise Evans, The Conference Department, The Institute of Energy, 18 Devonshire Street, London W1N 2AU. Tel: 071 580 0008; fax: 071 580 4420.*

Institute of Energy headquarters: No 18 Devonshire Street

AS OUR headquarters at 18 Devonshire Street has recently undergone a period of refurbishment and redecoration, members may be interested to learn a little of the building's history.

No 18 Devonshire Street stands on part of the site of Marylebone Gardens, which were opened in 1650. Here were held dog fights, cock fights, bear and bull baiting and boxing matches (regular attendees of meetings will tell you that little has changed!) There is one rather poetic story told that Dick Turpin, who was a patron of the gardens in the 1730s, stole a kiss from a Mrs Fountayne, the schoolmaster's wife, telling her that thereafter she would be able to boast that she had kissed a famous highwayman. Visitors to the building today need not fear that a similar fate awaits them.

The house began to go up in 1780 and the street was named after the fifth Duke of Devonshire, a relative of the Harley family who, at that time, were the ground landlords of this part of London. The first known occupant of No 18 was John Manners 'captain is His Majesty's navy', resident in 1792. Manners was an aristocrat, being a member of the family of the Dukes of Rutland. He served with Hood and Nelson in the Mediterranean during the Napoleonic wars; he fought in various campaigns — Leghorn 1795, Santa Cruz 1797, Copenhagen 1801 — but for reasons which are not clear appears to have missed the culmination of the sea campaign at Trafalgar in 1805.

Captain Manners was replaced at No 18 before 1796 by a widow named Lushington, and another widow, a Mrs Williams, was in possession of the property in 1807. She in turn disposed of her interest before 1812 to Charles Littledale, barrister-at-law. By 1818 it had changed hands again in favour of Colonel James Alston, a veteran of the Duke of Wellington's Peninsular campaign. He took part in the battle of Nivelle, which heralded Wellington's invasion of France in November 1813, fought at Orthes four months later, and was present at the battle of Waterloo in 1815.

When Colonel Alston vacated, about 1846, the house was acquired by Henry Richard Chetwynd-Stapleton, a gentleman of private income. He died in 1859 and his son lived here for a year or so before selling to Major Frederick Duffin. Presumably Major Duffin purchased the property when he left military service, after serving throughout the Sutlej campaign of 1845-46, and later in action in China. By 1871 the house was in the possession of the surgeon, Alfred Edward Duffin (the son or brother of Frederick) who maintained consulting rooms here until 1904. For much of that time he also lived here. For reasons which are not quite clear it seems that the building then stood empty for a year or two.

By 1907, however, it was in the possession of Harold Chapple, senior obstetric surgeon and gynaecologist to Guys Hospital and to the London Jewish Hospital. He was replaced here in the 1930s by a clutch of dentists, doctors, physicians and consultants, who continued until the second world war. The most eminent of these was probably Herbert John Paterson CBE, surgeon emeritus, National Temperance Hospital and Hon Surgeon to Edward VII.

President for the year 1978, Professor Ian Fells, pictured with Mrs Fells on the front steps of 18 Devonshire Street.

After the war, in 1947, No 18 passed to The Institute of Fuel, which, as we all know, as the Institute of Energy, occupies it still.

The Secretary

(The Secretary is grateful to Ms Sara Van Loock, who carried out the original research).

Members' news and appointments

AFTER 32 years of service in the gas utilisation and metering field, **Barrie Church** *(Member)* has retired as national engineering services manager of British Gas.

Using his wide experience, Mr Church has set up a specialist gaseous fuels consultancy to advise users, gas suppliers, consultants, contract energy management companies and contractors on all aspects of natural and liquified petroleum gases. He is currently involved in a series of one day oil, gas and coal environmental training courses for a major UK company's site operatives.

For more information contact Mr Church at 1 Needham Road, Luton LU4 9HD, tel: 0582 592898.

Granville Camsey FEng *(Fellow)*, executive director and managing director (Group Technology) of National Power plc is the new chairman of the European Construction Institute (ECI). His first official engagement was to present the opening address to the ECI's fifth conference in the series Construction in Europe last November in Florence.

