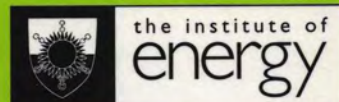


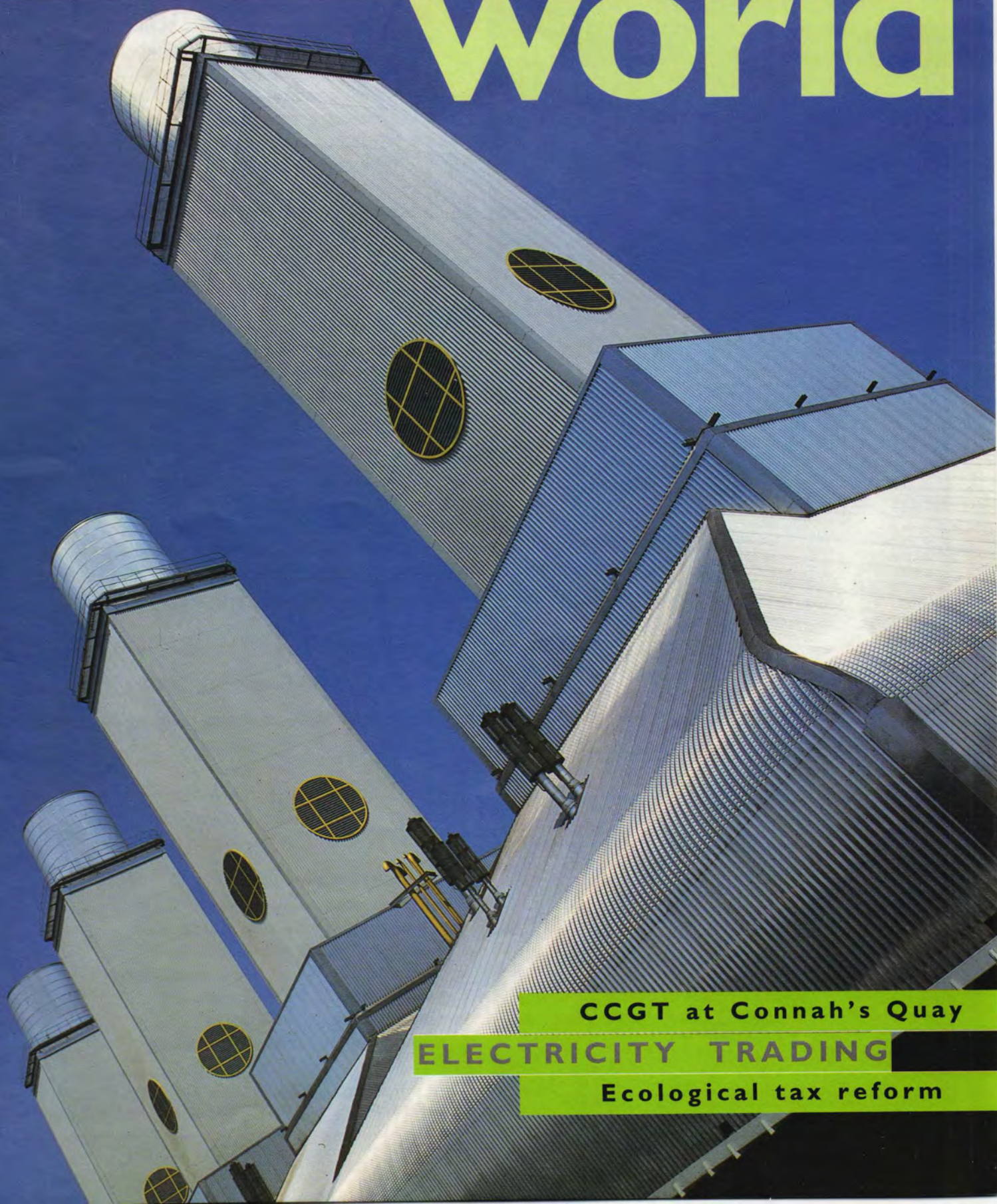
THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy



No.258 April 1998

world



CCGT at Connah's Quay

ELECTRICITY TRADING

Ecological tax reform

Intensive Training in Moscow and Minsk on "Preparation of Bankable Proposals for Energy Efficiency Projects"

In cooperation with several European companies we are conducting a series of training courses in the Russian Federation (Moscow) and Belarusia (Minsk). The project is sponsored by the EC Thermie Programme.

The aim of the courses is to develop and deliver a practical energy investment training programme. The course is aimed specifically at managers and decision makers in the energy intensive industrial sectors who have to face, in their daily responsibility, the solution to energy savings investment and related problems.

The emphasis is on how to build and maintain competitiveness in the emerging market economy.

At the same time, the course gives practical guidance in identifying the energy saving practices which offer the most cost effective and financially viable projects.

The training also covers production of appropriate investment proposals and/or financing applications to local and international banks, financial institutions and investors.

The training course is based on a formula developed and tested in a similar training programme in St. Petersburg in 1996.

The courses will start in May 1998 in Minsk and will continue until the end of July 1998.

**For more information regarding such training and networking offers, please contact
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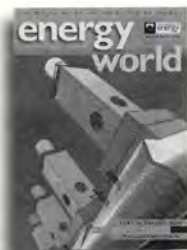
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COVER

Part of PowerGen's Connah's Quay power station, the workplace for this issue's 'A day in the life of ...' energy professional - **see page 20 for the full story.**

Located just inside North Wales and on the banks of the River Dee, Connah's Quay is one of the largest of the new generation of cleaner, gas-fired, combined cycle gas turbine power stations to be built and commissioned in the last few years.

(Photo courtesy of PowerGen)

Kyoto - the beginning of electricity transformation

by Simon Minett, Director, COGEN Europe

The Kyoto agreement, in effect, legally binds industrialised countries to transform their electricity systems. This is because there is no better economic alternative to cogeneration as a means to cut greenhouse gas emissions in the power production sector, and this implies both decentralisation and liberalisation - and therefore transformation - of the energy market.

Just before Kyoto, the European Commission identified cogeneration as the energy application which can make the single biggest contribution to achieving EU climate goals. CHP accounted for almost 20% of the proposed European solution. Similarly, cogeneration features, almost without exception, on every national climate response programme. Certainly, in the UK, there will be heavy dependence on the further growth of CHP if the UK is to achieve its own 20% reduction target by 2010 (base 1990 emission levels).

Identifying CHP as a solution is the easy part. Making it happen will be the challenge, and this is the point with which energy policymakers are now beginning to wrestle. COGEN Europe has some recommendations.

HOW MUCH COGENERATION?

The EU average for the development of CHP is a marginal 9%, expressed as the share it takes of total power production. In Denmark, Finland and the Netherlands, the figure is 30%+. In the UK, a disappointing 5% is all that has been done - the restructuring of the industry since 1989 has been characterised by the development of electricity-only CCGTs with a marginal development of CHP and therefore represents a missed opportunity.

The EU target for CHP is 18% by 2010. COGEN Europe regards this as unduly modest and believes that 30% is achievable - 18% is likely to be achieved without serious variation from business-as-usual scenarios. Indeed, UNIPEDE (the European electricity industry group) has itself predicted a 30% share for many countries.

TRANSFORMATION

Policymakers need to take into account that CHP is a form of heat production with electricity produced as a by-product. In other words, CHP is the simultaneous production of electricity and heat, with the dimensioning of the scheme being based on the demand for heat. The implication of this is profound. It means that developers of new electrical capacity should not look for a remote greenfield site for the construction of a large, centralised and low efficiency (yes, 55% is low in comparison with CHP) plant, but for sources of heat demand: industry, towns, cities and individual buildings. Power production, based on CHP, should be sited there, and so be decentralised.

In other words, the electricity system would transform from one of few centralised plants to one of many decentralised units. This increases flexibility, diversity, efficiency, customer control, environmental performance and economic benefits. It cuts transmission losses and utility control. It also shifts market power from traditional producers, usually monopolies, to the energy consumer - a central feature of energy market liberalisation.

Not only that, the implementation of CHP in this fashion neatly paves the way for these other decentralised technologies, such as renewable energy and fuel cells, which are not yet all ready for the market (except wind) but which will be within a few years. The development of CHP will already have brought about the transformation into which these cleaner technologies can fit.

Can it be done? It already is in the Netherlands, almost certainly the most decentralised power system in the world based upon CHP's 40% share of the electricity market.

HOW TO BRING ABOUT THE TRANSFORMATION

- A fully liberalised electricity and gas market which provides free access to networks, allows freedom to generate, directly links prices to costs and eliminates market barriers to CHP.
- The introduction of one or more of a range of market instruments which give the efficiency conversion of energy a stronger economic signal. One example is the development of an emissions credit trading regime, at national or international levels - or both. This will enable countries to exploit the most cost-effective mitigation solutions as a means of gaining financial, or other, advantages. CHP will inevitably be one of the solutions identified. In addition, voluntary agreements applied strictly can work, as can energy taxes.
- The strict implementation of the Integrated Pollution, Prevention and Control Directive (IPPC) which would ensure that both economic and environmental factors were taken into account in the development of new electrical capacity. CHP will almost always be a better economic option than the CCGT when all factors (including transmission losses and network costs) are taken into account. The recent move by the UK government to offer the possibility for exemption to CHP from the moratorium on the use of gas for power production is a clear step, though somewhat crude, in this direction.

These initiatives will not only make an enormous contribution to the achievement of the Kyoto targets, but will bring about a competitively driven transformation of the electricity system - worldwide.

BP's Spanish PV production to more than double

BP Solar is to more than double production of solar photovoltaic cells at its plant in Alcobendas, Madrid. Annual production of the cells will rise from four to 10 MW during 1998. Production at the plant will then represent some 8% of global production.

BP Solar says it will invest \$6.5 million in the plant - the largest single investment in solar cell production in Spain to date.

The plant will manufacture BP Solar's high-efficiency cells and will be automated as part of the expansion. These high-efficiency cells use laser technology to 'bury' conductive



metal in the cell's silicon wafers. The technique results in an efficiency rate (the proportion of light converted into electricity) of over 17%. These cells are the highest efficiency solar cells in

volume production, says BP.

Production of conventional cells at the plant (which use a silk-screen process to print a grid of metal onto the wafer surface) will cease.

BP Solar, a wholly-owned subsidiary of the BP Group, manufactures and markets photovoltaic cells, modules and photovoltaic solar systems. It has other cell manufacturing sites in Australia and India and is opening a new plant in Fairfield, California.

BP has invested over \$120 million in solar power since 1981 to create a business with annual turnover of \$80 million. In May 1997, BP Group chief executive John Browne announced ambitious targets to grow BP Solar's turnover to \$1 billion within 10 years.

Single energy market for the Baltic Sea area

A single energy market around the Baltic Sea would be beneficial for both energy producers and consumers, and future energy investments in this area will be regulated mainly by environmental assessments and those related to social and economic issues, rather than by increased energy requirements. So says the report of the Baltic Ring project, of the energy companies around the Baltic Sea.

The two-year Baltic Ring project, which has involved Finnish participants the IVO Group and the grid company Fingrid along with another 16 companies from ten countries, aimed to investigate both the possibility of creating a single electricity market around the Baltic Sea and the need for environmental investments in energy production and the possible benefits for the

consumers. A single electricity market in the Baltic Sea area is one of the most important issues in the EU's Transeuropean Networks programme.

The Study says that the electricity networks of Lithuania and Poland could be united. That way a continuous electricity network would be formed in the area of the Baltic Sea, which would be the first step towards a single energy market. It would also enable the free movement of electricity within the entire area of the Baltic networks.

The national energy companies of Estonia, Lithuania and Latvia, the Swedish Vattenfall and Svenska kraftnat, the Danish Elkraft and SK Power, the Norwegian EnFO, the German Preussen Electra, and energy companies from Russia, Poland and Belarussia took part in the Study.

New power stations around the world

Turkey - Rolls-Royce and Bilkent Holding of Turkey have formed a joint venture to build, own and operate an RB2211-powered 36 MW cogeneration facility at Bilkent University in Ankara, Turkey. The new facility, which will expand an existing 4 MW Bilenerji power facility, will provide efficient electricity and process steam/hot water to the university and other Bilkent manufacturing plants.

Dominican Republic - Glasgow-based Scotia Energy has entered final negotiations to undertake a £160 million power station contract in the Dominican Republic. Scotia Energy joined forces with the US power company Cogentrix to bid to build, own and operate a 300 MW combined cycle gas turbine power plant.

