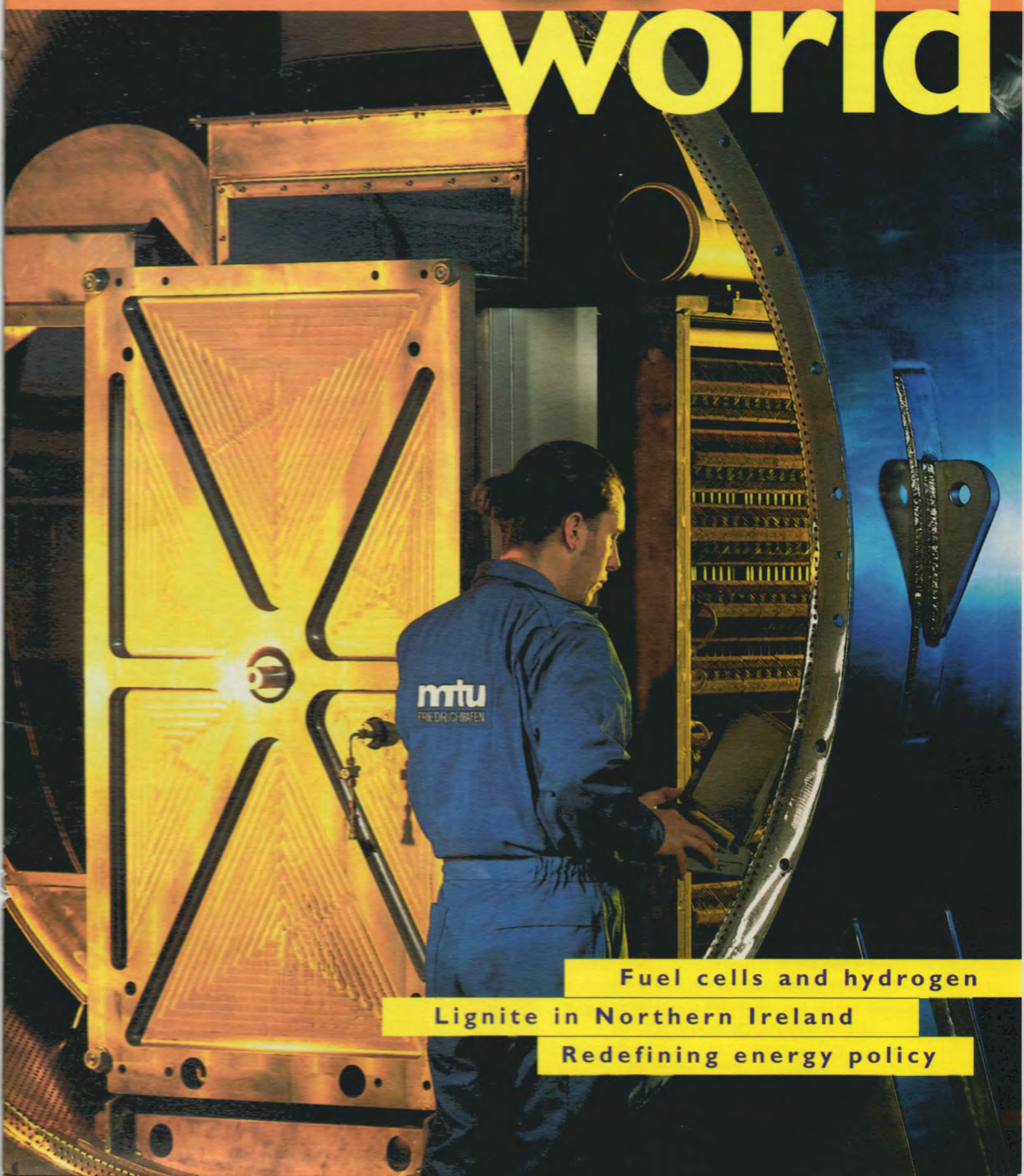
THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy world

the institute of energy

No.291
July-August 2001



Fuel cells and hydrogen

Lignite in Northern Ireland

Redefining energy policy

THE MAGAZINE OF THE
INSTITUTE OF ENERGY

Contents

COVER

A 250 kWe fuel cell cogeneration unit installed at a hospital in Germany, fuelled by natural gas but running on hydrogen produced within the unit. In this issue we take a look at the fundamental case for hydrogen as a fuel for the future, and to tackle climate change (see page 16) and those units already in-place, on-site and generating clean energy in Germany (page 12).
But fossil fuels are not ignored. See page 8 for news on lignite in Northern Ireland, and page 10 for the latest in the North Sea.

PUBLISHED BY
THE INSTITUTE OF ENERGY
18 Devonshire Street, London W1G 7AU.
info@instenergy.org.uk
eworld@instenergy.org.uk
www.instenergy.org.uk

EDITOR
Steve Hodgson
Tel/Fax: 01298 77601

ADMINISTRATION
Tel: 020 7580 7124

MEMBERSHIP, AND JOURNAL SUBSCRIPTIONS
Tel: 020 7580 0077 Fax: 020 7580 4420

ART EDITOR
Bill Brand

DESIGN
X-Design
Tel: 020 8874 3774 Web: www.xdesign.co.uk

ADVERTISEMENT SALES
TEL: 020 7580 0008
Bill Brand

PRINTED BY
Headley Brothers Ltd, The Invicta Press,
Ashford, Kent

THE INSTITUTE OF ENERGY

PATRON
Her Majesty The Queen

PRESIDENT
J E Ingham CEng FInstE

HON SECRETARY
Eur Ing R I Wilkie CEng MInstE

HON TREASURER
Eur Ing D Barber CEng FInstE

TERMS OF CONTROL
Energy World is circulated free of charge to all paid up members of The Institute of Energy. To libraries, organisations and persons not in membership it is available on a single subscription of £100 for 10 issues. Postage and packing is inclusive within the UK. For overseas purchase please add 10% of purchase price. Agency Commission - 10%.

ISSN 0307-7942

Energy World is printed on wood-free, chlorine free pulp

New directions in energy policy

Dr Dieter Helm, New College, Oxford, and OXERA

The 1980s and 1990s were the years of plenty for the UK after the energy crises of the 1970s. Before 1980, energy policy had to contend with ever-rising prices as OPEC's grasp on the oil market tightened, the balance of payments threatened sterling crises and the miners exerted significant political power. Oil prices quadrupled in the early 1970s and then doubled, fuelling inflation and causing recession.

In the early 1980s, the serious recession left Britain with 40% excess capacity in electricity. It also enjoyed oil and gas self-sufficiency. By the mid-1980s, oil prices had collapsed. There was little need to invest, and policy shifted towards privatisation, competition and cost-cutting. Sweating the assets made economic sense. This meant, eventually, the end of the nuclear programme, and a sharp contraction of the coal industry. It also meant the end of the Central Electricity Generating Board and the break-up of British Gas and British Coal.

The consequences of this revolution are still far from understood but even as they are, the underlying fundamentals are shifting fast. The 'new world' was ushered-in in 1999 when the oil price tripled, and gas prices followed. Suddenly, energy tomorrow could not be assumed to be cheaper than today, and relying on ever cheaper supplies from spot markets looked less attractive.