In addition to his membership of the Institute of Energy, Mr Camsey is a Fellow of the Royal Academy of Engineering and the Institution of Mechanical Engineers, a companion of the British Institute of Management, a Freeman of the City of London, a Livery Man of the Worshipful Company of Engineers, a member of the Engineering Council and of the Court of the University of Bradford.

Dr Anu Sanyal *(Fellow)* has taken over as chairman of the Environmental Control Division of the American Society of Mechanical Engineers (ASME) for 1993/4.

Since leaving Babcock in the UK, Dr Sanyal has worked for Energy and Environmental Research Corporation in the US, where he was appointed director of performance engineering.

Zephyr competition

'ZEPHYR' is a competition for innovative use of passive cooling principles in the design of mixed-use buildings.

The competition seeks an integration of passive cooling techniques in high quality architectural design, in locations that have a predominant need for cooling. Buildings should be designed in such a way as to optimise natural cooling, minimise heat gain and avoid overheating. Competitors may select their own site, anywhere in the southern EC, or alternatively may use a site in Athens, for which documentation will be supplied in the competition pack.

Extensive documentation, guidelines and design tools including computer software will be provided to all who register. A book documenting the winning projects will be published at a later date.

Registration must be by 18 March 1994. For further information contact Eileen Fitzgerald, ERG, University College Dublin, Richview Clonskeagh, IRL-Dublin 14.

Increase in demand a distinct possibility

'Selling More Coal' by Bryan Gladstone. Published by the Coalfield Communities Campaign, Barnsley, 1994, £10.00

A CONJURER'S skill lies in keeping his audience's attention focussed away from the sleight of hand that accomplishes the real trick. The Department of Trade and Industry, while bewailing the necessity for pit closures, assured everyone that they were inevitable because of the rapidly shrinking market for power station coal.

What they failed to point out was that other markets were not shrinking with anything like the rapidity of the ESI demand, nor that, if UK coal production were to be dictated purely by the demand for generation fuel, there could be a distinct shortage of suitable coals for other industrial, commercial and domestic customers, because there would be too few pits left to supply them. Already, large tonnages of these qualities are having to be imported because the British pits which traditionally supplied them have been closed down.

A new report by the deputy director of the Coalfield Communities Campaign, Bryan Gladstone, *Selling More Coal*, clearly demonstrates that by 1998 sales of deep-mined coal to non-ESI markets could lie in the range of 3.1 to 10 million tonnes (mt). That would ensure the preservation of between two and seven large mines. And the lower figure would be the outcome of too many deep mines being closed in the run-up to privatisation. On the other hand, the high figure will be possible if the deep mine industry makes a concerted effort to meet the needs of these markets, with encouragement from the government. While a 10 mt markets would be a notable sales achievement, it is in no way beyond the ability of the deep mine industry.

Mr Gladstone urges also a reintroduction of the Coal Firing Scheme, which operated to universal benefit in the early 1980s by generating 2.4 mt of additional demand. Thus a further expansion in industrial and public sector markets could increase demand by at least another million tonnes by 1998.

Peter Heap

Worldwide picture

'IAEA Yearbook' Published by the International Atomic Energy Agency, Vienna, 1993, pp294

THE IAEA Yearbook is a publication that is consistently of interest to the wider field of energy than specialist nuclear engineering — or strategy. The 1993 edition is no exception. In its unusual octavo size and six divisions totalling 294 pages, there is a clear picture of worldwide activity in atomic energy.

Absence of credit to the overall editor suggests individual divisional contributions, some of which carry by-lines. The survey of the IAEA in a changing world is forthright and realistic in a series of paragraphs each of which very skillfully summarises *all* the current controversies and concerns. The most succinct speaks of remaining formidable challenges, the spectre of Chernobyl and the many years of safe operation of some 500 reactors (by AD 2000) needed to restore a wider measure of public confidence.

Perhaps of most interest to members of the Institute is the report in section 'A' by M Samiei of the division responsible for technical cooperation programmes. This deals with a subject that normally gets little attention although the consequences of neglect are now a matter of which the general public is acutely aware. It is a pity the same media attention cannot be given to current endeavors to eliminate atmospheric pollution other than of nuclear origin.

This short, ten-page report, deals with a processing test facility being evaluated at the Institute of Nuclear Chemistry and Technology, Warsaw, Poland. This assumes that conventional technologies — wet scrubbing for SO_2 and selective catalytic reduction for NOx have reached their full potential. A new technology has been researched and is at the pilot test plant stage.