Brazil - BG plc, in association with Siemens Power

Ventures, has been selected by Eletropaulo, the state electricity distribution company, to negotiate the development of a 900 MW gas-fired power plant in Sao Paulo city, Brazil. The partnership, with BG as lead sponsor and operator, bid the lowest electricity supply tariff to build and operate the plant for 20 years before transferring it to Eletropaulo.

US - A consortium led by ABB has won orders to build, maintain and operate a 270 MW combined-cycle power plant in Massachusetts in the USA for the Berkshire Power Company LLC.

Taiwan - ABB has also been awarded a contract to build a 960 MW gas-fired combined-cycle power plant in Taiwan. Power from the plant will be sold to the national utility Taiwan Power Company.

New B9 Energy HQ driven by renewable power



The East side of B9 Energy's new, energy efficient and renewables-driven headquarters building

Douglas McIlldoon, the Director General of Electricity and Gas Supply in Northern Ireland has opened the remarkable new headquarters building of renewables developer B9 Energy in Larne, Northern Ireland. The building incorporates a host of energy

efficiency measures and is mostly fuelled by renewable energy.

Renewable energy technologies used to generate power and heating for the building include a 2.5 kW wind turbine, eight 85 W photovoltaic cells, a 9 kW wood burning stove and solar collector tubes.

The elevated, south facing site was chosen for maximum wind energy and solar gain to reduce heating and lighting costs.

Optimal energy efficiency was created by using the highly insulated KEPS energy efficient building system developed by Springvale EPS of Ballyclare. The lighting is low energy and a heat recovery ventilation unit uses the warmth given off by workers and their machines to heat the incoming fresh air.

The building is grid-connected so that it can draw power if required. However, it is estimated that the office will save approximately 35,000 kWh of electricity per annum. This equates to annual cost and carbon dioxide savings of £3000 and 24.5 tonnes respectively.

B9 Energy won an Energy Demonstration Grant from the Department of Economic Development of £75,000 towards the £300,000 cost of the building. The University of Ulster's Energy Design Advice Scheme liaised closely with the company on their plans.

B9 Energy is well known for its work on renewable energy in Northern Ireland and the Republic. The company has successfully developed 5 wind energy projects and operates a total of 110 turbines, as well as working on biomass projects. The company, which started in 1992 with 2 staff, now employs 15 and has bases in Larne, Newtownstewart, Derry and Letterkenny.

Energy trends for 1997

Provisional UK summary energy data for 1997 released by the DTI confirm the continuing displacement of coal by gas and suggest that annual primary energy consumption is on a steadily rising curve. A report in *Energy Trends* says that:

- Production and use of gas continued to rise in 1997 as use of gas for electricity generation increased.
- Production of coal continued to fall, particularly for deep mined production, but not as sharply as in the early 1990s.
- Production of nuclear electricity reached a record level, following an increase of 1% in 1997.
- Primary energy consumption fell in 1997 following the colder winter of 1996, but was higher than in 1995. Temperature-corrected energy consumption rose by 1% (1997 over 1996), following increases in each of the last five years.
- Consumption of coal continued to fall as the use of gas for electricity continued to rise.
- Consumption of petroleum fell due to the shift away from fuel oil and towards gas.
- Consumption of petroleum products for transport uses has increased, particularly for DERV fuel.

The Gloucestershire-based Secure Power Systems (SPS) has been awarded the UK distributorship for Bergey wind power units from Oklahoma. Bergey manufactures a range of wind power units to provide energy for constant power requirements and have world-wide installations from Arctic Russia to the Amazon. SPS will initially be using the units for telecom stations and are designing systems incorporating solar or prime mover energy sources to ensure a continuous power supply.



Planning policies for renewables 'must improve'

Achieving the Government's target for new renewable energy projects would require a 500% increase in the current rate of development. This demands radical changes to the way we plan and pay for renewable energy if the countryside is not to lose out and public support decline.

This is the message of a new report published by Council for the Protection of Rural England (CPRE). *Renewable Energy in the UK: policies for the future* has been written for CPRE by Dr Catherine Mitchell of the

Science Policy Research Unit at Sussex University as CPRE's contribution to the Government's review of renewable energy policy.

The CPRE suggests that some renewables projects can damage the countryside and generate strong public opposition at the planning stages: "Wind turbines are a case in point - only about one third of projects which have won Government financial support to generate electricity have been developed. Waste incineration projects have fared even worse, with only one fifth

of projects proving suitable in planning terms or overcoming other problems."

The answer is policies for planning and financing renewable projects which respond to public concerns and deliver better environmental outcomes, says the CPRE. The report says that the Government should:

- ensure that future decisions about financial support for renewables are not narrowly based on issues of cost, but take account of the potential environmental impacts;

- support a diverse range of energy technologies, including currently less competitive technologies such as solar and wood fuel combustion, to widen development options and ensure that technologies are better suited to local environmental conditions;
- develop a strategic energy policy framework which identifies the role for renewables and puts an overarching emphasis on measures to promote energy efficiency and reduce wastage.

Prescott urges greening of EU policies



Environment and Transport Secretary John Prescott

be achieved by closer integration of environment and transport policies.

Britain would lead the way during its Presidency, said Mr Prescott, with initiatives to encourage European cities to give preferential access rights to low or no emission vehicles and an exhibition of 'green' cars at an EU

Deputy Prime Minister John Prescott has called for greater efforts to cut vehicle emissions as part of Europe-wide greening of transport and other policies. He has told the European Parliament that improved local air quality and cutting carbon emissions as part of the European Union's Kyoto climate change commitments could only

summit to be held in Chester this month. On climate change, he added that "the first priority must be to complete the unfinished business of Kyoto, particularly the rules for flexibilities in the Protocol. Emissions trading, carbon sinks, joint implementation and the clean development mechanism all need to be agreed".

Advice line for PCBs

ABB Power T&D Capacitor Division has launched a free telephone hotline and advisory service for companies worried that there may be dangerous polychlorinated biphenyls (PCBs) in electrical equipment at their sites. ABB's free PCB hotline number is 0800 783 4913.

Capacitors containing PCBs

were used in power factor correction units, some fitted in switchboards and motors, until 1978. Many companies are likely to have some old equipment - the Government has estimated that 450,000 potentially hazardous PCB-impregnated capacitors have not been removed and destroyed.

Rolls-Royce Grid projects

Rolls-Royce has won orders from The National Grid Company worth £17 million to develop substations in the Midlands, Cornwall and Liverpool. Rolls-Royce has responsibility for project management, design, manufacture and site installation. In the West Midlands the company is to provide four mechanically-switched capacitor banks as part of NGC's reinforcement of its infrastructure to maximise use of the existing transmission system. These are controlled remotely

from the national control centre.

At Landulph, near Saltash, Cornwall, the company will provide two bays of 420 kV, one bay of 132 kV switchgear together with control and protection modifications.

Rolls-Royce will also carry out further improvements to the electricity supply system at Kirkby substation near Liverpool, replacing seven bays of 275 kV bulk oil circuit breakers with Reyrolle 420 kV switchgear and associated control and protection equipment.

Encouraging coal-based methane extraction

Strong interest in exploring for gas from coal sources is a key feature of the latest UK onshore oil and gas licensing awards announced by Energy Minister John Battle, who also said that the Government will propose new forms of onshore licences to encourage development of coal-sourced gas reserves.

"I would like to see coal bed methane reserves - gas trapped in coal seams - exploited wherever possible, particularly in

coal which is unlikely to be mined but also from potentially recoverable coal where extracting the gas beforehand can enhance mine safety. I recently consented to the UK's second coal bed methane development, at Arns Farm in Fife, and I hope to see further projects brought forward for approval in coming years."

Mr Battle added that companies had not been encouraged to consider coal bed

methane by the present licensing system, which was designed to manage conventional oil and gas exploration. He therefore plans to open consultation on proposals for a new form of onshore licence designed to encourage the exploitation of both conventional coal bed methane and other forms of coal-related gas.

"There would be environmental benefits from using the considerable quantities

of gas from abandoned coalworkings which escapes to atmosphere, where it is seventeen times more potent as a greenhouse gas than the exhaust from burning it would be" said Mr Battle. "Although unsuitable as feed to the national gas grid, this gas can be burned locally to generate electricity or to lower industrial processes and is a resource which the Government is keen to see used."

Trust welcomes extra funding



Dr Eoin Lees, chief executive of the Energy Saving Trust, has welcomed the Government's announcement that it is to maintain the Trust's budget at £19 million for 1998/99. Under the previous Government's spending plans, the Trust's budget was set to fall to £13.5 million.

"Coming at a time when the Government is under considerable financial restraints, this is a considerable demonstration of their commitment to the environment" said Dr Lees. "The increasing funding, and the millions of pounds of geared funding it will attract, will

enable the Trust and its many partners in industry, local authorities and elsewhere, to build on our achievements of the past few years in reducing the UK's CO₂ emissions and providing warmer homes."

Meanwhile, Offer's Professor Stephen Littlechild has proposed an extension to March 2000 of the 'Standards of Performance' for public electricity suppliers to promote the efficient use of electricity. Public electricity suppliers will be required to arrange energy efficiency projects which in aggregate save 2,500 to 2,850 GWh of electricity.

Plan to ring-fence coal-fired generation

The All-Party Coalfield Communities group of MPs and the Coalfield

Communities Campaign have launched a plan to guarantee a market share for coal-fired electricity generation and thus provide a long term future for Britain's coal industry. The Campaign is arguing that a ring-fenced share for coal in the electricity generation market would ensure:

- diversity and security of supply,
- no extra cost to the consumer or taxpayer,
- the introduction of clean coal technology, and
- a future for all the collieries presently under threat.

The document *A Market for Coal* aims to abate the crisis that was facing the coal industry before Christmas. At that time, pit closures seemed likely as contracts to supply coal to electricity generator looked unlikely to be renewed. In December a three month extension of

contracts was granted, giving coal producers time to put their case.

The CCC are calling for an end to what it calls the short-term approach of energy producers that has resulted in the 'dash for gas'. This has led to an increasingly heavy dependence on gas-generated energy. However gas is a limited resource and, as UK stocks deplete, generators will become increasingly reliant on imported gas, says the Barnsley - based Campaign.

At the same time, UK coal is some of the cheapest in the world, and receives no subsidy from the government. But so called 'sweetheart' deals for gas-generated power supplies have meant that the coal producers have not been competing on a level playing field, says the CCC.

The Government's Review of fuels for power generation is expected to be complete in the summer.

New engines for landfill power expansion

Haul Waste's landfill gas-to-energy site in Ardley, Oxfordshire uses one Caterpillar engine



Landfill gas user Haul Waste is expanding its power generation capacity with a further 10 Caterpillar 3516 generator sets from Finning (UK) Ltd to operate five new contracts awarded under tranche 4 of the Non-Fossil Fuel Obligation

(NFFO). The generators represent a £6 million investment and will increase Haul Waste's generating output to 25 MW by the year 2000.

The five new landfill power generation contracts include: a new operation at Masons in

Suffolk with two generators scheduled for a phased delivery; an expansion of the Beddingham operation in Sussex where two existing generators will be supplemented by a third; a doubling of capacity from four generators to eight at

Ockendon in Essex; another new facility at Westbury in Wiltshire with a single generator; and two additional generators for the Heathfield site in Devon. All are contracted to produce electrical power for 15 years.

Finning (UK) Ltd is supplying a full package which includes an integrated monitoring and telemetric control system, which enables 24 hour monitoring and control of engine performance via a VDU screen on site or by engineers at a remote control centre. Whenever the system identifies a potential failure, it dials up the control centre and alerts engineers that action is required. An engineer can then dial up the installation and, via an identical representation of the screens on site, perform required control functions.

First CHP plant exempted from moratorium

A CHP plant at British Sugar plc's factory at Bury St Edmunds, Suffolk is the first to be given Government consent while its review of energy sources for power generation is underway. Government consent for proposed power plants larger than 10 MW is being withheld during the review of energy sources for power generation.

But Energy Minister John Battle said that: "the Government considers the merits of this project mean that a decision should be made at this time to ensure the plant can be operational in time for the 1999 sugar beet harvest."

He added that the project "is a fine example of industry using steam and heat as well as electricity from a power plant to increase overall fuel efficiency and boost its environmental performance".

The new gas-fired CHP plant, with a capacity of about 80 MW, will replace steam and electricity generation by existing heavy fuel oil and gas-fired boiler plant which will be placed on standby once the new equipment is fully operational.

Use of the waste steam and heat in the sugar factory means that it will have a high fuel efficiency of 80%.

Energy labels extended; new fridges for old

Expansion of a Government-backed EC energy labelling scheme is set to help consumers find it easier to choose energy saving household appliances. Since 1 February, new domestic combined washer-dryers have joined fridges and freezers, washing machines and electric tumble dryers in requiring a European energy label.