Other changes in the fundamentals have added to a sense of unease about energy policy. The easy environmental gains from switching from coal to gas have been already banked. As economic growth pushes up energy demand, more radical solutions to climate change will be needed. *Reducing* CO_2 emissions from now on will require more radical intervention. Even stabilisation looks a daunting task for the developed world.

Gas dominates electricity

Finally, and perhaps least acknowledged, the gas industry now dominates electricity. Gas is set to become the primary fuel source for electricity generation, and Transco's gas network will have to guarantee not only gas supply security, but electricity too. Under Denis Rooke's publicly owned Gas Council (and the then British Gas Corporation), it was built to meet (continuous) domestic gas demand and (interruptible) industrial demand. It was not built to provide for the electricity industry as well, and certainly not on a non-interruptible basis. This gas network problem - and not simply excess capacity in electricity generation - is one of the main security of supply issues in the medium term.

The problem of gas would be less critical if it were not also for the fact that the new demands will increasingly be met from imports - much of which will have to come from Gazprom, directly or indirectly. Having disaggregated the energy sector to maximise competition, who will now sign a 25-year take-or-pay contract when customers can switch with ease, thereby stranding contracts? And, how will the critical *political* dimension be handled? While Germany has Ruhrgas, and France, Gaz de France, who will contract for Britain, and on what terms?

To some - particularly in OFGEM - these changes in fundamentals will be accommodated by the market. Capacity auctions will trigger investment in infrastructure. Volatility in prices will encourage peak plant investment and demand management. Spot markets will be linked to futures markets. There is, it argues, no problem of security of supply, which markets cannot solve.

There is much to be said for harnessing markets to secure energy supplies. But let it be recognised that this market is a peculiar one, and it is an oligopoly. Concentration is rising not falling. Energy supply in the UK is increasingly dominated by just three or four suppliers, and distribution businesses are being consolidated. Auctions, in such circumstances, cannot be relied upon to determine investment, and futures markets are incomplete.

Risk we cannot take

Notwithstanding these market failures, it *may* turn out all right on the day. But this is a risk which we cannot take, and energy policy is about *ensuring* secure supplies. What really matters is that a network failure would be far more serious than simply the failure of a company. Energy, like transport, is complementary to the rest of the economy. A glance at the mess in California, or on the railways here, should shatter complacency.

What is now needed is not a return to the energy policy of the 1970s, but a rethink of the parameters within which private companies operate. Network security is paramount, and, since Transco and NGC are regulated, regulators need to ensure that the new demands on the gas network are met with the sort of vision that was once deployed to switch from town to natural gas. Long-term contracts, too, may need to be facilitated.

Whether, as President Bush believes, we need to launch a new nuclear programme is a much more debatable question. But, in any event, the nuclear option requires a solution to the waste problems - something that has been progressively ducked since the 1970s.

A different energy world is emerging, and it necessitates a fundamental rethink of energy policy. That should not mean the end of competition - far from it. It should concentrate on adjusting the framework within which market forces operate. It is the job of government to ensure that the framework of energy policy keeps the lights on. It can delegate to markets, but that does not absolve it of responsibility.

Contact Dr Helm on tel: 01865 253000

US plans massive plant and infrastructure building programme to offset demand gap

America's new energy strategy will involve action on five fronts: modernising energy conservation, modernising energy infrastructure, increasing energy supplies, accelerating environmental protection and increasing security of supply. Or it will if the US Government accepts the recommendations of National Energy policy Development Group (NEPDG), established in the second week of the Bush presidency and chaired by vice president Dick Cheney, which published its report in May.

The report pulls no punches in its description of a US supply shortage: "America in the year 2001 is facing the most serious energy shortages since the oil embargoes 1970s .... millions of families find themselves dealing with rolling blackouts or brownouts .... drivers across America are paying higher and higher gasoline costs".

The answer is to: "add supply from diverse sources – this means domestic oil, gas, and coal .... it also means hydropower and nuclear power." The report recommends a massive programme of new power plant building: "To meet projected demand over the next two decades, America must have in place between 1300 and 1900 new electric plants. Much of this will new generation will be fuelled by natural gas. However, existing and new technologies offer us the opportunity to expand nuclear generation as well .... this power source, which causes no greenhouse gas emissions, can play an expanding part in our energy future".

Expanding national energy infrastructure is another priority. The report calls for 38,000 miles of new gas pipelines and 250,000 miles of new electricity distribution lines in order to match supply and demand, as well as oil refineries and pipelines. Its "antiquated and inadequate" electricity transmission grid currently prevents the US from routing electricity over long distances and therefore avoiding regional blackouts such as those seen in California this year.

The report has less to say about tackling climate change, adopting a tone that this has to second place to ensuring that energy is available to fuel economic growth in the US: "Increasing energy supplies while protecting the environment is the third challenge .... [but] even with successful conservation efforts, America will need more energy".

Similarly highlighted is the need to make sure that new energy development is not hampered by too much emphasis on environmental protection and other bureaucracy.

Critics, particularly environmentalists, have condemned the emphasis on increasing energy supplies, particularly plans for new oil exploration in Alaska and suggestions that between one and two thousand new power stations will be needed in the next 20 years, some of these nuclear powered. Friends of the Earth in the UK called the plan: "payback day for George Bush's political backers in the US oil industry". Others suggested that the emphasis on large-scale solutions is out of touch with modern thinking on smaller-scale solutions such as fuel cells and renewables.

One commentator, British Nuclear Fuels Ltd saw opportunities: "... BNFL will be well positioned to provide nuclear reactor technology and associated fuel, equipment and services .... the recommendation to reconsider current reprocessing policy in the US could present a potential market for BNFL".

Meanwhile, President Bush is reported to be planning to suggest a system of national voluntary agreements to tackle climate change, rather than a binding treaty such as the Kyoto Protocol.

He has labelled the Protocal "flawed, unrealistic and not based on sound science" in talks with European governments. However, many if these are keen to ratify Kyoto, without US participation if nessary, in resumed talks to take place in Bonn in July.

See the NEPDG report on the White House Web site at: www.whitehouse.gov/energy/

Japan's plastic-fuelled power plant

Construction of the world's first electric power plant to run entirely on fuel made from recycled plastic waste has started in Hokkaido, northern Japan. Due to be operational by next May, the plant will be able to convert more than 700 tons of waste plastic a day into electricity.

The plant will operates at more than 850°C, generating energy from the naturally high calorific content of plastic and producing 74,000 kW of electricity an hour, enough to power about 30,000 homes, says developer environmental and sanitation services company Sanix Inc.

By using a two-stage combustion system together with bag and limestone filters, the power plant will emit less than 200 ppm of nitrogen oxide, 50 ppm of sulphur oxide, and 0.1 ng-TEQ/Nm^3 of dioxin, significantly lower emissions than most oil-fired power stations built during the last ten years, says Sanix.

The company recycles plastics discarded by auto manufacturers and other industries. The proposed plant will be able to handle all types of plastic except for those containing halogens such as polyvinyl chloride, and fluorine, as well as heavy metals and laminated aluminium.