The electron-beam process has five major steps: fly-ash removal by conventional electrostatic precipitation; flue-gas conditioning by water spray, to cool to working temperature; injection of ammonia in precise amount; excitation of the resultant product by exposure (seconds only) to either single or multi-stage irradiation by electron beam. Finally, either an additional electrostatic precipitation stage or membrane filtration.

The chemistry is described as ionisation by electron bombardment producing free radicals which react with both SO_2 and NOx to produce both sulphuric and nitric acids — which are neutralised by the ammonia. The operating temperature of between 70 and 90°C can vary the gas removal: NOx increases with temperature, SO_2 decreases but when inlet SO_2 increases NOx removal is favoured. High sulphur coals could prove the process most efficient, it is claimed.

So far, a 600/1000 keV accelerator has been used; combined microwave and electron beam radiation is planned. The process described also surveys international research in Japan, USA and Germany — but not the UK. No data is given for process efficiency, whether gas and particle recovery are fully complete. Cost per kW(e) has been estimated at $311 and 1.01 cent/kW/h — less than conventional wet scrubbing. A profit is forecast for the balance between cost of ammonia and the by product sold as fertiliser. Heavy metals are not seen as a problem.

By comparison, the Pittsburg Energy Technology Centre has now released a description and data of the dry dust injection process which, it is claimed, now approaches commercial operation. It would appear this is indeed a far simpler application: removal of SO_2 is given as 60/70 per cent. NOx removal does not figure in the review.

The remainder of the IAEA Yearbook's content covers marked progress both in technology and attitude to public awareness. The detailed approach to questions still both matters of public concern and media sensation-seeking has every appearance of frankness and honesty. It would be difficult for any investigator to show that this publication seeks to promote atomic energy at the expense of truth and accuracy. In the circumstances it would be difficult to avoid the recommendation: every Institute member should have a copy of this responsible publication.

Norman Jenkins

Recently published

'The 1994 NSCA Pollution Handbook' Edited by Loveday Murley.
Published by the National Society for Clean Air, Brighton, 1994, 512 pp, £21.95 inc p& p, direct from NSCA, 136 North Street, Brighton BN1 1RG. Tel: 0273 326313.

'Daylighting in Architecture — A European Reference Book' Edited by Dr Nick Baker and Dr Koen Steemers.
Published by James & James Science Publishers, London, 1993, 384 pp, P/B £60.00. Available from James & James, 5 Castle Road, London NW1 8PR. Tel: 071 284 3833.

'World Coal Trade Statistics 1987-1992' by William H Fischer.
Published by WEFA ENERGY, London, 1993, £325.00. Available from Mireia Mangual, WEFA ENERGY, 62 Margaret Street, London W1N 7FJ. Tel: 071 631 0757.

'UNESCO International Directory of New and Renewable Energy Information Sources and Research Centres'
Published by James & James Science Publishers, London, 1993. Printed version of UNESCO's ENERGY database. From James & James, Tel: 071 284 3833.

Energy and quality of life — a reply

BACK in 1978 I found myself sharing a platform with Professor Thring, contributor of the *Viewpoint* article in the November issue of *Energy World*. We had been invited to address an audience in Basildon on the subject of nuclear energy, and Professor Thring had apparently been fielded as my 'opponent'. Then, as now, his contribution consisted mainly of strongly held personal opinions, forcefully expressed.

His dismissal of nuclear power appeals to the long discredited 'hot particle' theory, and to a somewhat outlandish point about the difficulty of removing the daughter products of plutonium from walls — as if this is a familiar household problem! Hard to swallow estimates of future levels of energy consumption are offered with little to support them; and he offers a utility function with *negative* marginal returns to incremental expenditure, for which he claims statistical support, which would surprise me very much. The satisfaction with which he condemns the whole of western industrial society to much reduced incomes calls to mind a famous utterance of the first of three great men I propose to quote. Many years ago, Bertrand Russell said "If only people desired their own happiness as much as they seem to desire the unhappiness of others the world would be a nicer place to live in."