Domestic fridges, freezers and their combinations have been labelled since January 1995, as having washing machines and electric tumble dryers since October 1996. The scheme will be extended to dishwashers from January 1999, and will eventually cover light bulbs and

other domestic appliances.

Meanwhile, over 3,000 lucky SEEBOARD customers are being offered new fridges for only £25. The Fridgesavers Scheme is providing brand new, energy-efficient fridges for a nominal cost to anyone in the SEEBOARD area whose fridge is using too much electricity and who is in receipt of benefit. This innovative scheme, developed by the Energy Saving Trust and funded by the fourteen Public Electricity Suppliers including SEEBOARD, is targeting those on benefit because they tend to have the oldest and most inefficient fridges.

Electricity: trading

by Richard Slark, ILEX Associates

The UK electricity industry is moving rapidly towards a major upheaval, as full supply competition is introduced to the small business and domestic sectors. The new market will result in unprecedented changes being made to the way in which electricity is traded, which could have major consequences for those participating in the electricity market. Unfortunately, to those uninitiated in the intricacies of electricity trading, many of these changes appear complicated, and a newcomer to the industry, trying to understand what is going on, could easily be buried under a mountain of jargon. This article explains some of the basic principles that determine the way in which electricity is traded and provides an introduction to the commercial arrangements that will underpin the new market.

THE INCREASING SCOPE OF COMPETITION

At privatisation in 1990, supply competition was introduced to the largest 5,000 consumers of electricity, with maximum demand in excess of 1 MW. In 1994, competition was extended to a further 50,000 consumers with maximum demand above 100 kW. In this, the last phase of liberalisation, competition will gradually be extended to all remaining electricity consumers. The new market is currently expected to start opening in September 1998, and to be completed by June 1999.

1990: above 1 MW

1994: above 100 kW

1998: all consumers



So who needs to understand how electricity will be traded in the new market? Certainly not the average domestic consumer - for whom the only change will be the letterhead on the electricity bill, and the lower charges or better service that competition may bring. However, for a party such as a local authority, non-Pooled generator or large electricity consumer wishing to take advantage of the opportunities that the new market may bring, a detailed knowledge of the how the market will operate will be vital. These opportunities might include supplying your own tenants, selling your generation to other parties or becoming your own Meter Operator, Data Collector and/or supplier.

BACKGROUND

At a very basic level, electricity is like other traded commodities such as oil or coffee. It needs a wholesale market where the sellers (generators) and buyers (suppliers) can trade electricity, and it needs a retail market where the suppliers can sell on the electricity to final customers. As with other markets the participants need to agree on the price and quantity to be traded.

However, electricity also has some unique characteristics which mean that it must be traded in special ways. Namely:

- it cannot be stored;
- it cannot be differentiated according to who generated it;
- the amount generated must always exactly match the amount consumed at any moment in time; and
- it can only be delivered through an electricity grid.

It was partly for these reasons that nearly every country around the world decided that the activities of electricity generation and supply could only be undertaken by monopoly companies - often just one company undertaking both functions. However, towards the

end of the 1980s certain governments came to the view that the monopoly nature of these companies was resulting in higher prices for consumers, and decided to introduce competition into the activities of generation and supply. The activities of transmitting and distributing the electricity through the grid would remain 'natural' monopoly activities because it would simply not be cost-effective to build a competing set of pylons and cables.

In 1990 the electricity industry in England & Wales was the first to introduce competition to the activities of generation and supply. The Central Electricity Generating Board (CEGB) was split into three generating companies: National Power, PowerGen and Nuclear Electric. In addition, the legislation was changed so that anybody could build a new power station (subject to meeting planning and technical standards) and sell their power into the new wholesale market.

Competition in supply was introduced by reducing the supply monopoly which the twelve regional electricity companies (RECs) had over customers in their area, and allowing other suppliers to purchase electricity from the wholesale market to sell to customers. Initially, supply competition was limited to very large industrial customers. From 1994 this was widened to include medium-sized business customers, and from 1998 domestic supply competition will occur.

WHY WE NEED POOLS

Because of electricity's special characteristics, the competitive market needed to be structured in such a way as to achieve the following three main functions:

- ensure that the amount of electricity being generated at any moment in time exactly matches the amount being consumed;

in the new market

- identify how much each participant has generated and consumed; and
- determine a price at which these transactions can be traded.

The mechanism developed to achieve these functions in England & Wales is the Pool. This essentially performs the role of the wholesale market where suppliers and generators can buy and sell electricity on a half-hourly basis.

Generators are required to sell all their electricity into the Pool. Similarly, suppliers must purchase all their electricity from the Pool on a half-hourly basis. The amount suppliers are deemed to have purchased from the Pool is based on the amount their customers have consumed in each half-hour. It is for this reason that the new trading arrangements have been devised to calculate, or at least estimate, every customer's consumption for each half-hour.

For those customers with half-hourly meters (mandatory for all customers with a maximum demand above 100 kW), it is simply a very large data collection exercise to calculate a supplier's total half-hourly take from the sum of its customers half-hourly demand. However, for the 25 million customers without half-hourly metering, the new arrangements incorporate a mechanism for estimating the half-hourly demand of these customers from their annual consumption. Rather than insist that all non-half-hourly customers install a half-hourly meter, which would involve considerable cost and take years to complete, the new trading arrangements will use a series of load profiles to estimate the half-hourly consumption. A load profile is a fraction of the annual consumption in each half-hour of a day, and is calculated from research on actual consumption patterns.

Customers with similar consumption patterns over the day are lumped together in a *profile class* of which there are eight, relating to:

- domestic customers;
- domestic customers with (Economy 7) electric heating;
- standard non-domestic customers;
- non-domestic customers with multi-rate meters;
- maximum demand metered customers with a load factor of less than 20%;
- maximum demand metered customers with a load factor of between 20% and 30%;
- maximum demand metered customers with a load factor between 30% and 40%;
- maximum demand metered customers with a load factor of more than 40%;

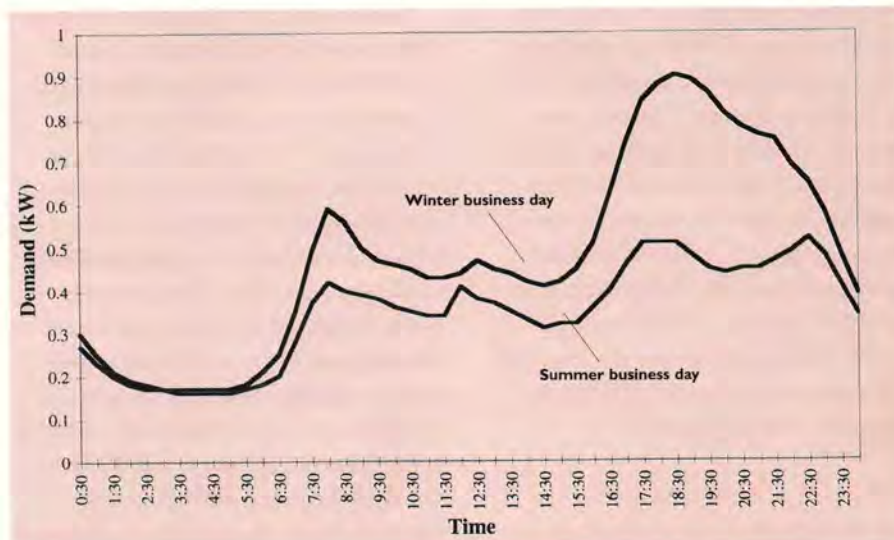
THE NEW COMMERCIAL ARRANGEMENTS

The Pool trading arrangements centre around the process of Settlement - working out how much each supplier owes, and to whom. Settlement consists of a chain of processes carried out by different market participants. These processes can be categorised as follows:

- *Meter Operation*: installation and maintenance of customers' meters;

- *Data Collection*: retrieval and processing of data from the customers' meters;
- *Data Aggregation*: summation of metering data by supplier, customer class and location (public electricity supplier [PES] area);
- *Registration*: operation of a database of customer meter and supplier details to facilitate the various settlement processes;
- *Settlement*: calculation of each supplier's Pool take for each half-hour of each day (ie how much each supplier's customers have consumed) and calculation of supplier's purchases;
- *Funds Transfer*: conversion of supplier purchases into financial liabilities, and organisation of the flow of funds.

The diagram on the next page not only shows how these processes link together to form the overall settlement function, but also illustrates how the responsibility for undertaking these processes has changed. The first flow chart shows how the current settlement process occurs for those customers presently in the competitive market, whilst the second chart shows how settlement will occur

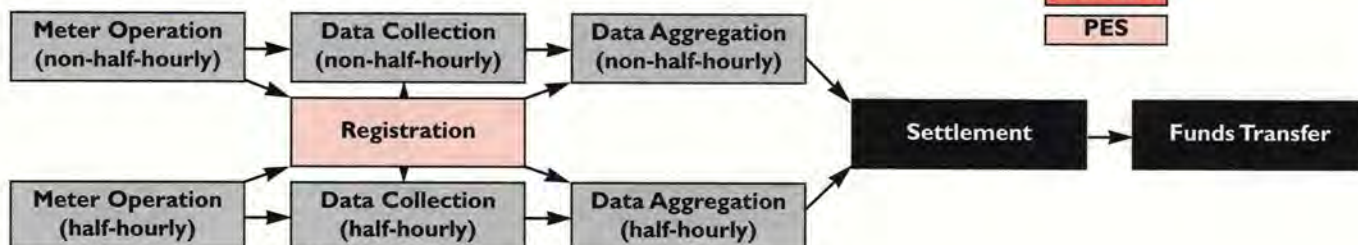


Load Profile: standard domestic (Source: The Electricity Association)

Existing competitive supply settlement processes



New competitive supply settlement processes



after the new trading framework has been introduced. In the existing market the entire process, apart from metering which is undertaken by the customer's agent, is the responsibility of the Pool and is undertaken by agents of the Pool.

In the new trading arrangements, the processes of Meter Operation, Data Collection and Data Aggregation are the responsibility of the supplier, whilst only Settlement and Funds Transfer are the responsibility of the Pool. Registration will move from the Pool's national system to 12 regional registration systems run by the local public electricity suppliers, known as the PRS (PES Registration Service).

The processes of Meter Operation, Data Collection and Data Aggregation are undertaken by agents appointed by the supplier. Any party can undertake these functions for half-hourly meters, provided that they are accredited by the Pool for that process. Most suppliers will become accredited as their own Meter Operators, Data Collectors and Data Aggregators and some large consumers or chains may also find it advantageous to become their own Meter Operators or Data Collectors. For all non-half-hourly metered customers the local PES will retain a monopoly on these three functions until April 2000.

HOW WILL IT ALL WORK?

On being appointed by a customer, a supplier will register its name and those of its agents against the customer in the

PRS. For half-hourly metered customers the Data Collector will then be responsible for reading the meter, either on a daily basis for above 100 kW customers (for whom metering data must be submitted to the Settlement process each day) or less frequently for other customers, in line with the data storage capability of their meter.

The Data Collector will then pass this meter data on to the Data Aggregator (and also to the supplier - for billing the customers; and local PES distribution business - for billing the supplier for Use of System charges related to the transmission and distribution networks). The Data Aggregator will then sum the metering data for each supplier within each local PES area. It will then pass this 'aggregated' data on to the Settlement agent.

For non-half-hourly customers the Data Collector (which will continue to be the local PES until April 2000) will continue to read meters in the normal way: once or twice a year. The Data Collector will use these meter readings to update a forecast of each customer's consumption over the forthcoming year and to provide an actual customer consumption for the previous twelve months. This forecast and historic data will be passed on to Data Aggregator (and the supplier and distributor) who will sum, for each supplier, the total consumption in each class of customer, in each PES area. The Data Aggregator will then pass this information on to the Settlement agent, who will use it to calculate the half-hourly consumption of these customers, by

application of the profiles.

The Settlement agent, or to give it its full title, the Initial Settlement and Reconciliation Agent (ISRA), will calculate each supplier's 'take' in each half-hour in each PES area as the sum of demand from half-hourly and non-half-hourly customers. ISRA will then calculate each suppliers electricity purchases as the product of the total half-hourly take and the Pool Selling Price (PSP) for that half-hour.

ISRA will then passes details of these purchases to the Funds Transfer agent who is responsible for calculating each supplier's liabilities from its purchases in the new trading arrangements and any purchases in the existing settlements system. The existing settlements system will be wound down over the 12 months or so following the opening of the new market, with above 100 kW customers migrating to the new trading arrangements. The Funds Transfer agent also oversees the flow of funds between the electricity industry.