Sanix plans to have 20 plants operating across Japan by the end of 2002.

World's largest solar project for Philippines

Over 400,000 people will benefit from a deal between BP and the Spanish and Philippine governments to bring solar power to 150 isolated villages in the Philippines. The $48 million contract – said to be the largest solar energy project ever – is financed by the Spanish government and will be implemented in two phases, the first scheduled to begin in September.

The first phase of the project will centre on 35 agrarian reform communities in the Mindanao region of the Philippines. BP will use solar in around 70 villages to power:

- 5,500 home lighting systems,
- 25 irrigation systems,
- 97 potable water and distribution systems,
- 68 schools, 68 community centres, 35 health clinics and 100 communal lights,
- 35 new AC power supply systems for income generation purposes, and
- project management and installation of 428 packaged solar systems.

"This project reminds us that in the world's most isolated areas, solar is often the most cost effective way to supply basic, essential needs such as lighting, water pumping, irrigation and refrigeration for vaccines and medications," said BP Solar President and CEO Harry Shimp.

One of ten boilers en route from Britain's Beel Industrial Boilers to Turkey, where ALSTOM power will install them as part of new cogeneration systems for AK Energi at five paper mill and textile plant sites.

Each boiler will use the exhaust gas from a turbine to raise 11,500 kg/h of saturated steam. Each boiler is fitted with a control and instrumentation package, economiser, divert-damper and by-pass chimney to maximise efficiency across a wide range of operating conditions.

Hydro-electricity in Costa Rica and Canada

Suppliers to the international hydro-electricity industry have formed the Hydro Equipment Association (HEA) in an effort to increase public awareness of hydropower as well as its promotion as the most developed renewable energy source.

Founding members are ALSTOM Power, Voith Siemens Hydro Power Generation and VA Tech Hydro, three of the leading equipment suppliers of electrical and mechanical products and services for hydropower stations.

Meanwhile, Costa Rica is to get a new 128 MW hydro-electricity project, while Canada is upgrading a 26 MW facility in northern Ontario.

The Japan Bank for International Cooperation has signed an agreement with Costa Rica's Instituto Costarricense de Electricidad for a loan of up to $135 million for the Pirris Hydro-electric Power Development Project.

The loan will fund the procurement of materials, equipment and services needed for the construction of a 128 MW hydro-electric power plant and related facilities in the midstream of the Pirris River, 70 km south of the capital city, San Jose.

Costa Rica is rich in hydro and geothermal power resources, with hydro-electric power already accounting for around three-quarters of ICE's total power supply. However, demand for electricity has been steadily increasing in line with Costa Rica's economic growth, and is expected to rise at an annual rate of 6% until 2020. Although present electricity generation facilities are sufficient to meet demand, serious shortages are predicted from 2006 onwards, unless more power plants are developed.

In Canada, Great Lakes Power Limited has awarded a design-build contract for the redevelopment of its High Falls power station in Northern Ontario to the joint venture team of McNamara Construction Company and AMEC Inc of Toronto, Canada. Engineering design for the $75 million project has already begun with project completion scheduled for late 2002.

The High Falls hydro generating station is located on the Michipicoten River in northern Ontario. The original facility was built in 1930, upgraded in 1950, and has an existing capacity of 26 MW. The redevelopment involves construction of a new plant with an installed capacity of 45 MW.

The first privately owned combined-cycle power plant in South Korea, at Bugok, was handed over to the Seoul-based private plant operator LG Energy Co at the end of March. The plant, which the Siemens Power Generation Group (PG) equipped with two V84.3A gas turbines and one steam turbine, feeds around 560 MW into the country's state-owned power grid.

The plant, which attains an efficiency level of 58%, is operated primarily on natural gas; however, oil can also be used as backup fuel. Siemens' 120 million Euro contract also covered the supply of the instrumentation and control equipment, supervision of erection and performance of commissioning.

'No plans' to increase nuclear power

The new Labour Government has "absolutely no plans" to increase Britain's nuclear power capability, according to Prime Minister Tony Blair speaking just two days ahead of the general election, but is: "putting a lot of money now into renewable forms of energy".

Blair was speaking after Friends of the Earth had challenged him to 'come clean' on what it described as "secret plans by state-owned British Nuclear Fuels Ltd (BNFL) to build new nuclear power stations in the UK". Encouraged by remarks made at a conference last December by BNFL Chairman Hugh Collum, FoE believes that BNFL intends to develop a new generation of mixed oxide (MOX)-fuelled reactors. Collum is quoted as saying: "we have the designs for the reactors we need" and "we also have the sites on which to put these reactors".

MOX fuel is to be manufactured at the built but yet-to-be-opened for business Sellafield MOX plant in Cumbria. The plant was completed four years ago but, despite BNFL's enthusiasm to start, the order book remains slim, alleges FoE. British Energy, the UK's privatised nuclear generator, has refused to use MOX. BNFL, however, says that the latest contract, signed in May to supply MOX fuel to Framatome ANP, means that the plant now has "contracted/reserved business close to the break-even sales level".

FoE is now taking the Government to the High Court over BNFL's plans to start operations at the plant, suggesting that the Government has acted unlawfully by deliberately restricting the scope of the final public consultation exercise.

'Very good prospects' for the renewables industry

Stimulated by the Government's proposed 'renewables obligation' and helped by both the Climate Change Levy and green electricity tariffs, the market value of renewable energy in the UK is likely to remain strong over the next ten years. This is the conclusion of a new report: *Green benefits for renewable generators* from Econnect.

Taking the government's proposals for the Renewables Obligation at face value, Econnect's in house market advice team has evaluated the likely gains to a licensed supplier of purchasing Renewable Obligation Certificates (ROCs) from green generators, rather than using the buy-out option. The report describes scenarios for the development of renewable generation over the next ten years, and the corresponding value of the proposed 'recycle fund'. This fund provides an incentive for suppliers to purchase ROCs, over and above the proposed 3p/kWh 'buy-out price', and suggests very good prospects for the renewables industry.

The report provides information to aid investment decisions and will be of interest to generators, suppliers, developers and financial backers of renewable energy projects.

Contact Colin Williams at cmw@econnect.co.uk or go to www.econnect.co.uk for a copy of the report

Welsh company supplies US Energy Department

A UK-based company that sells its unique solar energy systems worldwide - including Antarctica - has won a $20,000 competition to design a solar wall for the US Department of Energy's headquarters in Washington DC.

Thermomax had already won its third Queen's Award for Enterprise for International Trade earlier this year, and the company and has doubled the size of its manufacturing base at Blackwood in south Wales in the last twelve months.

The company develops high technology solar energy systems utilising photo thermal, as opposed to photovoltaic, technology. The system relies on light rather than heat from the sun and can therefore be operated in extremes of temperature.

Thermomax's sun wall design for the south facade of the US DoE's Forrestal Headquarters is "a massive, eye catching, sweeping design, which incorporates 2,200 solar tubes. It proves that building integrated solar collectors can be both functional and beautiful, maximising technology and design," explained the company's Dr Vahid Tabatabai.

This latest success follows the completion by the company of one of the largest solar installation systems of its kind in the world. Designed and manufactured by Thermomax, the system in Taiwan uses 10,000 solar tubes to supply a hot water system for an airforce-training base that accommodates 3,000 personnel.