Environmental improvements consume economic resources, just as other economic 'goods' do. In 1994 we have arguments in favour of compulsory regimes that could hardly do other than reduce our ability to generate the economic resources necessary to deliver the environmental 'goods' Prof Thring wishes to see. In bewailing the unemployment produced by replacing human labour with machines, he is indulging in Luddism. In pressing for the poor countries to be given 'fair shares' of world energy supplies, he misdiagnoses the problem of poor countries, which is that they are poor, not that they are deprived of fuel. As Lord Boyd Orr — the first head of FAO — once said : "There is no shortage of food in the world: only a shortage of purchasing power." Putting obstacles in the way of maintaining and increasing the purchasing power of the rich countries reduces opportunities to purchase the products that poorer countries need to sell to set them on the road to higher incomes. One need look no further than the steep rise in incomes per capita in countries such as Tai-Wan and Korea, that are producing electronic goods and cars for the West's consumer markets.

Least acceptable is Prof Thring's confidence in his ability to know, a century in advance, what problems future societies will face, and what needs to be done to solve them. This brings me to my third great man: the late Professor Harry Johnson, a distinguished economist who managed to grace universities in London and New York at one and the same time. He pointed out that in the third quarter of the 19th century, about 85% of America's energy was in the form of fuelwood. Had someone successfully insisted at the time that fuelwood consumption be restricted to serve the needs of future generations, it would have made that poor society even poorer, while contributing nothing to the welfare of much richer 20th century societies, for whom fuelwood is not a problem. One is led to conclude that the best legacy each generation can hand over to the next is a high level of income per capita, to provide the wherewithal to solve the problems they will actually face, rather than those we might mistakenly project upon them.

Dr L G Brookes *(Fellow)*
Bournemouth

Diesel or CNG?

IN YOUR December issue of *Energy World*, you mentioned that the Institute of Energy was involved in sponsoring speed records for diesel cars.

Your reasons centre around improving the diesel engine by research for racing, and the green issue of reducing carbon dioxide emissions.

While agreeing with the logic of these compared to petrol, I have a concern that the Institute may be biased towards oil, and had ignored the promotion of natural gas (NG) powered engines.

I would request that the Institute gives as much imagination to improving and promoting the natural gas engine, since it is far less polluting in all exhaust gases than the diesel.

I appreciate that natural gas filling points are few and far between at the moment, but can't speed trials be included for NG vehicles? If NG cars are good enough for Canada, let's have them here.

Jon Barclay
Reading, Berks.

• ***The Institute replies:*** *The Institute is aware of British Gas' development of compressed natural gas (CNG) fuelled light commercial vehicles. The current programme covers conventional internal combustion engines converted to operate on CNG, but we are aware that the internal combustion engine designed specifically for CNG could have a considerable potential. We would hope that success with the current British Gas conversion programme will encourage designers and manufacturers to look very seriously at the CNG alternatives, and to aim for an engine with very low emissions of pollutants. The Institute of Energy is keen to see developments in this area, as well as in the diesel field.*

High level of competition

THE 1993 Young Woman Engineer was announced in January. She is Helen Marsham, a cable engineer with Cable and Wireless (Marine) Ltd of Chelmsford.

Ms Marshman was presented with her award at a special ceremony in London, by Graham Mackenzie, president of the Engineering Employers' Federation. She received a cheque for £500 and a silver rose bowl.

Now 25, Ms Marsham, who is from Blaina in Gwent, joined Cable and Wireless (Marine) Ltd in 1989, and her present duties as third cable engineer include the operation, maintenance and calibration of specialist submarine optical fibre transmission test equipment, through to the final lowering of the cable into the ocean.

On completion of her secondary education she took a one-year training scheme in information technology electronic systems at Tredegar Information Centre, followed by a three-year BTEC HNC course in marine communications and electronics at Wray Castle College.

Joint runners up for the award, Kathryn Connor and Deborah Hodges each received a cheque for £150. 29-year-old Ms Connor, manufacturing team leader with British Aerospace Defence Dynamics, Lostock, Bolton, lives in Chorley, Lancashire. Ms Hodges, aged 25, is from Chippenham, Wiltshire, is a senior engineer with Westinghouse Signals Ltd.

The Mary George Memorial Prize — an additional award given to the young entrant showing particular promise as an incorporated engineer (IEng) — was presented to 23-year-old Heather Arthur from Balloch Dumbartonshire. Ms Arthur is a high voltage electrical diagnostician, professional and technology officer with the Ministry of Defence Engineering and Works Services Department at the Clyde Submarine Base at Faslane. She received a cheque for £100 and a silver salver.