The last stage in the Settlements process is Reconciliation, which involves the rerunning of the entire Settlement process several times over the following 14 months, when more actual metering data becomes available from the meter reading cycle, so removing any forecasting errors.

Contact Ilex Associates on:
tel: 01865 722660,
fax: 01865 722988

Europe's liberalisation agenda

Many European countries are making moves to follow Britain's lead towards liberalisation of their electricity markets. The International Energy Agency regularly publishes reports on the energy policies of its member countries - here its authors consider the position of the energy industries in Belgium, Norway and the Slovak Republic.

NORWAY'S ELECTRICITY MARKET REFORMS

The International Energy Agency (IEA) acknowledges the impressive reforms in the Norwegian electricity sector, which may serve as a model for other countries. The report also recommends a critical evaluation of Norway's gas marketing process.

Norway has been restructuring its electricity regime since 1991; it now has formed the world's first international electricity market, with Sweden. The right to create supply monopolies has been taken away from local distributors and consumers at all levels may now choose their supplier. The state power authority was split up into separate generation and transmission functions. The IEA expresses concern about inadequate incentives for private sector investment in new capacity and sluggish progress in rationalising 200 municipally-owned distribution utilities.

Norway has become the second largest oil exporter in the world, after Saudi Arabia, thanks to its major offshore oil and natural gas reserves and significant hydroelectric resources. Norway's stable political situation contributes to security of supply in the region, and its mix of gas, oil and hydro power ensures diversity of choice.

The report also examines the pivotal position of Norwegian natural gas in the European market. It calls for a critical evaluation of the state's role and a continuing review of the existing structure for gas transport and sales, and the rectification of any distortions.

SLOVAKIA 'SHOULD ACCELERATE ENERGY SECTOR REFORM'

The IEA notes that since the country emerged as an independent state in

1993, Slovakia has made substantial progress in its efforts to establish a market-oriented energy sector. But major tasks still lie ahead, in particular improving flexibility, diversification and efficiency of the energy system, liberalising energy prices and ensuring that nuclear power production meets international safety requirements.

Slovakia is an important player in European energy trade. The country's unique location at the main transit route for Russian gas to European markets makes it critical to energy supplies for Western Europe. About 80% of all Russian gas exported to Central and Eastern Europe is pumped across Slovak territory. This includes more than 25% of total West European gas supplies. There are also signs that Slovakia's role in regional electricity trade will increase.

Slovakia is poorly endowed with resources and highly dependent on energy imports. Domestic oil and gas production is negligible and the country imports virtually all of its oil and gas from Russia. These imports equal 48% of total primary energy supplies. Together with nuclear fuel - also supplied from Russia - and coal imports, Slovakia imports about 89% of its energy needs. Domestic energy resources are essentially limited to low-quality lignite and hydropower.

In light of this high import dependence, the IEA encourages Slovakia to improve its energy security.

The IEA recommends further distancing of the energy industry from government influence and sees a greater need for competition in the energy sector, particularly for oil product transportation and distribution.

Adequate energy sector regulation that ensures fair, transparent and stable rules for energy sector operations is not yet in place, but is crucial for attracting foreign capital and enhancing productivity. Large parts of the energy industry are directly or indirectly owned by the state, and foreign involvement is essentially limited to oil products distribution.

BELGIUM'S ENERGY DIVERSIFICATION

The IEA praises the successful phasing out of the country's uneconomic indigenous coal industry without major social crises and commends Belgium for using widely diversified sources for natural gas imports - a policy which contributes to the overall security of European gas supply. The IEA report also lauds the excellent safety record of Belgium's nuclear industry.

But the IEA recommends that concrete measures be taken to liberalise the Belgian electricity and natural gas sectors and to improve energy efficiency. Belgium's natural gas and electricity industries are highly concentrated and integrated, and risk distorting energy markets. For the benefit of consumers, structural reforms are required, says the IEA. More competition should be promoted in the electricity and gas markets, including among distribution companies. Non-discriminatory access to the high pressure natural gas and high voltage electricity grids should be assured.

With the coming of federalism in Belgium, significant responsibilities have been transferred to the three regional governments, particularly in the fields of rational use of energy, energy technology, research and development in energy and environmental protection. The IEA report encourages the regions to harmonise their programmes in these areas, particularly in energy efficiency, a cornerstone of national policy for reducing CO₂ emissions. Implementation, monitoring and evaluation of this policy should be conducted on a co-operative basis throughout the country. Further co-ordination between the Federal and regional governments is needed to ensure that environmental protection targets are realistic, achievable and cost-effective.

Commercial orders for Energy Policies of IEA Countries - Norway, the Slovak Republic and Belgium - 1997 Reviews may be directed to the IEA Public Information Office, tel: +33 1 4057 6557, fax +33 1 4057 6559, e-mail: info@iea.org.

County Council utilises the EDI solution

Lincolnshire County Council has chosen to take its monitoring and targeting process one step further. It is one of the first councils to use electronic data interchange (EDI) to automate the transfer of electricity invoices into their M&T software system.

Jaime Beckett, Energy Group Manager at Lincolnshire County Council is responsible for looking after electricity, gas, water and sewage for 900 sites. As with any multi-site organisation, this involved the manual processing of thousands of invoices into their M&T database before attempts to identify savings could be made.

However, in 1995, this all changed. With the installation of the TEAM Bulk Bill Management System (BBMS), Lincolnshire County Council became EDI enabled.

EDI removes the need to manually process invoices, payments and statements; thus increasing data accuracy and reducing data processing time. This leaves more time for data analysis and for the implementation of valuable energy saving initiatives.

Lincolnshire County Council purchases its electricity from two suppliers, Yorkshire Electricity (YE) and East Midlands Electricity (EME), both of whom send out their invoices electronically and in bulk.

Invoice data is transferred directly into their EDI system, which automatically populates their M&T software.

TEAM BBMS assures that:

- all of the data being entered into the M&T system is arithmetically correct;
- meter readings match consumption;
- break point rates have been correctly applied.

Until recently, data from 700 YE invoices had to be manually input from paper bills into energy accounting software for checking and analysis. Taking approximately two minutes per invoice, this was both a time-consuming and inefficient means of data transfer. In addition, data entered could suffer from inaccuracies, being subject to typing errors or the occasional missed invoice.

Last April, Lincolnshire County Council began to receive its YE invoice data electronically via EDI floppy disks. The disks are sent to the council on a monthly basis and can be used to generate paper invoices if they are required. This data is transferred automatically into TEAM BBMS for error checking. Any rejected data is corrected or returned to the electricity company. This system ensures that all bills are correct and that data entered into the M&T database is accurate.

In the case of EME, it would have taken an estimated 93 man-hours each year to manually enter 2,800 invoices. However, EME data tapes enable Jaime Beckett to input them directly into his energy accounting software in a similar manner to the process described for YE.

This 'paperless trading' has facilitated cost savings resulting from the elimination of keyboard entry and paperwork reductions. The accuracy and reliability of data has been substantially increased whilst leaving more time for identifying energy savings.

Jaime Beckett is very positive about EDI, "Using TEAM BBMS, the 3,550 invoices received in a year from our electricity suppliers now take just three hours to populate TEAM Energy Accounting, a significant decrease from the 118 hours per year that previously were taken up manually keying-in-data." In addition to this saving, last year, the annual report that Jaime Beckett produced from his monitoring system helped him to identify: £20,000 worth of billing errors, £85,000 in energy savings, and £24,000 water and sewerage savings.

Contact the Energy Auditing Agency Ltd,
tel: 01908 690018, fax: 01908 690019, e-mail: info@teamenergy.com

Norweb joins Tesco for electricity sales

February this year saw the announcement of an unprecedented link-up between ENERGi, the energy supply division of Norweb, and food retailer Tesco. The alliance offers ENERGi customers one Tesco Clubcard point for every pound spent on their gas or electricity bill.

The alliance is, according to a new report from MarketLine International, the first between an energy supplier and a supermarket - and has a high chance of success.

The Marketline report says that alliances between energy companies and supermarkets are the variety most preferred by customers, and that supermarkets have the best existing customer infrastructure for this type of alliance.

Competition in the domestic gas market is planned to spread nationwide by May 1998,

while domestic electricity competition should be introduced by the end of 1998. According to MarketLine, the domestic markets will both be driven predominantly by price and service but, with price and service differentials between many suppliers expected to be minimal, many suppliers have sought to differentiate further their supply offerings by making affinity alliances with non-utility companies. Such alliances can aid customer acquisition and retention, as well as strengthen the brand of the supplier.

A MarketLine survey conducted last year suggested that over a third of domestic energy users said that they would choose an energy supplier linked up with a supermarket whose reward card they had. Slightly fewer chose a credit card company. Both of these options came well in from the next most preferred - banks and building societies.

Syntegra aids Southern

Syntegra, BT's systems integration business, has completed delivery of a messaging hub which will integrate Southern Electric's information systems and enable them to exchange data with each other and the Managed Data Network Service (MDNS).

The MDNS will be used by electricity supply and distribution companies, as well as the electricity Pool and Scottish settlements, to exchange data on daily trading and keep records of customers' choice of supplier and usage of electricity.

The service is essential to the effective working of the competitive UK electricity market, which will be operational later this year.

UK electricity prices among the lowest in Europe

EU Industrial Electricity Prices



UK households are enjoying some of the most competitive electricity prices ever compared with their European neighbours. UK domestic power prices are now fourth cheapest out of the 15 EU member countries despite the strength of sterling, according to the

Electricity Association in its latest edition of *International Electricity Prices*.

Prices for a typical domestic customer, allowing for standing charges and VAT, fell 5% in real terms to 9.01 p/kWh by January 1997. That compares with a price of 12.06 p/kWh in Belgium,

the most expensive nation in the table. Since then, typical electricity prices for UK households have fallen a further 6% in real terms. Overall, prices are now 19% lower than when the industry was privatised in 1990, with a typical household bill now £61 less in real terms (excluding VAT), says the Association.

In the industrial market, UK electricity prices under contract are also fourth cheapest among the 15 EU states. Prices for a typical medium-sized industrial user, with a 2.5 MW, 40% load factor supply, fell to 4.14 p/kWh, compared to 6.58 p for Italy, the most expensive.

Lower electricity prices obviously benefit UK customers, but they are also good news for power companies: "whose competitive edge is set to exploit new opportunities as electricity markets across Europe are progressively opened to competition", says the Association.

Copies of *International Electricity Prices* are available from the Business Information Centre, Electricity Association, tel: 0171 963 5915, email: enquiries@electricity.org.uk

Triad warnings cut peak electricity costs

'Triad' warning services such as that available from Yorkshire Electricity can save large industrial and commercial customers thousands of pounds in energy costs during peak demand periods on the National Grid. Already, over 400 commercial sites up and down the UK have taken advantage of Yorkshire's service, with the largest customer, Allied Steel and Wire, saving over £1 million on electricity bills in 1997.

The Triad Warning Service, specially designed for customers who buy energy on a half-hourly consumption basis, warns customers of potential Triads - the three half hours in the year when national demand for electricity is at its highest and power is at its most expensive. This usually occurs during early winter evenings when there is a massive demand for energy on the National Grid from commerce and industry, street lights and domestic use.

The warning gives customers the

opportunity to switch off their energy supply and avoid the transmission costs associated with buying electricity during a Triad. Customers are not obliged to switch off their supply, but many do because they can save more money on their electricity bills by switching off, then they would lose by halting production.

Triads are used by the National Grid Company (NGC) to calculate how much electricity supply companies need to pay for using the transmission system. NGC takes the demand of each supplier at the time of the three Triads between November and February and works out an average. It multiplies this average demand by a set price to calculate the total Transmission charge owed. As Yorkshire Electricity passes this charge onto all customers at NGC tariff prices, it is in the interests of large energy users to reduce their electricity load during Triad peaks.

Yorkshire Electricity issues approximately 25 Triad warnings a year and faxes customers daily during the winter months. The Company predicts when a Triad is likely to occur with the use of sophisticated software, historical national demand data and weather forecasting. From its experience, Yorkshire Electricity also knows that Triads will always take place between 4.30 pm and 6.00 pm and always on Mondays to Thursdays. To date, none have ever occurred on a Friday.

In this year's Triad period, the highest electricity demand to date occurred on Wednesday 17 December 1997 at 5.00 pm when demand reached an estimated 49,222 MW.

Information on Yorkshire Electricity's Triad Warning Service is available on tel: 0345 227733.