Thermomax currently exports to 44 countries and the growing demand for its products has resulted in the creation of 60 new jobs in Wales over the last year.

Thermomax tubes use photo thermal technology

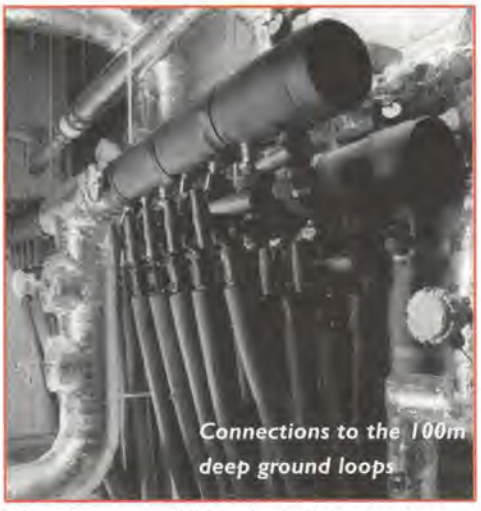
Geothermal air conditioning system for Croydon office

The UK's largest ever 'Geothermic' ground source heating and cooling system has been installed in a new commercial building owned by Axa Sunlife Pensions in Croydon by Clivet.

The building's tenant, Ascom Hasler and Axa Sunlife specified the novel geothermal heating and cooling system in a move to reduce the energy consumption of the building while providing an effective heating and cooling system.

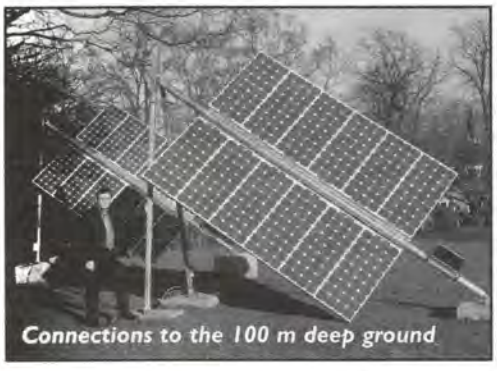
The heating and cooling system utilises the ground to provide a heat source and heat sink enabling major environmental and running cost benefits to be achieved. Surplus heat generated in the building during the summer months is effectively stored in the earth and used to improve system efficiency during the heating season. Heat extracted from the ground and used in the building during winter months gives the free cooling ability and higher efficiency mechanical cooling in the summer.

The maintenance free ground loops are made of 6 km of high-density polyethylene and are situated under the car park. System installation involved drilling a grid of holes to 100 m depth and installing a U loop of 28 mm bore polyethylene pipe within each hole.


Connections to the 100m deep ground loops

Clivet modelled the office building and established that it is a cooling dominated building requiring 120 MWh of cooling and 80 MWh of heating.

Within the building itself are 85 Geothermal Versatemp water to air heat pump units. Water is circulated through the ground loop to these units.


Connections to the 100 m deep ground

Professor S B Riffat, Head of the School of the Built Environment at the University of Nottingham (pictured) is inviting farmers looking for new business opportunities to work on projects to develop renewable energy farms.

The farming industry has suffered badly in the recent years due to BSE and foot and mouth disease, and some farmers have decided to look for new business opportunities. Power generation from renewable energy – such as a photovoltaic array like the one shown- would be highly suitable business venture for farmers, says Professor Riffat, as would manufacturing sustainable technologies.

The School has a world-class reputation in renewable energy and has developed a range of new technologies driven by solar and wind energy. Professor Riffat would like to assist farmers to set up several 1 MW power plants using solar tracking technologies and is looking for farms to collaborate with him on the project. The energy produced from the solar energy plants could be sold to the main grid system and farmers would effectively become power producers.

Farmers interested in the project should contact Professor S B Riffat; tel: 0115 951 3157, e-mail: saffa.riffat@nottingham.ac.uk

Incinerators breach emissions limits

A new report from Greenpeace: *Incineration: criminal damage* reveals that incinerators in England are committing hundreds of pollution offences every year by discharging more toxic pollution than legally permitted. The ten plants examined broke pollution laws a total of 553 times in 1999 and 2000 but incurred only one prosecution for the entire period, says Greenpeace.

The report also identifies Sheffield as being the worst incinerator in England with 156 breaches over a two-year period. In an action designed to publicise the report, Greenpeace volunteers scaled the chimney of the Sheffield plant and blocked the rubbish feeders, successfully shutting down operations for several days.

The report is based on data obtained from Environment Agency pollution registers and shows ten incinerators committing between nine and 156 offences during the two year period.

The most common breaches were for emissions of hydrogen chloride, sulphur dioxide, oxides of nitrogen and carbon monoxide – there were no breaches of dioxin limits.

Operator of the Sheffield incinerator, which supplies heat for the City's community heating network, said that it had had a number of problems last year due to teething problems as the incinerator was upgraded. However, staff at the plant had "worked hard to continuously improve the plant's performance" and there had been only one nitrous oxide and two hydrogen chloride peaks over the last six months.

Energy management market 'to grow by 60%'

The UK market for energy management products will grow by a dramatic 60% in the next two years, according to research by Datamonitor, with growth is expected to be particularly high in the medium-sized user segment.

The main reasons, says Datamonitor, is the convergence in retail energy prices and new government regulations, including the Climate Change Levy, which are leading to higher energy costs. More and more industrial and commercial energy users are turning to energy management products in a bid to decrease their energy spend, says the company.

Datamonitor's research suggests that UK industrial and commercial energy customers are expected to be spending £610 million per annum on energy management products by the end of 2002, with energy suppliers as the main beneficiaries of this growing revenue stream. However, at present most suppliers' energy management offerings fall short of their customers' requirements.

Datamonitor's survey of major energy users suggests that 36% more industrial and commercial users expect to use energy management products by the end of 2002. Moreover, existing users are planning to increase their annual spend on energy management products by an average of 22%.

Energy suppliers will be the main beneficiaries of this growing revenue stream as energy management evolves to become a necessity for major energy users, rather than an optional extra, says Datamonitor. Companies who currently operate an in-house energy management structure will increasingly begin to outsource this task.

At present, the majority of users who outsource their energy management requirements employ a specialist energy management provider of hardware and software. Energy suppliers are not as yet viewed as a major delivery channel for energy management services, and at present account for just 10% of the market.

However, Datamonitor says that over the next two years major energy users will increasingly look towards their energy supplier to provide these services. Many of the major users surveyed expressed a distinct preference for obtaining their energy supply and energy management services from the same source.

A third 10 MW Francis turbine and generator has installed and commissioned for Alcan Smelting and Power at Kinlochleven by Gilkes. The new plant is installed in place of some motor generator sets and generates 10 MW of electrical power from a head of 278 m at 1000 rpm. Gilkes' experience with low specific speed Francis turbines was utilised to provide this effective power generation solution.

Gilkes' contract included the design, manufacture, supply, installation, commissioning and performance testing of the turbine, GEC Alstom generator, main inlet valve, hydraulic controls, turbine controller, lube oil system and special inlet pipe work.