DG to stay until unification

IT WAS announced at the end of January that Denis Filer, director general of the Engineering Council, who was due to retire in May 1994, will now stay on until a definite proposal for a reformed Council has been prepared.

Mr Filer's successor will then be appointed with the principal initial task of implementing the changes.

The extension of Mr Filer's term of office will be in addition to his appointment as chairman of Adwest Group plc, the engineering company, a position he takes up on a part-time basis from 1 April. He has been a non-executive director with the company since 1991.

Mr Filer was appointed director general of the Engineering Council in 1988, after a distinguished career in industry, culminating in the post of ICI's director of engineering.

At the end of 1993 Sir John Fairclough was selected to serve a further three-year term as chairman of the Engineering Council. This second term will take effect from the annual general meeting of the Council, to be held in May this year.

Sir John's decision to serve a second term was also influenced by the wish to oversee the unification of the engineering profession.

Cash to improve technology teaching

A TOTAL of £440 000 has been pledged to 22 schools across the UK to improve their technology teaching. Each school is receiving £10 000 from the Engineering Council's Technology Enhancement Programme (TEP), sponsored by the Gatsby Charitable Foundation, and £10 000 from funding partners such as Training and Enterprise Councils.

Altogether 62 schools belong to the TEP, which aims to increase the capability of students, aged 14 to 19, in technology, mathematics and science, through a more practical, vocational approach. The programme provides curriculum material and well-equipped rooms for the schools, phased over three years. The aim is to develop modules of work which support GCSE and GNVQ courses in schools and colleges. An accreditation framework is provided and certificates are presented to each pupil who completes a TEP module.

The programme introduces real life problems into the classroom, through links with local industry, so that skills are learned to match the needs of industry. The use of high quality materials, equipment and accommodation is encouraged in order to bring the students' work closer to industrial standards.

The TEP work is carried out by a central team and by teacher/engineer teams at the schools involved. An important condition for receiving an award was that the school had to be linked with local industry. Schools were asked to find a minimum cash investment of £2000 within the matched funding from local industry. Neighbourhood Engineers, the Engineering Council's scheme linking engineers with their local secondary schools, is also involved with many of the chosen schools.

It makes sense for the many organisations and initiatives supporting the teaching of technology in schools and colleges to coordinate and collaborate their efforts. In this respect the TEP is liaising closely with the Nuffield Foundation, the Department for Education's Technology Schools Initiative and Technology Colleges, the Royal College of Art, the Standing Conference on School's Science and Technology, and others. The Council's policy is to support all schools and colleges irrespective of their status.

Fourth booklet in WISE series

THE Engineering Council recently published the fourth booklet in its series 'Engineering Equals' — this latest addition is targeted specifically at parents.

The Council, which runs a campaign to persuade girls to be more technologically minded with the possibility of taking up a career in engineering, says in *Engineering equals for parents* that parents can encourage their daughters to take an interest in engineering by choosing toys and activities with care.

Girls should be offered more than just materials such as dolls' clothes — hard materials such as construction sets and modelling materials, says the Council. Parents could also involve their daughters in DIY, maintenance and simple construction in the home, in much the same way as has traditionally done with boys. Belonging to an engineering club and visiting science museums would also greatly stimulate girl's interest in engineering.

In the foreword to the booklet, Sir John Fairclough, chairman of the Council, and Margaret Morrissey, former chairman of the National Confederation of Parent Teacher Associations, say: "Technology is a part of everyday life, whether it is using a microwave oven, a video tape recorder, a bank cash dispenser or a computer. Girls with confidence in science and technology will enjoy a better life because they will make full use of the technology at work, at home and in their leisure time.

The booklet, with an introduction by the Rt Hon John Patten, Secretary of State for Education, includes examples of good practice, places to visit, useful publications and sources of information. It is being sent to all primary and secondary schools, careers services and main libraries in the UK.

The WISE campaign started in 1984, and was set up by the Engineering Council and the Equal Opportunities Commission to encourage women to consider careers in engineering. Copies of the booklet are available free (send A5 25p sae) from The Engineering Council, 10 Maltravers Street, London WC2R 3ER.