Green taxes - on energy and overall competitiveness'

by Bonnie Downing

A new report published by Forum for the Future and Friends of the Earth will strengthen the lobby in favour of environmental taxes, not least because it comes at a time when other European countries are introducing similar taxes to those which it advocates. The package of taxes being proposed for the UK is dominated by a carbon/energy tax levied on business and industry, and a higher road fuel duty escalator.

	Tax revenue £bn	% GDP	Employment '000s	Jobs/£m tax revenue	% consumer prices	Balance of payments % of GDP	CO ₂ emissions mtC
Carbon/ nuclear tax	6.0	0.1	102	17	-0.2	-0.1	-6.9
Landfill Tax	3.1	0.0	43	14	0.1	0.0	0.0
Road fuel duty escalator	14.0	-0.1	166	12	1.1	0.0	-5.8
Incineration tax	0.0	0.0	0	10	0.0	0.0	0.0
Aggregates tax	2.4	0.2	82	34	-0.5	-0.1	-0.1
Removal of car perks	0.6	0.1	24	40	-0.2	0.0	0.0
Car parking tax	1.7	-0.1	-17	-1	0.2	0.0	0.0
Combined package	27.1	0.2	391	14	0.5	-0.2	-12.8

Table 1 Key effects of the environmental taxes, singly and as a combined package, in 2010. (All units are measured as differences from a base scenario)

The report: *Ecological tax reform, environmental policy and the competitiveness of British Industry* puts forward a case for the introduction of ecological tax reform, or ETR, in the UK. In simple terms, this is a system of taxation which offsets the impact of the tax by making corresponding cuts in other taxes, a method which the study refers to as 'recycling' taxes. In this case the proposal is to 'recycle' revenues raised from green taxes by making corresponding reductions in employers' National Insurance Contributions (NICs).

In the report Friends of the Earth (FoE) and Forum for the Future (FFF) advocate the use of environmental taxes because, they argue, in a market-based economy, environmental improvements are unlikely to happen through voluntary action. They also have several clear benefits: they can be used for many different sources of pollution and, because they become incorporated in the prices of products, they send appropriate signals to producers and consumers to shift away from

environmentally intensive consumption.

Most importantly, green taxes can be used to reduce other taxes: "It is well understood that some taxes have a detrimental effect on the economy by reducing the incentive for people to work and to be employed and to save. Taxes on labour, or on income from labour or savings have this effect. Where the revenues from environmental taxes replace labour taxes, greater employment may result."

SHIFTING THE BURDEN

The rationale behind ETR is to shift the tax system away from taxes which impose costs on the economy (ie labour costs) towards those which would achieve environmental objectives.

Based on statements made at the time of last year's Budget, FoE/FFF believe the government will support its proposals: "The UK government appears to have been convinced by the arguments and experience of ecological tax reform, for in its Statement of Intent on environmental taxation at the

time of the Budget in July 1997 it promised: Over time the government will aim to reform the tax system to increase incentives to reduce environmental damage. That will shift the burden of tax from 'goods' to 'bads'".

ETR would impose seven green taxes. These are:

- a carbon/nuclear tax levied on commerce and industry, rising from \$1 per barrel of oil equivalent in 1998 to \$13 in 2010;
- an annual increase of £2 in the rates of the landfill tax raising the existing £7 and £2 bands to £33 and £20 per tonne;
- a tax on waste disposal by incineration equivalent to the lower rate of the landfill tax;
- a road fuel duty escalator of 9% rather than the promised 6%;
- a tax on primary aggregate production of £1 per tonne in 1998 rising annually to £13 per tonne by 2010;
- the removal of company car perks; and
- a tax on private car parking at the workplace, proposed to start in 1998 at £1 per week per space, increasing by £1

road fuel - 'need not harm

per annum, rising to £13 per week per space by 2010.

To ascertain the impact of these taxes the researchers commissioned Cambridge Econometrics to use a sophisticated modelling system, named MDM-E3, which is capable of combining data relating to energy, the environment and the economy. Their aim was to demonstrate first how the UK economy generally would be affected and also to clarify the outcome for 49 different industrial sectors. In both cases the outlook is from 1997 through to 2010.

To examine the macroeconomic impact, MDM-E3 applied the seven tax reforms separately, and then as a combined package. The results are set out in Table 1. As this shows, the combined package of measures leads to a reduction in CO₂ emissions of almost 7% and the creation of 249,000 jobs by 2005 and 391,000 by 2010. The amount of extra revenue raised is £27 million, while the corresponding cut in NICs reduces these to just 3% by 2010.

A very different outcome is obtained when the proposed taxes are applied to different industrial sectors, however. The report says: "In order to do this, the cost structure of each industry must be examined to determine whether it is likely to experience an overall increase or decrease in costs."

WINNERS AND LOSERS

The main finding from this part of the research is that some companies would be clear winners and some clear losers from ETR. Because of the recycling principle behind ETR, the proposed reduction in employers' NICs means that the industries which stand to gain most are those which are the most employment-intensive, whereas: "Those industries for which energy costs make up a relatively high proportion of total costs (energy-intensive industries) are likely to suffer more from a package of tax measures designed to increase taxation on energy and waste."

Detailed tables are used in the study to show how different types of industry would be affected by the taxes with education, health and social services,

retailing and the hotel industry benefiting the most from reduced costs, while industries such as fuels manufacturing, oil and gas, chemicals and air transport face higher costs. The overall conclusion can be summed up in one sentence contained in the report: "The industries most likely to gain from the proposed ETR package are those with the highest labour costs and the lowest energy costs."

Paul Ekins, Programme Director of Forum for the Future is urging businesses in the winning sectors to lobby the government hard to get an ecological tax reform underway. The report makes little reference as to how the energy industry would fare under a system of ecological tax reform although, as an energy-intensive sector, it is by implication one of the 'losers'. The power generation industry for example, currently running at an efficiency rate of 36%, is a huge carbon producer. Under ETR it would face dramatically increased costs but without benefiting from a corresponding reduction in its NICs.

Commenting on this, Paul Ekins said there could be ways for the energy industry to reduce its exposure to the tax: "It might, for example be possible to recycle the revenues raised from the industry back to that sector as whole. There is a precedent for this in Sweden where a nitrogen oxide tax is made on the largest energy producing companies. The revenues are taken from the companies on the basis of their measured nitrogen efficiency and are returned on the basis of the energy output, so that the most energy efficient and least NO_x producing companies gain, while the least energy efficient and most NO_x producing companies lose."

EUROPE LEADS THE WAY

Meanwhile, in parts of Europe the race is on to find out which country will eventually be the 'greenest'. Green taxes were introduced by the northern-most countries some time ago, ranging from those imposed on air quality (such as France's charges on polluting atmospheric emissions introduced in 1985 and Sweden's NO_x tax introduced in 1990); to charges on water pollution

(Belgium and Germany); water supply and solid waste charges and noise.

The latest announcement (made, incidentally, after the publication of the FoE/FFF study) is that the Netherlands' government now intends to increase taxes on energy and fossil fuels (excluding motor fuels) to achieve a 7-10 million tonne cut in carbon dioxide emissions. Plans for how the revenues raised from these new taxes will be used sound very similar to the system proposed by FoE/FFF: taxes will be returned to the economy, through reduced income taxes, lower taxes on corporate profits and increased social benefits, and to support energy saving measures.

To allay fears over the claimed anti-competitive nature of green taxes the FoE/FFF study refers to the Danish experience. Denmark has been a pioneer in the area of environmental taxation and a quote from its Ministry of Economic Affairs confirms that its potential to trade has not been affected: "Danish experience through many years is that we have not damaged our competitiveness because of green taxes. In addition we have developed new exports in the environmental area."

FoE/FFF hopes the UK government will not wait long before it puts words into actions and "sets off down the ETR path."

The UK government is under pressure to find ways of meeting its commitment to reduce carbon dioxide emissions by 2010. Provided it is serious about this commitment, the pressure to listen to those advocating ecological tax reforms will become harder to resist, especially given that the Netherlands has also confirmed its intention of moving towards a system which shifts taxes from labour to employment. In the meanwhile, environmental groups behind green tax reform could find themselves joined by companies which, having read the findings in this report, could finally be persuaded that it is in their interests to support them after all.

Copies of the report: Ecological tax reform, environmental policy and the competitiveness of British Industry are available from the Forum for the Future, tel: 01242 262729, fax: 01242 262757.



A scheme whose time has come?

Richard Tinson, Director, National Energy Foundation

Richard Tinson discusses the contribution which the Energy Efficiency Accreditation Scheme could make to the challenge of reducing carbon dioxide emissions in business and industry.

The government continues to confirm its commitment to reduce CO₂ emissions by 20% on the 1990 levels by 2010, and all commentators agree that it will take a persistent, determined and indeed heroic effort. Just how the target is to be achieved may become clearer when, following various reviews, the UK climate change strategy is published later this year.

Readers of *Energy World* have been kept well informed of the issues and developments as they have unfolded in recent months. In this article, some aspects of reducing CO₂ emissions in business and industry are considered, with particular reference to the Energy Efficiency Accreditation Scheme.

Business and industry accounts for over 40% of energy use and CO₂ emissions, and inevitably will feature prominently in plans to achieve the national target. Statistics indicate that both business and industry have reduced their CO₂ emissions significantly in the 1990s. However, this is less due to improvements in the management and use of energy, than from reduced CO₂ emissions produced in the generation of electricity which they use.

In recent years, the pattern of electricity generation has changed and in such a way that CO₂ emissions have fallen by a third.

However no significant further improvements are expected in electricity production between now and 2010. In other words, reduced CO₂ emissions in the future will have to come from better management and utilisation of energy by end users in

"We believed independent assessment would have positive benefits, and provide a valuable overview of our approach to energy management. Accreditation - and the 'double e' logo - demonstrate clearly to the outside world the Corporation's commitment to energy efficiency" -

Paul Kennedy, Energy Manager, The Corporation of London.

business and industry, not from changes at power stations.

It is an article of faith in the energy efficiency industry that, in every sector of use, improvements of at least 20% in energy costs can be made by cost-effective investment. It is also true that in recent years, many users have achieved the same result not through improved energy efficiency, but simply by taking advantage of the lower unit prices available for gas and electricity. Interest in energy efficiency by business and industry has, not surprisingly, declined as prices have fallen, and attitudes towards it will have to change considerably if the required progress is to be made.

In seeking to reduce CO₂ emissions through improved energy efficiency the government is faced with a serious dilemma:

the past twenty years have demonstrated that even if the message about the economic benefits of greater energy efficiency is received, users are slow to act. There is also the simple fact that energy efficiency is a very difficult area in which to legislate.

Indeed, a 1993 EU Directive on the subject has been virtually ignored by member states because its implementation would present major practical difficulties.

However, legislation which affects energy efficiency is on the way from another, more recent directive, the Integrated Pollution Prevention and Control (IPPC) Directive. This applies to larger industrial undertakings and the government is at present consulting on its implementation in the UK. It seems that IPPC legislation could be an important means by which progress is made towards CO₂ reduction targets, by requiring progressive improvements in energy efficiency from those to whom it applies.

In the latest IPPC Consultative paper, a key phrase in the section on energy efficiency is "negotiated agreements", with a clear indication that Ö "the Government therefore proposes to take powers to facilitate the uptake of negotiated agreements". An important first step in this direction has been taken with members of the Chemical Industries Association, who have voluntarily agreed to improve their energy efficiency by 20% by the year 2005 compared with 1990. Other major industrial users are likely to find themselves under increasing pressure to



The four latest companies received their accreditation certificates last November: Kettering General Hospital, RNAS Yeovilton, Sandwell Metropolitan Borough Council and Compaq Computers.

follow the chemical industries' example.

However, there are many industrial consumers to whom the Directive does not apply. Nor does it affect business, ie commerce, services and the public sector, a widely diverse group of users including shops, offices, hotels, hospitals, schools, civic and public buildings, etc. They may well find themselves receiving active encouragement to enter into voluntary agreements, and there is one tried and tested scheme which could provide a basis for this.

The Energy Efficiency Accreditation Scheme was established in 1993 by the Energy Systems Trade Association (ESTA) in close collaboration with The Institute of Energy. Two members of ESTA (also Fellows of the Institute), Brian Chamberlain and Martin Fry, have from the outset been closely involved in the Scheme.

The Scheme is based upon voluntary independent assessment. It enables organisations to submit themselves to external examination of the way they manage and use energy.

Experienced, trained assessors carry this out and in particular, look for evidence of:

- management policy and reporting procedures,
- the levels of investment (not only in financial terms), actual and planned, in energy efficiency measures,

- improvements already achieved.

If required standards are achieved, a recommendation for accreditation goes forward to the Institute. Subject to it receiving the seal of approval after review, accreditation follows. Accreditation then lasts for three years, and can be renewed if a follow-up assessment indicates continuing progress.