The Kinlochleven scheme first produced aluminium in 1907. Eleven Pelton turbines each drive two 250 VDC generators to provide power for the smelting process.

Combined cooling and power for telehouses

Telecommunications centre developer 186k Limited is to use 'combined cool and power' (CCP) plants for two of their 'telehouses' currently under construction at Hemel Hempstead and Bristol. Under an £8 million deal, Lattice Energy Services (LES) will install the CCP units to provide secure and cost-effective energy to the stations.

Combined cooling and power matches site energy requirements

The telehouses host the computers and switches that enable 186k's fibre optic network to connect to all other telecoms providers.

At Hemel Hempstead, the local regional electricity company could not provide the full 4 MWe supply, so 186k opted for a CCP plant with support from the REC and from static uninterruptible power supplies and diesel driven generators. The CCP plant at Bristol will provide 3 MWe of electricity and cooling with full electrical back up from the REC grid.

Security and reliability of power supply and air conditioning is vital for the telehouses, which need to maintain round the clock operation, 365 days per year.

The CCP systems provide more than 99.999% reliability, says LES.

Indeed the new systems are ideally suited to the telecommunications market which generally has a requirement for electrical energy and air conditioning (cooling) in broadly equal measures. The CCP system eliminates the majority of the air conditioning power needs, reducing the overall energy demand of the telehouse, typically by 22-25%. The ratio of cooling and power produced by CCP closely matches requirements of a typical telehouse.

Developing Ballymoney's lignite

by Andrew Cox, editor, UK Coal Review

Northern Ireland is the only region of the United Kingdom containing significant undeveloped reserves of lignite or brown coal (estimated at more than 1 billion tonnes). Their existence has been known for at least two centuries - but the deposits were not considered to be of commercial value. That position changed in the late 1970s and 1980s as a result of the exploration work by several companies - who concentrated their activities in three distinct areas located in Counties Antrim and Tyrone: the Ballymoney area; the Lough Beg area (south of Crumlin on the eastern shore of Lough Neagh); and the Coagh/Washing Bay area of East Tyrone (on the western shore of Lough Neagh).

Considerable work was undertaken to assess the commercial potential of the deposits near Lough Neagh and planning permission was granted in 1984 for its partial extraction. However, the collapse of the oil price at that time led to these plans being abandoned. The subsequent privatisation of the Northern Ireland electricity sector, the availability of cheap natural gas, plus significant political and economic risks in the Province have acted as a barrier to some alternative generation projects. So the lignite deposits were viewed as a long-term asset - an option available to meet the future energy needs of Northern Ireland.

Meekatharra Minerals Ltd (now called Aulron Energy Ltd) have been the licensees for the Ballymoney lignite deposits since 1986. Despite the adverse conditions in the Northern Ireland energy market, they decided to retain their interest in the area - adopting a more longer-term perspective than the other energy companies.

The energy scene in Ireland has changed considerably since the 1980s - and now the development of a major lignite mine and associated power project at Ballymoney seems to be a strong possibility.

The development of the Ballymoney lignite deposit has been the subject of feasibility studies and news reports since the 1980s. An early example can be seen in a news story in the September 1990 issue of *Energy World*.

The opportunity to develop a lignite-fuelled power station at Ballymoney was instigated in 1986 when Meekatharra (NI) Ltd, a wholly-owned subsidiary of Aulron (formerly known as Meekatharra Minerals) acquired lignite prospecting licence MM1/86 by the process of competitive tender.

Since 1986 the licence area has been comprehensively explored and assessed - with more than 100 boreholes having been drilled to define the extent of the lignite deposit. Mine feasibility studies have also undertaken to establish a suitable mining method. In addition, reports on the proposed development and operation of a mine designed to fuel an adjacent power station have been submitted to the Northern Ireland Department of Economic Development on two occasions.

Aulron indicated in 2000 that the Ballymoney lignite deposit covers an area of 13.8 km^2 and contains a lignite resource of 660 million tonnes (a measured resource of 630 million tonnes and a further indicated resource of 30 million tonnes). This deposit is comparable with the opencast coal resources of England, Wales and Scotland.

Fuel quality

Lignite is a low to medium rank coal whose calorific value lies between that of peat and sub-bituminous coal. Typically it has a high moisture content, but lignite is widely used as a fuel for electricity generation (with global consumption currently running at over 900 million tonnes per annum). However, due to their composition, not all lignites are suitable for power station fuel, particularly in Europe and other western industrialised countries where tight emission regulations have been introduced.

Basic quality data for the lignite in the North East Extension of the Ballymoney deposit indicates that the lignite is suitable as a fuel for power generation.

Aulron's published data in 2000 indicated that the lignite in the North Eastern Extension of the deposit has an average dry ash free volatile matter content of 62%, and a dry ash free specific energy of 10,746 Btu/lb (approx. 25 MJ/kg) indicating a good reactivity fuel. Analysis of the borehole samples showed the lignite has high ash fusion temperatures (1450-1600°C), and low sodium, chlorine, potassium calcium and magnesium levels - implying that it will have low fouling and slagging tendencies.

The average in-situ sulphur content of 0.13% and chlorine content of 0.01% are both low in comparison with other lignites and the coals used in power generation in Europe and the UK.

Due to the high moisture content most lignite-fuelled power stations are located in close proximity to the mines that supply them. This is because transporting lignite over significant distances adversely affects the economics of any lignite power project. Aulron has indicated that it would seek to locate the power station at Ballymoney approximately 200 m from the mine's extraction area.

Project proposals

Aulron plan to extract the lignite at Ballymoney and utilise it in a purpose-built mine-mouth power station - utilising up to 5 million tonnes of lignite per annum over a projected 30 year period.

The project is expected to benefit from low-cost mining conditions because the lignite occurs in thick seams, close to the surface. The maximum depth of working is estimated at 120 m, with individual seam ranging up to 56 m in thickness. Aulron has reported that this should ensure that the base-load power station will be competitive - generating some of the cheapest electricity in Northern Ireland.

During February 1999 the company's Ballymoney Power subsidiary submitted proposals to the Northern Ireland authorities to build a 500 MWe pressurised fluidised bed combustion (PFBC) power station to utilise the lignite reserves. This

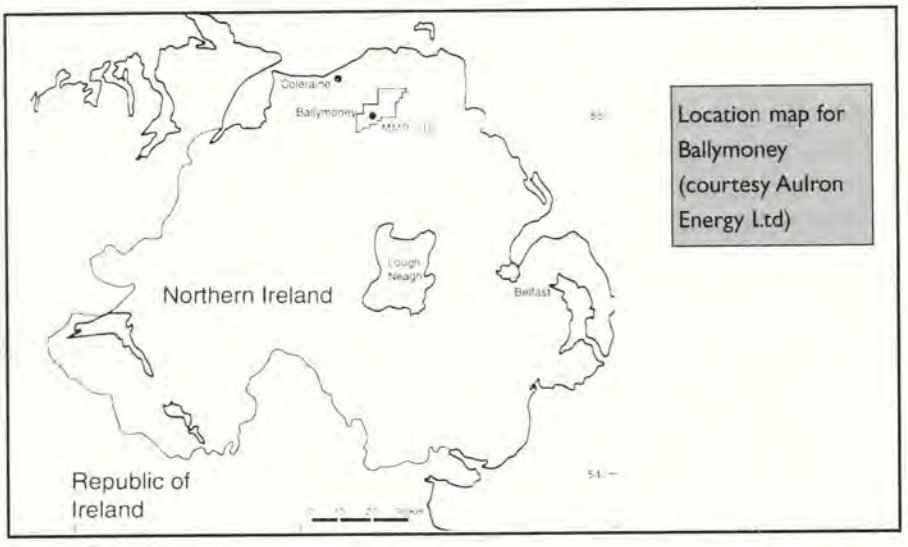
cleaner coal technology plant would have a significantly higher combustion efficiency than existing coal-fired power stations operating in the UK. PFBC is well-proven technology (with several plants operating in Europe, Japan and the USA) - with combustion efficiencies of 45% or higher.