EVENTS

February 1994

A systems approach to environmental management
Seminar, 22 February, Leamington Spa. Details from the CMTC Management Centre, Woodland Grange, Old Milverton Lane, Leamington Spa CV32 6RN. Tel: 0926 336621; fax: 0926 450648

Oil project finance
Conference, 22-23 February, London. Details from Monique Quant, IBC Financial Focus Ltd, 57/61 Mortimer Street, London W1N 7TD. Tel: 071 637 4383; fax: 071 323 4298

March 1994

New ways of reducing heating costs
Teach-in for housing professionals, house owners, tenants, energy action groups, 1-3 March, 5-7 March, Rhayader, Mid Wales. Details from David Huw Stephens, Tir Gaia Solar Village, Rhayader, Mid Wales LD6 5DY. Tel/fax: 0597 810929

Inter-Institution Young Engineers Dinner & Dance
5 March, London. Details from Joanna Holland, Institution of Civil Engineers, tel: 071 222 7722 ext 9980.

Sizewell B — Aiming To Be First
Conference, 8-9 March, London. Details from Julie Brown, IMechE, on 071 973 1316.

Energy in Central & Eastern Europe — political initiatives & opportunities for business
Conference, 9 March, London. Details from Judith Mackenzie, The Institute of Energy, 18 Devonshire Street, London W1N 2AU. Tel: 071 580 0008; fax: 071 580 4420

Used lube oil disposal
Conference, 10 March, London. Details from Caroline Little, Conference Officer, The Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

Mining Latin America
Conference, 10-14 May, Santiago, Chile. Details from The Conference Office, Mining Latin America, IMM, 44 Portland PLace, London W1N 4BR. Tel: 071 580 3802.

The Future Electricity Market
Conference, 11 March, London. Details from Brenda Ribero, The Economist Conferences, 15 Lower Regent Street, London SW1Y 4LR. Tel: 071 830 1000; fax: 071 931 0228.

Transport for a Better Birmingham
Conference, 12 March, Birmingham. Details from The Environmental Strategy Unit, Birmingham City Council, 67 Curzon Street, Birmingham B4 7DH. Tel: 021 235 6992/1.

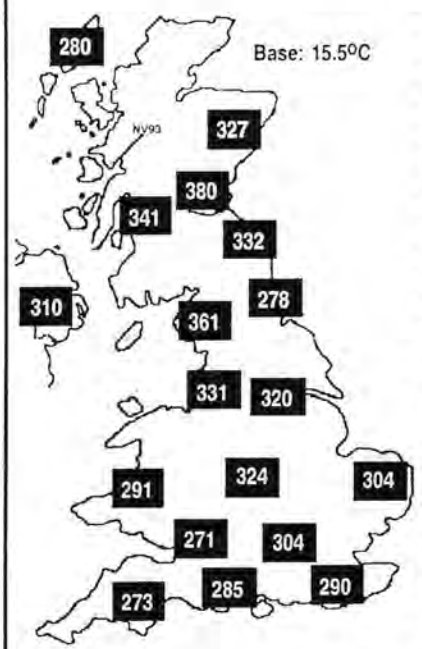
The Fundamentals and Use of Consequence Models for Risk Assessment
Two-and-a-half day course, 14-16 March, Cambridge. Details from University of Cambridge Programme for Industry, 1 Trumpington Street, Cambridge CB2 1QA. Tel: 0223 302233; fax: 0223 301122.

GasTrade 94
International conference, 16-18 March, Hong Kong. Details from Brian Singleton, GasTrade Ltd, P O Box 238, Weybridge, Surrey KT13 8YR. Tel: 0932 856848; fax: 0932 828149.

Quality systems in NAMAS laboratories
Course, 17 March, Leatherhead, UK. Details from Miss Vicky Prior, ERA Technology, tel: 0372 374151, ext 2461.