Accreditation does not require organisations to be achieving 'state of the art' standards of energy efficiency. It requires them to be giving proper attention to the management of energy use, and to be making positive progress in improving standards. The Scheme also caters for those who may have not yet reached accreditation standards, but aspire to do so.

"The Civil Aviation Authority has used the Accreditation Scheme for a number of strategic reasons. First, as a public sector organisation, to announce its support and commitment to energy efficiency within its area of activity. Secondly, to test and benchmark its achievements during the period leading to Accreditation against a national system of standards, and thirdly to maintain interest in energy management amongst its operational line managers" - Robert Gevargiz, Energy Manager,

The Civil Aviation Authority.

The Scheme has a number of benefits:

- it demonstrates environmental achievement and commitment to the public, customers and shareholders,
- it is an independent check on energy management procedures and practices,
- it provides guidance from independent

Organisations accredited include:

Asda Stores Ltd
Birmingham City Council
British Telecom
Heathrow Airport Ltd
J Sainsbury plc
London Stock Exchange
Manchester Airport plc
Marks & Spencer plc
MFI Homeworks
National Westminster Bank plc
Rover Group Ltd
Tesco Stores Ltd
Thresher

assessors on improving energy performance, and

- it results in energy savings - the process of gaining accreditation invariably identifies savings that can be made.

Among those who have become accredited are many household names - see box.

Since the beginning of this year, the National Energy Foundation has joined forces with ESTA to become responsible for promoting and administering the Scheme. The Institute also continues to give the Scheme its full encouragement and support, and there is no doubt that much of the prestige which follows from gaining accreditation is the result of the Institute's involvement as accrediting body.

The Accreditation Scheme is principally concerned with energy efficiency, but it is planned to include also the CO₂ figure associated with energy use. The Scheme could then be used as an independent check on progress in reducing CO₂ emissions. As such, it could have a very useful contribution to make in assisting organisations who are participating in voluntary agreement programmes.

More information on the Energy Efficiency Accreditation Scheme can be obtained from The National Energy Foundation, 3 Benbow Court, Shenley Church End, Milton Keynes, MK5 6JG. Tel: 01908 501908. Fax: 01908 504848. E-mail: eeas@natenerg.demon.co.uk.

Kyoto - the impact on fossil fuels

The first major conference to consider the Kyoto climate change agreement, organised by the Royal Institute for International Affairs and held in London in February, heard the views of both Shell and the World Coal Institute on the implications for global energy markets. Steve Hodgson reports.

The post-Kyoto agreement analysis industry has swung into action. Oxera, the influential Oxford-based economics consultant, in its new briefing paper: *The Kyoto Agreement: implications for the energy sector* suggests that Kyoto achieved more than is at first apparent. The protocol target, says Oxera: "represents a 30% cut compared to the emissions levels that would be expected by 2010 without emissions-control measures". The treaty should, therefore: "send a powerful signal to business that it needs to accelerate the delivery of climate-friendly products and services".

On the other hand, says Oxera, the protocol will not actually stop concentrations of greenhouse gases from increasing because "emissions from developing countries are set to outweigh the modest cuts made by the developed nations". Further, many of the details of the protocol's implementation are as yet unresolved.

Perhaps most pessimistically, Oxera considers it "unlikely that the Republican-dominated US Senate will ratify the treaty", and "with current policies, US emissions are projected to increase by 34% over 1990 levels by 2010, 40% by 2015, and 45% by 2020".

The view from Shell, presented at the RIIA conference by the chief executive of Shell International Gas Ltd Walter van de Vijver, was to welcome the Agreement, which "offers encouraging opportunities for profitable business in and outside our industry". He went on to present the case for gas.

"Today, fossil fuels supply around 85% of the world's primary energy needs. Throughout the 20th century, as demand

increased, energy supplies became more diversified. The trend has been towards fuels with a lower carbon content and, of course, gas is a major player here, having the lowest carbon content of any fossil fuel".

Shell studies of the long-term energy future make us believe, he said, that:

- Technology will provide us with new solutions, both on the energy demand side, with greater efficiency of use, and on the supply side with more diversified sources including new renewables. This is an area where the Shell Group is moving fast, through a new core business called Shell International Renewables.
- The global use of fossil fuels will increase, but may peak towards the middle of the next century. The use of coal will grow as part of this, but not to the same level as some others would suggest.
- The relative carbon content of world energy use has decreased steadily over the past hundred years, and we expect this to continue.
- As a result, carbon dioxide emissions could peak in the period 2020-2030. This would lead to stabilisation of atmospheric CO₂ levels at just over twice the pre-industrial level, close to the target proposed by the European Union.

Also speaking was Ron Knapp, chief executive of the World Coal Institute. He admitted that coal is a 'soft target' for campaigners against climate change, but pointed out that coal in fact only contributes around 13% of global greenhouse gas emissions, 20% of carbon dioxide, 7% of methane and 5% of oxides of nitrogen

Looking to the future, Knapp suggested that growth in global coal production and consumption up to 2010 will be below earlier forecasts, but primarily due to reduced economic growth in a number of Asian economies following recent difficulties, rather than Kyoto or its fall-out.

"Asia, the growth area for the coal industry in recent years, is isolated from the

direct impact of the Kyoto Protocol with the exception of Japan. If Japan has to meet the Kyoto targets, this is likely to impact on Japan's coal consumption and also on its economic growth. Achieving the Kyoto target could also cause a reduction in the level of Japanese investment within the region. How much effect this would have will be dependent on the mix of policies chosen by Japan if it is to achieve a Kyoto target."

"In the short term, the factor with most influence on the Asian coal market will be the recent Asian financial meltdown. Some commentators have already revised downwards the estimate of growth in oil

The global use of fossil fuels will increase, but may peak towards the middle of the next century.

demand in 1998 by one third as a direct result of the severe market adjustment. Predictions are that the Asia Pacific coal consumption levels will still increase, driven

mainly by demand in China and India. The uncertainty is the size of the increase rather than the direction of the overall market."

"In the second largest market region - North America - a Kyoto influence is unlikely because ratification remains very much in doubt, but cannot be ruled out. Most commentators suggest the US will not sign the Kyoto Protocol."

The other market region of significance in considering the Kyoto implications for coal is Europe, said Knapp, where the European Union is likely to introduce the Kyoto Protocol emission reduction targets of minus 8% or the original negotiating figure of a 15% emissions reduction. Already falling, from around 350 million tonnes in 1991 to an estimated 240 million tonnes in 1998, the trend in hard coal consumption in the EU is likely to continue, said Knapp, as is domestic production of coal within the EU.

Despite considerable uncertainty about ratification of the Kyoto protocol, the writing for carbon-intensive fuel is on the wall. There seems to be general agreement that the world will continue migrate away from coal and towards gas, and that a peak in carbon burning may arrive within two or three decades. That old environmentalist concept of 'the end of fossil fuels' looks closer than ever.

The changing power industry

Electricity Industry Review is the Electricity Association's annual snapshot of the state of the UK's power generation and distribution industry. A wealth of information and statistics about the industry, the 1998 Review describes an industry in very different shape to that which was privatised in 1990. Steve Hodgson reports.

The Electricity Association's 1998 *Electricity Industry Review* has a picture of a stopwatch - counting down to 1998 - on the front cover. And, while the industry has failed to meet the original April 1st deadline for completing the liberalisation of the electricity markets, the *Review* does report considerable progress made by the industry since privatisation in 1990.

Launching the *Review* in January, the Electricity Association highlighted the benefits which electricity consumers have seen in recent years: lower domestic and industrial electricity prices, sharp falls in polluting emissions, and a fall in complaints made to Offer and the Electricity Consumers' Committees (see box). But the *Review* also makes fascinating reading as a snapshot of a major industry still in the throes of major change.

The UK electricity industry is enormous - with assets worth £30 billion, the industry contributes around 1.6% of Britain's gross domestic product and serves 26 million customers. This year it is facing perhaps its biggest change since privatisation as the domestic electricity market is opened-up to competition.

Taken out of the public sector in 1989, the industry has undergone a good deal of change of ownership since then. Seven of the twelve regional electricity companies are now owned by unfamiliar-sounding American parents (Dominion Resources, CalEnergy, American Electric Power & Public Service Company of Colorado etc), four are owned by other UK groups (Eastern by the Energy Group but again the subject of a takeover battle from the US; MANWEB is part of Scottish Power; NORWEB and SWALEC were both swallowed up by their water companies -

North West Water and Welsh Water respectively). Only lonely Southern Electric remains independent.

The international theme continues with the major generating companies extending their operations overseas, partly in compensation for falling shares of the UK generation market. National Power has invested more than £1 billion in 8,500 MW of generating capacity in Australia, Pakistan and the US, while PowerGen is said to be the fourth largest independent power project developer in the world, with projects totalling 7,700 MW in Europe, India and the South Pacific. The National Grid Company now operates Argentina's transmission system.

Looking at patterns of electricity supply at home, the RECs' local monopolies seem like throwbacks to a very ancient regime. In 96/97, some 59% of the 135,000 GWh of electricity supplied in Britain was supplied by a 'second tier' supplier, ie not the local REC. PowerGen has built itself a commanding lead in market share of the 1 MW plus market, with 23% of the market in 96/97, followed by National Power at 17% and four more of the RECs each with more than 5% of the market. 'Others' - independent power producers - supplied 14% of the industrial market.

The 100 kW to 1 MW market (the large commercial market) is headed by a REC, albeit the REC which looks least like a REC - Eastern, with a 15% market share; followed by London and Yorkshire each with 12%.

Eastern Electricity, or more properly Eastern Group, is the fifth largest generator in England and Wales, producing 6% of the total from more than 6 GW of generating capacity, the bulk of which is five coal-fired power stations leased from National Power and PowerGen. The big two of National Power and PowerGen now supply a little less than half the total market, with Nuclear Electric third largest with 17% and the state-owned Magnox Electric fourth.

The other major change in generation has been, of course, fuels used. Taking the UK as a whole and looking at the situation in 1990 and 1996: the market

share attributable to coal has fallen from 64% to 42% (and is still falling), and gas has come from less than 1% to reach 21% of the market (and is still growing). The other significant move has seen the nuclear share rise from 21% to what may prove to be a peak of 28%, and oil's share fall from 11% to 4%.

The overall electricity market continues to grow slowly, with small dips in industrial use mirroring economic recessions, and peak demand has risen from a weather-corrected 48 GW in 1989/90 to 50 GW in 96/97.

One variable moving sharply in the other direction is employment in the industry, although the *Review* illustrates this as a sharply rising curve in productivity, measured in output per employee. The industry has shed roughly 10,000 people a year since 1990 and the trend continues right up to 1996/97, so that the 150,000 employees working in electricity at privatisation was reduced to 84,000 in 96/97.

BENEFITS TO CONSUMERS AND THE ENVIRONMENT

The *Review* says that:

- domestic electricity prices have fallen by 18% in real terms since 1990 - excluding the addition and then reduction in the rate of VAT added to bills,
- prices for commercial/industrial users in the 100 kW- 1 MW market are down by 25% in real terms since the market was opened to competition in 1994,
- Pool prices are down by 4% since last year - the third successive year-on-year fall.
- Carbon dioxide emissions per unit of electricity generated are down by 24% for the period 1990-95,
- sulphur dioxide and nitrous oxide emissions are down by 45 and 40% respectively for the same period.
- complaints to Offer and the Electricity Consumers' Committee fell by 10% in 96/97 - complaints are now less than half the number recorded in 1990.

A day in the life of a...

The third in a series of articles on the work of energy professionals. Previous articles have described the work of an energy manager and an energy consultant. Here, we meet the manager of a new combined cycle gas turbine power station.

by Steve Hodgson

Derrick Farthing works in a large, comfortable third floor corner office with panoramic views over the River Dee, part of the North Wales coast and the Wirral. With a background in engineering at coal-fired power stations in Nottinghamshire and Staffordshire, he is now station manager at PowerGen's new £500 million flagship combined cycle gas turbine power station at Connah's Quay, Flintshire. Officially opened last summer and rated at 1430 MW, Connah's Quay turns natural gas into electricity, generating sufficient power to supply half of Wales.

A far cry from traditional images of older power stations and giant cooling towers, Connah's Quay is brand new, smaller in scale and environmentally-friendly. The image begins with the landscaping and planting around the exterior of the plant, and extends right into the offices. These are spacious, with an atmosphere of calm. Were it not for people walking in wearing overalls (and plastic overshoes to protect the carpet), this could be the offices of any large company.