Aulron reported in March 2001 that it had been approached by five international power groups to join the Ballymoney project. Independent studies of proposed mining strategies and the electricity market in Northern Ireland and the Irish Republic have been commissioned. Aulron noted that, on completion of these studies, negotiations based on the latest competitive market assessments will begin with these groups to introduce a new power station partner to the project. A decision on new project partners is currently expected this summer.

In April this year Aulron also announced that phase one of the energy market study (concerning the Ballymoney mine and power project) awarded to Primark WEFA had been completed. The study reviewed the electricity market potential for the Ballymoney project both in Northern Ireland and the Irish Republic in the context of an 'all-Ireland' integrated electricity market and estimated the market potential for the Ballymoney project. It concluded that the estimated price of the electricity supplied to the grid from such a project would be competitive with existing or new generation options in Northern Ireland.

The independent mining study of the Ballymoney project was also completed during the first quarter of 2001, confirming that estimated mining costs have reduced since the company's previous work during the 1990s. This reflects advances in mining equipment productivity and real reductions in equipment costs.

Aulron also noted that a pre-feasibility study for a Ballymoney power station is currently being prepared by independent consultants, possibly for completion by this summer. This study will be included in an information memorandum with a view to inviting proposals from potential new power station partners.



Location map for Ballymoney (courtesy Aulron Energy Ltd)

Irish electricity markets

Electricity demand in Ireland (North and the Republic) is growing steadily. This has been fuelled by continuing population growth as well as economic growth (particularly in the Irish Republic). There is a need for new generating capacity in Northern Ireland as some older power stations are closed - and also in the Republic.

Northern Ireland also has some of the most expensive electricity in the UK and western Europe - a situation that is not forecast to change in the short to medium-term. Analysts have noted that the recent increases in natural gas prices will probably ensure that prices for electricity consumers remain at high levels.

In 1995 the 300 MWe interconnector between Northern Ireland's grid and the Republic was re-established after being shut down for many years. The North-South interconnections are now being increased to 600 MWe (with a further expansion anticipated in the near future) - which together with the new 500 MWe interconnector with Scotland - allow far greater opportunities for electricity trade for new generating companies.

Other companies in the electricity sector have also warned the Irish Government that new generating capacity is required to meet a potential power shortages in the Republic. Some recent forecasts have indicated that a shortfall in generating capacity could reach 300-500 MWe by 2005.

Viridian Group, the Northern Ireland electricity company, warned in May 2001 that there was a danger that enough new power stations would not be built in the Irish Republic to meet electricity demand - which is showing growth of up to 5% per annum.

Liberalisation of the Irish Republic's electricity market is taking place but companies like Viridian have pressed the Government to open the market to full competition as soon as possible in order to encourage the development of new generating capacity. Earlier this year Patrick Haren, Viridian's chief executive, said that there was a need to build a significantly-sized power station once every two years.

The Northern Irish generating sector is placed to meet some of the growing demand in the south by exporting electricity via the interconnector. Aulron's Ballymoney generation project could make a significant contribution to rising electricity demand in the Irish Republic as well as meeting electricity demand in Northern Ireland (which is currently growing at around 2% per annum).

The development of a significant surface mining project and the construction and operation of an associated power station would certainly bring important economic benefits to the Ballymoney area. Unfortunately, there will inevitably be a significant environmental impact in this predominantly rural area. Some opposition (local, regional and possibly international) to a major surface mine and power station planning application should be anticipated. Aulron and its consultants will therefore have a major task ahead of them in overcoming potential objections and conflicts with other local activities.

North Sea – keeping production flowing

Exploration for completely new oil and gas fields in the North Sea may be just about over, but known-about fields continue to be brought into production and some older fields are being given a second wind. This round-up of recent activity within Britain's oil and gas production industry shows how.

Older fields are being brought back into production

Second bite at Angus, Beatrice

Amerada Hess and co-venturers have received DTI approval for redeveloping the previously decommissioned Angus oil field. This will be the first time on the UKCS that a decommissioned field has been redeveloped.

The Angus field was originally produced between 1991 and 1993 from two subsea wells connected to the Petrojarl floating production, storage and offloading vessel (FPSO). At the time it was the smallest stand alone field on the UKCS producing approximately 12 million barrels.

Production is expected to commence at the end of the third quarter this year.

Meanwhile, the DTI has approved the Beatrice redevelopment project, in which Talisman will rejuvenate the large Beatrice oil field off Inverness, safeguarding 60 long-term jobs. Producing oil since 1981, Beatrice was shut-in as a precautionary measure in August last year when a small pressure loss in the main export pipeline was discovered.

Talisman proposes to replace the pipeline, refurbish the Beatrice-Bravo platform and redevelop the field with further wells.

Developing Otter after 25 years

TotalFinaElf has announced agreement between several partner companies on the development of the Otter oil field in the northern North Sea, one of the largest undeveloped discoveries in the UK continental shelf, subject to approval by the DTI.

Start-up is expected in the fourth quarter of 2002 with a plateau production rate of 30,000 barrels of oil per day. Development costs will amount to around £150 million.

The field was discovered in 1977 but, says TotalFinaElf, has only now become commercially viable as a result of new technology applications and the use of available capacity in the existing infrastructure.

The subsea development, which will tied back to the Shell Expro-operated Eider platform, will comprise five subsea wells; three oil producers and two water injectors. Each of the three producer wells will be artificially lifted by electrical submersible pumps. As a result of the Otter investment it is anticipated that the life of the Eider platform will be extended by over five years. Transportation, processing services and routine operating services will be provided by Shell Expro via the Eider/Cormorant North platforms.

- Meanwhile, a £250 million project to develop the Skene gas field, also in the northern North Sea is on target to produce first gas by early 2002. ExxonMobil subsidiary Mobil North Sea Limited (MNSL), will operate the field, which is expected to produce up to 180 million cubic feet of gas per day, plus 25,000 barrels per day of associated liquids. Recoverable resources are estimated at 95 million oil-equivalent barrels. The field will be developed using a subsea manifold, which will be tied back to MNSL's existing Beryl Alpha platform.