DEGREE DAYS: NOVEMBER 1993

Source: **Degree days direct**



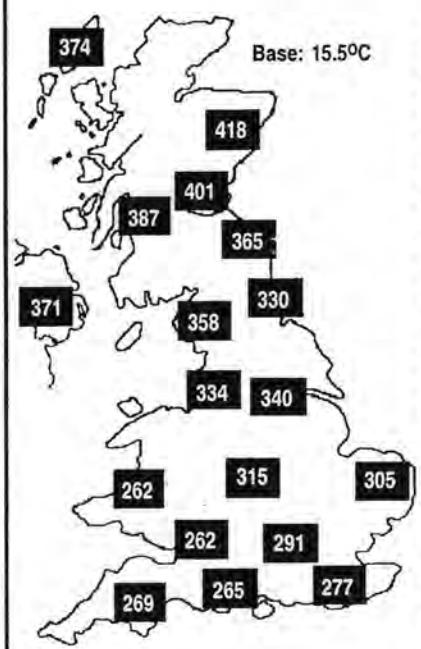
These regional figures, calculated from daily outside air temperatures, provide an index of demand for space heating over the month and thus enable excessive consumption to be detected.

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, 17 Church Street, Newent, Glos GL18 1PU (0531-821350)

DEGREE DAYS: DECEMBER 1993

Source: **Degree days direct**



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ENERGY IN CENTRAL AND EASTERN EUROPE

Political Initiatives and Opportunities for Business

9 March 1994, The Church House Conference Centre, London SW1.

TIMETABLE

9.00 - 9.45 *EXHIBITION*
COFFEE & REGISTRATION

INTERNATIONAL INITIATIVES

9.45 Chairman's Introduction
Dr Michael Clark MP

10.00 Opening Address
Tim Eggar MP

10.15 **Ambassador John Ferriter**
10.40 DISCUSSION

11.00 **Randal Fischer**
11.25 DISCUSSION

11.45 **Deputy Minister Milan Ĉerný**
12.10 DISCUSSION

12.30 Chairman's Summary
Dr Michael Clark MP

12.40 LUNCHEON & EXHIBITION

EXPERIENCE AND OPPORTUNITIES FOR THE UK

13.55 Chairman's Introduction
Professor James Harrison

14.00 **Dr John Rhys**
14.25 DISCUSSION

14.35 **Russell Herbert**
15.00 DISCUSSION

15.10 **Dr Alf Roberts**
15.35 DISCUSSION

15.45 **Dr John Topper**
16.10 DISCUSSION

16.20 Chairman's Concluding Remarks
Professor James Harrison

16.30 End of Proceedings

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Your Invitation to

ENERGY IN CENTRAL AND EASTERN EUROPE
Political Initiatives and Opportunities for Business

Organised by

The Institute of Energy and The Parliamentary Group for Energy Studies

Wednesday, 9 March 1994

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

Energy for Eastern and Central Europe is the key to the successful transition of these countries to prosperous market economies. The countries are generally characterised by an over capacity of old and obsolescent plant, sometimes dangerous. Future demand for energy is very uncertain. Political, financial and technical support from Western Europe is important to help with judicious renovation and new investment. New markets and new institutions are needed to facilitate the commercial process. This seminar will look at the political and economic initiatives of the major actors, their reception in the host countries and the opportunities which are created for UK business.

INTERNATIONAL INITIATIVES

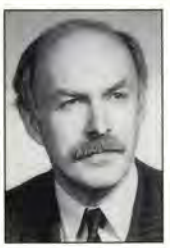
- *UK and EC programmes and initiatives*
- *Options for institutional and structural change*
- *The relevance of Western experience*
- *The role of financial and technical assistance*
- *Financial needs and how they may be met*
- *The risks and uncertainties of reform*
- *A view of Western co-operation and joint ventures*

EXPERIENCE & OPPORTUNITIES FOR THE UK

- *Practical difficulties and practical experience*
- *Achievements to date*
- *Prospects for joint ventures*
- *Upgrading of gas, electricity and heat networks*
- *Opportunities for UK industry*
- *Managing the risks*
- *Making the contacts*

The speakers are:





Tim Eggar MP Minister for Energy

Ambassador John Ferriter Deputy Executive Director, International Energy Agency (Paris)

Randal Fischer Group Head Natural Resources, European Bank for Reconstruction & Development

Milan Černý Deputy Minister, Ministry for Industry and Trade of the Czech Republic

Dr John Rhys Director, NERA Economic Consultants

Russell Herbert Managing Director, Global Gas, British Gas plc

Dr Alf Roberts Executive Director Commercial, PowerGen plc

Dr John Topper Commercial Director, CRE

The Session Chairmen are:

Dr Michael Clark MP, Chairman of the Parliamentary Group for Energy Studies

Professor James Harrison, President of The Institute of Energy

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