And, while the office accommodation is open plan, his elevation from operations engineer to station manager - with its routines of less engineering and more meetings - means that Derrick has the only private office.

Outside, beyond the boundary fence, gulls, waders and ducks feed and the river rises and falls with the tide. Large salmon are said to occupy this stretch of the river. The coastline is not pretty, but the Dee estuary is a site of international importance for nature conservation, with rare birds visiting regularly. Curiously, two more major industrial installations are visible from Derrick's office: National Power's Deeside CCGT and the Shotton Paper Mill.

power station manager



Derrick Farthing at work - his office overlooks the River Dee

For such a large plant, Connah's Quay employs just 70 permanent staff, plus some 150 people working for contractors on-site during overhauls.

With a very high level of automation, it doesn't take many people to run the Connah's Quay plant. Not only is it operated as a 'baseload' power station, ie at full power around the clock but, being gas-fired there are no deliveries of coal to deal with, or exports of ash. Among gas-fired CCGTs, the station is unique in that it burns gas from the Liverpool Bay field under the Irish Sea. Gas is piped from the field to a reception terminal at the Point of Ayr and then to the station.

Connah's Quay is also more than a power station. Excess gas which is not burnt at the station is treated at a gas treatment plant located at one end of the site, before being piped under the River Dee to a BG facility at Burton Point, from where it enters the national gas pipeline network.

MANAGING PEOPLE

Power stations still tend to be run by engineers, rather than accountants. The

Connah's Quay management structure includes heads of operation & maintenance; engineering; human resources; finance & procurement; and performance and environment.

Derrick Farthing graduated from the operations & maintenance and engineering routes and now manages people as much as plant. He achieves his goals through a small, highly qualified team - who in turn operate the power station. At any one time, the 1430 MW power station is operated by just five people. Working in shifts, six operation and maintenance teams operate the four-turbine plant, which turns gas from the Irish Sea into electricity 24 hours a day, 365 days a year. Of the five people, one is to be found at a desk in the central control room, with the others dispersed around the site.

Derrick has been in power stations all his life, following the lead his father established as a power station electrical engineer. Derrick joined the then CEGB at the age of 16 as a student apprentice and spent many years working at coal-fired power stations in the Trent valley.

He started working in the efficiency department at the Cottam power station in Nottinghamshire, monitoring plant performance and looking for small increases in efficiency.

Moving to High Marnham, he worked as a control engineer before a spell at Drakelow C where he took on special projects as well as the role of operations engineer. Then back to High Marnham in charge of a shift team, promotion to production and engineering manager back at Cottam, and then the move to Connah's Quay, originally as head of production and plant engineering. He and many of the other staff joined while the station was still under construction, working to set up the operations and maintenance infrastructure.

All three of the old coal-fired power stations are still operational, Cottam by PowerGen and High Marnham and Drakelow C are leased to the Eastern Group. Connah's Quay was itself built on a site adjacent to that of a former coal-fired power station, by GEC Alsthom.

POWERING DOWN

For a power station operating on baseload, starting up and closing down the turbines is a rare event - although the 350 MW units are sometimes modulated down to 250 MW. However, by chance the gas supply to the station had been interrupted a few hours before I visited the station. The interruption, at 3.30 am, was the result of technical problems. The operations team closed down the station in stages and, when the problem was solved, took it back up again to full power. Derrick was telephoned at 7.30 am with a report of what had happened.

"This is a good example of our approach at Connah's Quay" says Derrick: "Shut down and start-up has been rehearsed many times and there was no need to involve me this time. We have a highly empowered team here, operating with a high degree of freedom and competence".

Despite its automation, the plant will always require human intervention, says

Derrick: "The philosophy is that the plant is controlled automatically, with operators responding to exceptional events. With so many systems we do need to intervene at times".

With such a smooth operating regime, Derrick sees his own role as "making sure we deliver the output expected of us by the company". Derrick's analysis of what that output is interesting. Top of his list is an excellent safety record, followed closely by environmental care. The station monitors its discharges to the river and the atmosphere, both of which are regulated by Environment Agency IPC licences. Attention is also paid to minimising noise and the visual impact of the plant - 60,000 shrubs and trees have been planted to landscape the site.

Next on Derrick's output list are cost control, electrical output, availability of the plant and its efficiency.

Alongside his experience of operating power stations, Derrick has also found time to complete a degree in mechanical engineering from Trent Polytechnic (now Nottingham Trent University) and a business studies qualification from the Manchester Business School. He talks highly of the old Trent Polytechnic and its mechanical engineering course: "There was plenty of practical stuff, some of which I still use, but we also learnt about the role of engineers in society".

He is also a chartered engineer, a member of both the Institution of Mechanical Engineers and the European Institute of Mechanical Engineering (FEANI), as well as a Eur Ing.

Does he regret the move from engineering to a management role? "Oh no - I manage teams of engineers now and will always retain an affinity for the engineering aspects of the job." Even a new power station can improve its operations, so there are always new engineering projects to tax him as well.

My visit also coincided with a monthly station staff meeting chaired by Derrick Farthing. The agenda was a mix of company-wide issues with local concerns, including contractor safety, government energy industry reviews, the

'twinning' of Connah's Quay with a PowerGen CHP plant in Hungary, new starters and leavers and a forthcoming environmental audit at the station.

Does he enjoy his work? "Certainly - empowerment works at all levels and I enjoy considerable freedom in my job as well as empowering the station staff to do theirs. Empowerment is made much easier at a new power station like this".

Derrick is one of many people working in the modern, privatised and liberalised electricity supply industry who also saw the state-owned industry from the inside. The change of culture has been immense, he says: "Today's attention to detail and empowerment of staff means that modern power stations have availabilities well over 90%. Back in the days of the CEGB a figure in the 80s was considered good."

CONNAH'S QUAY - ESSENTIAL FACTS

- At 1430 MW, the largest CCGT in Wales
- Built in three years by GEC Alsthom under a turnkey contract
- Four power generating modules each incorporating a GT9FA gas turbine, steam turbine, AC generator and waste heat recovery boiler
- Fuelled by natural gas from the Liverpool Bay field
- Power exported via nearby NGC substation
- Operates at 54.8% efficiency (net of power used on-site)
- Cooling is by water abstracted from the River Dee
- Also treats gas for injection into the national gas grid
- 3% of the UK's gas flows through Connah's Quay, to be either burnt or exported

Engineers: well paid and on the way to business success

We would, I am sure, all agree that a major task of the engineering profession is to enhance the influence of engineers at all levels of society, for a whole variety of reasons.

As engineers, we know better than most that a convincing argument rests on good evidence and facts. It is therefore surprising that these have been in short supply in the past. It has been an important aspiration of the new Engineering Council to rectify the situation and, as far as possible, act as the centre for factual information about engineers and engineering and assemble the necessary statistics.

Considerable progress has been made in this direction and I would like to take the opportunity of sharing with you some of the information and our deductions from it. For a start, we can demonstrate that engineering is for most a well-paid profession and that an engineering degree is one of the surest routes to business success.

EMPLOYMENT PROSPECTS

A recent report by the Institution for Employment Studies tracked the job

experiences of all Sussex University graduates over a 42 month period. It showed that, six months after graduation, engineering graduates were more likely to be employed than any other discipline. After 42 months, no engineers were working part time, unlike 14% of humanities and creative arts graduates. Average salaries were £15,750, beaten only by mathematical sciences graduates (mostly computer scientists) on £15,787.

The Engineering Council's 1997 Survey of Professional Engineers and Technicians illustrates that not only are salaries, on average, continuing to rise at a rate well above inflation, but unemployment rates are extremely low and still falling. With their earnings averaging £40,131, Chartered Engineers, for example, are better paid than Chartered and Certified Accounts (£28,033), solicitors (£34,860) or architects (£25,272).

Another recent study, this time by the Higher Education Funding Council for England and Wales, looking at 38 different disciplines, has shown that the salaries of engineering graduates ten years after graduation are in the top echelon of the

by Mike Heath, Director General, Engineering Council

earnings league. Their salaries are significantly bettered only by those of their peers pursuing careers in clinical dentistry, law and economics but are ahead, for example, of most medical professionals.

GETTING TO THE TOP

What about the prospects of getting to the top? Six per cent of undergraduates become engineers so, pro rata, one might reasonably expect that six per cent of university vice-chancellors were engineers. In fact the figure is eighteen out of 107 or 17%. And should anyone have any doubt about the engineering and scientific credentials of chief executives of FTSE 100 companies, a snapshot check of some 57 of them found that 11 were Chartered Engineers - again, a much higher proportion than would be expected pro rata.

A DTI-sponsored study last May by the Institute for Employment Research into the chief executives of 43,000 manufacturing companies found that, of those who had formal qualifications, engineers and scientists outnumbered accountants three to one despite the professions being roughly equal in size.

It seems that industry cannot get enough engineers and there are shortages at every level. A new report from the Association of Graduate Recruiters shows that in both 1996 and 1997, good quality engineers were easily top of a list of shortfalls among their members. This is the message of new SARTOR - the new CEngs will be much sought after, but at last employers will be able to distinguish them from the rest.

STUDENT QUALIFICATIONS

Although the higher education establishments are turning out enough engineers by quantity (apart from a bulge from 1991 - 1994, acceptances to engineering degree courses at 17,000 per year, compare well with previous years), too many have neither the ability nor the competence that industry requires.

All these statistics help us towards a clearer picture of where we are in engineering and where we might be going. There is much more work to be done in devilling out the statistics and drawing the right conclusions but I hope you will agree that work so far is encouraging.

Environment Award for Engineers

If you have been involved in research, design, manufacture, production or construction of a product, project or process which demonstrates a positive engineering contribution to

protecting or enhancing the environment - and you are a member of one of the engineering Institutions - you could win £5000. There are also class awards for Best Practice in

Environmental Management (eg ISO 14001) and Built Environment Innovation.

Sponsored by Foster Wheeler Energy Ltd and Lloyd's Register, the Engineering

Council's 1998 *Environment Award for Engineers* may be able to reward your efforts in this area.

For an entry form, contact the Engineering Council, tel: 0171 240 7891

April 1998

Third party access in UK and European gas markets

Conference, 20-21 April, Brussels, £899 + VAT
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, email: 100531.3067@compuserve.com

Energy management and environmental effects

Course, 20-24 April, Birmingham, £1500
Details from Dawn Williams, University of Central England, tel: 0121 331 5420, fax: 0121 331 6315, e-mail: ct@uce.ac.uk

The challenge of SARTOR

Conference, 21 April, London
Details from the Institute of Marine Engineers, tel: 0171 481 1854, fax: 0171 488 1854, email: lc@imare.org.uk

The Mediterranean gas conference

Conference, 21-22 April, Istanbul, £900
Details from Overview Gas Conferences, tel: 0171 613 0087, fax: 0171 613 0094

CHP - technology and environment

Course, 21-22 April, Leeds
Details from Department of Fuel & Energy, University of Leeds, tel: 0113 233 2494, fax: 0113 233 2511

Year 2000 projects in the oil and gas industry

Conference, 22-23 April, Aberdeen, £899 + VAT
Details from Euroforum, tel: 0171 878 6886, fax: 0171 878 6885

Advances in downhole technologies

Conference, 23-24 April, Aberdeen, £649 + VAT
Details from IBC UK Conferences, tel: 0171 453 5491, fax: 0171 636 6858, e-mail: cust.serv@ibcuk.co.uk

Eco-efficiency - doing more for less

Conference, 28 April, London, £449 + VAT
Details from IBC UK Conferences, tel: 0171 453 5491, fax: 0171 636 6858, e-mail: cust.serv@ibcuk.co.uk

Reserve acquisitions in oil & gas

Conference, 29-30 April, London, £899 + VAT
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, email: 100531.3067@compuserve.com

Norway - oil and gas industry export

Conference, 29-30 April, London, £749 + VAT
Details from IBC UK Conferences, tel: 0171 453 5491, fax: 0171 636 6858, e-mail: cust.serv@ibcuk.co.uk

Practical energy management in academic establishments

Course, 30 April, Bristol, £75+VAT. Details from Torpy Energy, tel: 0117 938 9300, fax: 0117 938 9315

May 1998

Coal transport logistics and economics in North America

Course, 4-7 May, Baltimore, \$3200 Details from CoalTrans Conferences, tel: 0171 779

8945, fax: 0171 779 8946

The impact of the Interconnector on UK and Continental gas markets

Conference, 7-8 May, London, £899 + VAT. Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, email: 100531.3067@compuserve.com

Low energy design strategies

Six day course, 11, 18 May, 1, 8, 15, 22 June, London
Details from the Institute of Environmental Engineering, tel: 0171 815 7675, fax: 0171 928 8968