Stricter environmental regime for Atlantic Margin

Just four weeks before the election, the then Energy Minister Peter Hain announced a strengthening of Government's environmental regulation of offshore oil and gas activity. The new regulations will, said the DTI, enhance the strict environmental protection framework governing the UK's offshore oil and gas industry, with additional protection for animal species and habitats.

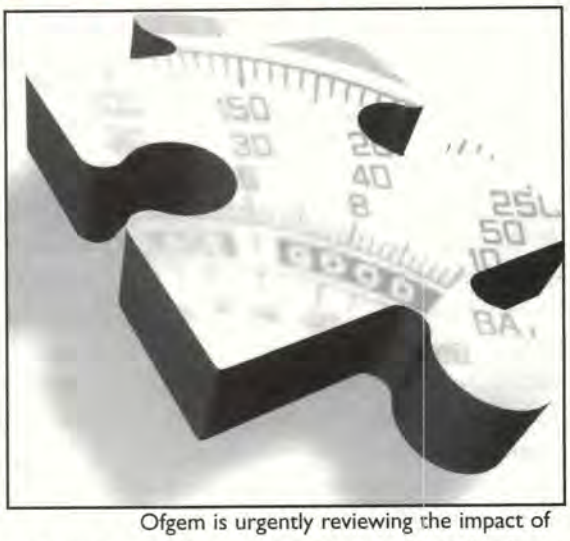
Mr Hain said: "We have worked long and hard to ensure that the requirements of the Habitats and Birds Directives are properly applied to the decision-making process for oil and gas activities. We now have a workable and highly effective system for protecting unusual or rare habitats in UK waters, while encouraging responsible developments of the UK's valuable energy resources."

Hain took the opportunity also to announce the latest round of exploration licence awards, the 19th Offshore Round, many of which are for the deep water 'Atlantic Margin' to the north west of Scotland.

The UK Offshore Operators Association (UKOOA) welcomed the announcement, stressing that the Atlantic Margin: "holds the potential to extend the life of the UK's offshore industry as fields in the North Sea decline, preserving jobs, supporting local economies and maintaining an indigenous energy supply for the nation."

Redefining energy policy

The third of the Institute of Energy's energy policy conferences was held in London two days before the general election. Steve Hodgson reports.



The current scope of UK energy policy thinking is much too narrow – concentrating as it does on the supply of fuel and power and ignoring both ambient energy sources and the services which fuel and electricity provide to users: comfort, illumination, mobility, etc. So concluded the Royal Institute of International Affairs' Walt Patterson, delivering the final presentation. And the omission is important, as it prevents many of the most important issues from being considered, let alone included, in new policy initiatives, added Patterson.

It's an old story, but what householders want is not a certain number of kWh of electricity per day, but lit rooms, some coolth in the fridge and working appliances. No-one is interested in the volume of gas (or oil, or coal) being delivered, so long as thermal comfort conditions are maintained and hot water is available.

Similarly, industrial managers want their furnaces to heat up to required temperatures, their pumps to pump and machines to machine. Even the keenest managers are not really interested in counting therms or kWh, except as a means of reducing the figure and thus the energy bill.

But to ignore the *services* which energy provides and to concentrate on the fuels and energy carriers which provide the services is to miss half the point. More practically, ignoring energy services causes policy makers to miss important opportunities, continued Patterson. Why spend money on a new gas pipeline to improve heating of a housing estate when a similar effect can be achieved by improving the thermal performance of the homes by proper insulation and glazing systems? Saves energy, and carbon dioxide, too.

Patterson believes that governments should shift their attention over to a host of demand side or energy-use possibilities; finding policy levers to cause people to improve their own energy services infrastructure.

Earlier, the Science Policy Research Unit's John Chesshire highlighted a particular area where the lack of considered policy on energy use is causing a problem. Consider the investment climate within an industrial company, where VAT can be passed on, tax allowances apply and, for investment in energy efficiency, enhanced capital allowances are available. Now look at a public sector or domestic energy user from the non-profit sector. VAT has to be paid rather than passed on and there are no tax allowances.

The outcome is a severely tilted playing field, where the cost of capital for the non-profit sector ends up at between twice and three times that available to industry and commerce – and to the energy suppliers themselves. The uneven tax regime leads away from least-cost solutions and discourages the non-profit sector from 'doing the right thing' for energy efficiency and renewables.

Conflicting objectives

Energy policy is also complicated, with several, sometimes conflicting objectives. Why should consumers worry about carbon dioxide emissions when energy bills have been falling, asked Chesshire. The energy manager at Boots, Andrew Jones, gave a stark example of how different parts of the policy web have worked against each other. Some time ago, Boots did the right thing by investing £20 million in a major CHP unit at its main manufacturing site outside Nottingham. The plant worked fine until new electricity trading arrangements (NETA) were introduced earlier this year, after which Jones could not find a single electricity company willing to buy the excess output from the CHP plant.

NETA has delivered lower bills for industrial electricity consumers (see Home News *Energy World* June 2001 for more on this) but was here threatening the viability of a major CHP plant which is delivering significant environmental, as well as economic, benefits. Eventually Jones found someone to buy his excess power, and Ofgem is urgently reviewing the impact of NETA on CHP (and renewables), but Jones: "won't be investing in another CHP plant" for a while.

So what kind of energy company could service a wider energy agenda? John Thompson described the trends seen by his employer, Enron Europe: a company that specialises in identifying important new 'waves' and successfully riding them.

Globalisation and the 'death of distance' are unstoppable, said Thompson, as is intermediation (or getting rid of the middle man). Enron's approach is to move with the times: finding out what the company is good at and then doing just this, preferably world wide using e-commerce, and ditching other activities through outsourcing. Even with this approach, companies will only be able to keep hold of a competitive advantage for a short while, before redefining themselves as being good at a different mixture of activities.

The conference also heard from Peter Atherton of Schroder Salomon Smith Barney on redefining energy analysis. Atherton said that green/ethical credentials play next to no part yet in the valuation of companies, but that this would change with the arrival of emissions trading. The DTI's Neil Hirst concluded that one way through the energy policy jungle was to look for measures which satisfy more than one objective: 'win-win' measures such as energy efficiency in homes which also helps fight fuel poverty, or addressing regulatory barriers to connecting renewables to the electricity network.

Fuel cells – cogeneration

Static fuel cells using hydrogen to generate electricity and heat are approaching commercial reality, with several units already operating in Europe, the US and Japan (though not yet in the UK). Here a German engine and turbine manufacturer which has formed an alliance with an US-based manufacturer of fuel cells describes its trials of 250 kW units operating in real applications in Germany.

A **'HotModule'** fuel cell power plant produced by MTU Friedrichshafen started operation at the Rhön Klinikum hospital in Bad Neustadt in Germany's Franconia region in May. In so doing, it became the first high-temperature fuel cell installation in the world to be used in a hospital, supplying 250 kW of electrical energy and 170 kW of thermal energy, in the form of high-pressure steam, to the hospital.