Applied combustion technology

Course, 11-14 May, the Netherlands
Details from the Center for Professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

Understanding heat treatment

Course, 12-14 May, Birmingham
Details from the Wolfson Heat Treatment Centre, tel: 0121 359 3611, fax: 0121 359 8910, e-mail: whtc@aston.ac.uk

Central/eastern European gas

Conference, 13-14 May, Bucharest, £900.
Contact: Overview Gas Conferences, tel: 0171 613 0087, fax: 0171 613 0094

Energy investment - a funding guide for SMEs

Seminar, 19 May, London
Details from Emma Ayad at the IMechE, tel: 0171 304 6828, fax: 0171 973 0182, email: e_ayad@imeche.org.uk

Pipelines 98

Exhibition, 19-21 May, Birmingham
Details from EMAP Construction, tel: 0171 505 6625, fax: 0171 505 6699

Photovoltaic systems

Course, 21-22 May, Reading
Details from the University of Reading Energy Group, tel: 0118 931 8765, fax: 0118 931 3327

Restructuring of the coal industry and coal-fired thermal power sector

Seminar, 25-27 May, Bulgaria
Details from the UN Economic Commission for Europe, fax: +41 22 9170038, e-mail: josefine.andorfer@unece.org

Gas for power generation

Conference, 25-28 May, Singapore
Details from AiC Conferences, tel: +65 322 2700, fax: +65 223 3554

Energie Expo

Exhibition, 27-29 May, Paris
Details from IDEXPO, tel: +33 1 4665 1834, fax: +33 1 4663 2600, e-mail: idexpo@wanadoo.fr

Interpreting utility data

Course, 28 May, Bristol, £75 + VAT. Details from Torpy Energy, tel: 0117 938 9300, fax: 0117 938 9315

Steam turbine governing and overspeed protection

Seminar, 28 May, London
Details from Susan Jones at the IMechE, tel: 0171 973 1294, fax: 0171 233 1654

Shell Research Fellowship It's your decision...

The Institute administers several Awards, one of those being the Shell Research Fellowship. Its general remit is "to encourage advanced technological research in the fields of energy utilisation and conservation and the development of alternative energy forms."

Applications are now invited for the 1998 IoE Shell Research Fellowship. It has been decided that this year, the Award will comprise attendance at the World Renewable Energy Network International Seminar and Industrial Co-operation Marketing Innovation and Business Opportunities for Renewable Energy. This is to be held at Brighton, England, on 20-26 September 1998. The Award will cover the Seminar fees (including accommodation) and return air fare from country of origin plus transfer from the UK airport to and from the conference venue. The Institute will make all the relevant arrangements for the Award winner.

Applicants will be a member (of whatever grade) of

The Institute of Energy, working or studying in a "developing country". Their goal will be to attend the Seminar and on return to their own environment demonstrate a transfer of what they gained in knowledge and understanding from attendance at the Seminar. It is essential that any applicant has a good spoken and written understanding of the English language to benefit from attendance at the Seminar.

To be considered, you should apply in writing by 20 June 1998 to the "Shell Research Fellowship" at The Institute of Energy, 18 Devonshire Street, London W1N 2AU.

You will be required to send a curriculum vitae, full current contact information and a single A4 page stating what you would plan to get from attendance at the Seminar and how you would plan to transfer knowledge back to your home environment. You must also state that you are available to attend the conference between 20-26 September inclusive - this Award is not transferable if you cannot attend.

As was reported in the February edition of *Energy World* a major priority for the Institute up to the millennium and beyond is to grow the membership. If we are to appeal to new members and still continue to be relevant to our existing members, we will need to put in place services and lead recruitment drives across a broad front, and that will need to be focused through a clear strategic plan. Such plans need time to develop but it is anticipated that our strategy will be published to you, the members, later in the year.

Meanwhile, we are examining our current range of services to members, but not in isolation. We are using a range of mechanisms to ask what your views are on different issues. *Energy World* is an obvious mechanism for some of the consultations, as it goes direct to every member of the IoE, regardless of grade of membership.

JOURNAL

So here is your chance to participate in one of our first exercises. As you are aware, we produce two publications *Energy World* which is printed 10 times a year and circulated to all members, and the *Journal*, a technical document issued 4 times a year; only to those members who request it and to outside subscribers. Currently some members only receive the *Journal* if they pay £10 per annum to cover the cost of postage and packaging. One suggestion which is now being considered by your governing Council is that the £10 fee be extended to all members

who request the *Journal* removing the differential between the various membership grades. This would also bring us in line with many other similar organisations, as the majority only mail one publication automatically to their members.

MEMBERS' LIST

In the past, the Institute has published an annual Members' List providing the name, address, grade of membership and branch affiliation for each member, for the use of members only. The cost of producing this may be supported by advertising but the full cost is underwritten by the Institute. The decision to produce a new list for 1998 must be made shortly.

We would like to hear the views of you, the member.

Will you let us know what you think about the two issues:

Should we introduce a charge to all of the members who ask for the *Journal*?

Should we produce a Members' List in 1998?

The more members who contact us on these issues the more representative will be the outcome. You can get in touch with us via telephone, letter, fax or email. If we are to shape up the Institute in line with the views and needs of its members, we need you to give us your views. We look forward to hearing from you; tel: 0171 580 7124, fax: 0171 580 4420, email: info@ioe.org.uk

Who's out there?

If you live or work overseas, would you be interested in helping the Institute with its international activities.

We are looking for members who would like to interview others for professional recognition, help with possible project work, promote the Institute, liaise

with educational establishments for accreditation purposes and much, much more.

So if you are an interested jet setter, or permanent overseas resident please contact Tracey Fisher on tel: 00 44 171 580 0077, email: tfisher@ioe.org.uk.

Annual General Meeting

Notice is hereby given that the seventy-first Annual General Meeting of The Institute of Energy will be held at The Institute of Energy at 1.30 pm on Tuesday 23 June 1998, to transact the following business:

- 1 To sign the minutes of the 70th Annual General Meeting held on the 8 May 1997.
- 2 To receive the Annual Report and Accounts of The Institute for the year ended 31 December 1997 together with the report of the auditors.
- 3 To receive the Annual Report and Accounts of the Benevolent Fund of the Institute of Energy for the year ended 31 December 1997, together with the report of the auditors.
- 4 To elect Lawford & Co, chartered accountants, to serve as auditors for the ensuing year and to agree that their remuneration be agreed by the Executive Committee.
- 5 To determine the level of annual subscriptions payable by individual grades of membership for 1999.
- 6 To announce the names of new members of Council.

Dated this 11th day of March 1998. By Order of the Council
D P Davy
Secretary & Chief Executive

Branch Events

MAY 1998

SOUTH WALES AND WEST OF ENGLAND

Wednesday, 6 May, 2.00pm
Visit and lecture on the "Dow Corning Genesis Project" joint meeting with The Institute of Gas Engineers, Dow Corning Ltd, Barry. Contact Mr I Weslake Hill, tel: 01222 757527

YORKSHIRE

Thursday, 7 May, 6.00pm
Visit to the Royal Armouries, Leeds. Family event - special group rates apply. For details contact Mr A Mallalieu, tel: 0113 2768888

NORTH WESTERN

Friday, 8 May 7.30pm
Annual Dinner at Haydock Thistle Hotel. Contact Mr E Curd, tel: 0151 625 6744

NORTH EASTERN

Wednesday, 13 May
AGM. The Eco Centre, Windmill Way, Hebburn. For details contact Dr C R Howarth, tel: 0191 222 7303

MIDLAND

Thursday, 14 May
AGM, Rolls Royce
For details contact Mr H Freeman, tel: 0121 353 2397



Richard Bujko (right) with Lightening Gladiator and Brian Machin, chief executive of Manx Energy (left). Richard Bujko one of the Institute's VQ and TEMOL assessors has recently moved to Manx Energy from the National Grid Company.

Workshops oversubscribed

The Institute of Energy recently hosted four highly successful workshops on energy management on behalf of the Energy Efficiency Best Practice Programme. The events were held in London and Birmingham and at two S/NVQ Satellite Sites situated in Sunderland and Glasgow. Potential VQ candidates had the opportunity to meet their satellite site co-ordinator.

Over 50 delegates attended each event from a variety of organisations including local authorities, industry and voluntary organisations. The general consensus was that the events provided an excellent

networking opportunity and the chance to take away a practical understanding of the National Standards for Managing Energy. Delegates benefited from a presentation on the value and uses of standards and in the afternoon they generated additional ideas in a lively workshop session.

The workshop invited participants to analyse and work through particular units of the standards, the unit "Promote Energy Efficiency Throughout the Organisation" resulted in some interesting performances indeed!

May we thank the satellite sites and other host organisations and everyone else

Catering for Careers

The Institute of Energy is developing its education services and you may wish to help.

The staff are working with the Centre for Research Education and Training in Energy (Create) to design a

new energy careers brochure. For this to be effective we are looking for members who would like to have their picture and a short profile placed in the brochure as a case study, to give an idea to young people

about what it is energy professionals actually do.

If you would like to help please contact Tracey Fisher on 0171 580 0077, fax: 0171 580 4420, email: lcollins@ioe.org.uk

Realise the Power of Energy Efficiency

Energy is the most controllable, yet unrecognised resource that we use daily. Saving energy can bring you financial savings, environmental benefits and increase your organisation's competitiveness.

The Institute of Energy can give you the tools, the training and the recognised qualifications to allow you to do just that.

The Institute has played a key role in developing the National Standards for Managing Energy and has produced publications, training materials and qualifications in Managing Energy to help you and your organisation to succeed.

- *The Good Energy Manager's Guide,*

is an easy reference checklist for those of you who are new to energy management, or who have little time to dedicate to it

- *Continuing Professional Development Manual in Managing Energy*

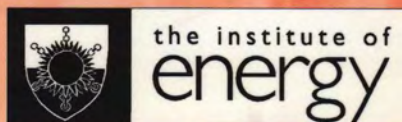
is a self development tool enabling you to map your competence to the National Standards for Managing Energy, identify training needs and learning styles. This manual is also the candidate pack for those obtaining a SINVQ Level 4 in Managing Energy

- *Training in Energy Management through
Open Learning - TEMOL,*

will provide you with the necessary underpinning knowledge and understanding to meet the national standards. On registration, you receive a tutor and 2 years free membership to the Institute.

- *SINVQ Level 4 in Managing Energy,*

is a nationally recognised qualification, which can contribute to membership of the Institute. The Institute is the first delivery centre to award this qualification, so be the first to achieve one!



PLACES STILL AVAILABLE ON THE FOLLOWING SHORT COURSE

COMBINED HEAT AND POWER *Technology Safety and the Environment* Tuesday 21 - Wednesday 22 April 1998

TUESDAY 21 APRIL

- Introduction
- Combined heat & power - achievements and prospects
- The design and specification of CHP systems

Visit to University of Leeds CHP site

- ETSU - Best practice programme for CHP
- CHP and the Environmental Protection Act
- External Approvals - the operator's perspective
- Gas control and safety for CHP

WEDNESDAY 22 APRIL

- Design of use of compression ignition engine for CHP
- Gas turbine technology for CHP systems
- Supplementary/auxiliary firing of gas turbine and diesel exhausts
- Operating experiences with a gas turbine based CHP system
- Measurement of exhaust emissions
- Emissions characteristics of CHP systems
- Future developments in CHP technology

LEADING CONTRIBUTIONS FROM:

Dr Mike Davies, *University of Leeds (Course Director)*

Mahmoud Abu-Ebid, *ETSU*

Mike Baker, *TRANSCO*

Mike Cannon, *European Gas Turbines*

Barrie Church, *Global Energy Associates Ltd*

Colin French, *Saacke Ltd*

Peter Gaywood, *Combustion & Energy
Technology Ltd*

Charles Hibberd, *McMillan Sloan & Partners*

Chris Megainey, *Department of the Environment, Transport
and the Regions*

Humphrey Niven *Ricardo Consulting Engineers*

John Parsons, *BG plc, Research & Technology*

Nick Purdon, *Consultant*

Robin Wainwright, *ALTA Estate Services, University of
Birmingham*

COURSE COST

£375 which includes tuition, notes, lunches and light refreshments for both days

VENUE

Weetwood Hall (Conference Hotel), Leeds

A new purpose built conference and training complex, offering first class hotel facilities

FOR FURTHER DETAILS, PLEASE CONTACT:

Jenny Bannister, Dept of Fuel and Energy, **University of Leeds**, LEEDS, LS2 9JT.

Tel: 0113 233 2494

Fax: 0113 233 2511

Email: shortfuel@leeds.ac.uk

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