The HotModule is particularly well suited to use in medical establishments because the fuel cell operates at a temperature of 600°C and produces high-pressure steam which is required in large quantities in hospitals and clinics for sterilisation and climate control. Other advantages of the use of the HotModule at the hospital include the cost of integrating the installation into the hospital. Jörg Demmler, the head of Technical Controlling at Rhön Klinikum AG explains: "We only incur very small expenses for peripheral systems because the HotModule is very flexible in adapting to our energy requirements. The costs of sound insulation, exhaust air treatment and maintenance are also lower than for conventional modular power plants". Time is another factor: "The approval procedure required by German anti-pollution legislation that would have been necessary with other types of power plant was not needed with the HotModule".

Hospitals are potentially important areas of application for the new technology, they have to permanently maintain emergency power generators to ensure an uninterrupted supply to the most important electrical systems – in the operating theatre, for example – in the event of a mains power failure. Fuel cells could replace such installations in the future and provide part of the power requirements on a permanent basis. Such an alternative would be very cost-effective for hospitals because the electricity from a mass-produced HotModule is no more expensive than from a major electricity supplier. In addition, fuel cells supply a constant, and therefore high-quality, current – an absolute necessity for highly sensitive medical equipment.

Second field trial

The installation in Bad Neustadt is also important to MTU because it is the second field trial plant in which the HotModule is being used in real operational conditions. Dr Rolf A Hanssen, Chairman of the MTU Management Board, views the project as highly significant: "Here we have been able to benefit from experience gained with our first installation at the University of Bielefeld, which has been running very successfully for more than a year. With field trials such as those in Bad Neustadt, we aim to demonstrate that the HotModule is extremely versatile and is suitable for a wide variety of applications such as in food production, brewing and, of course, hospitals".

The first 250 kW unit has successfully completed its first year of practical field trials by supplying 723 MWh of electrical energy and 550 MWh of heat within a year to the Bielefeld municipal electricity company. Over the 6000 hours for which the unit was connected to the power grid in the year 2000, an electrical efficiency of 47% was measured for the installation as a whole, while the fuel-cell block on its own achieved a level of 56%.

MTU is hoping to gain more practical experience from the installation in Bad Neustadt that will be important for the construction of a prototype and the subsequent start of volume production that is planned for 2004. One of the most important targets on the road to mass production is to further reduce the manufacturing costs of the unit. MTU is aiming to offer series-production HotModules for between 1000 and 1200 Euro per kW of output.

Production of the HotModule is a co-operative venture with MTU's US-based partner Fuel Cell Energy Inc, which supplies the cell packages which are the central components of the plant.

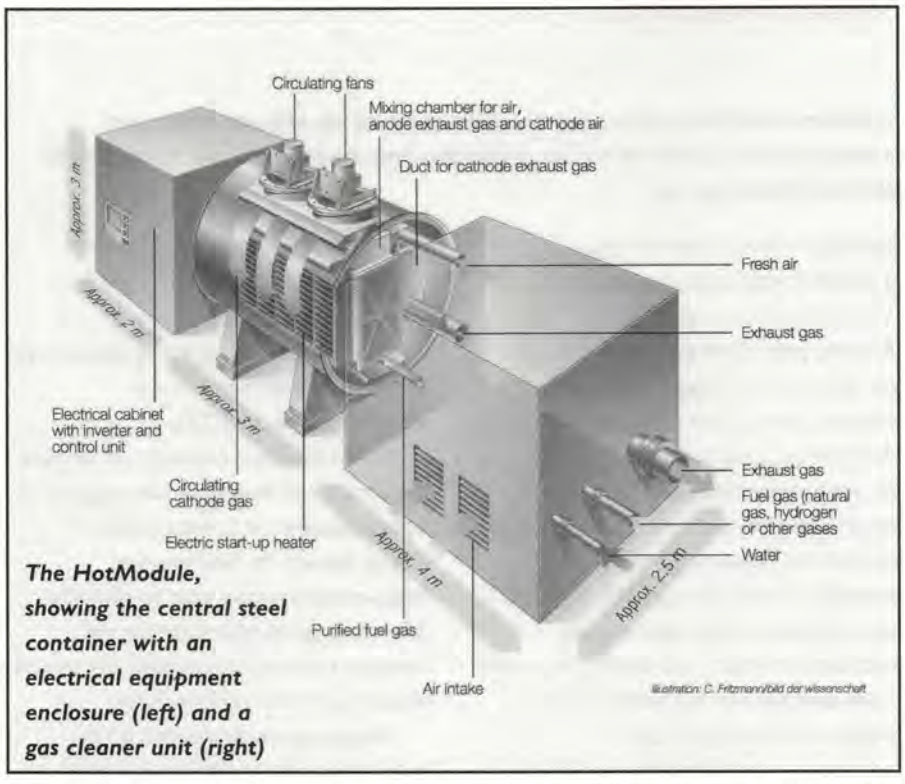
High temperature operation

In the central components of the HotModule, a steel cylinder, the operating temperature is 600°C. This may appear

Technical Data for the Bielefeld HotModule

Fuel	natural gas
Power output	250 kW
Number of cells	about 300
Efficiency (electrical)	56% (for the cell block)
Thermal utilisation	two phases: process steam and heat
Thermal output	170 kW
Service live (expected)	5 years
Weight	15 tonnes

for the future?



The HotModule, showing the central steel container with an electrical equipment enclosure (left) and a gas cleaner unit (right)

expensive, but it pays off in several ways. It is this high temperature which makes it possible to do without expensive catalysts of precious metals: nickel is all that is needed to put the fuel-cell reaction into operation. At 600°C, another welcome effect occurs: when natural gas and water are brought together within the fuel cell, hydrogen splits off. This is exactly the fuel which is needed to operate fuel cells and which, with other technologies, must first be obtained in voluminous reformer plants.

A further advantage is a by-product: high-pressure steam which, for example, is needed in hospitals and in the chemical and food-processing industry or, as at the University of Bielefeld, is used as process steam for research purposes. Waste heat can also be used by passing it through a steam turbine to further increase the system electrical output. This enables high-temperature fuel-cells to reach a total efficiency of 65%, exceeding the efficiency of even large gas and steam power stations.

Simple operating principle

The HotModule is very simply constructed. The complete plant consists of three separate components: a central steel container, a gas cleaner and an electrical equipment enclosure – see diagram. The container houses the fuel-cell stack and is the actual HotModule which gave the system its name. The gas cleaner is situated upstream of the system and the electrical enclosure contains the system controls and conditions the alternating current output. Tie rods hold together the 300 individual cells which are lined up to form the stack. Each cell is constructed as a flat sandwich with two electrodes (an anode and a cathode) as outer walls enclosing a foil which is filled with the lithium/potassium-carbonate electrolyte.

When the hydrogen flows over one electrode and air flows over the other one in an environment of 600°C, a process is started which generates electricity. This process takes place at atmospheric pressure and employs low flow velocities. At this high temperature, the electrolyte of carbonate ions (CO_3^{2-}) melts, enabling the exchange of electrons: the carbonate ions transfer their charge to the anode and give off an oxygen atom which combines with the hydrogen which flows by, to form water (H_2O). The remaining carbon dioxide (CO_2) returns to the cathode side, takes on two electrons and an oxygen atom from the air flowing by and returns to the process as carbonate ion (CO_3^{2-}).

Reducing costs

Up to now, the fuel cell technology has been used with decentralised power stations generating electric power and heat, only for demonstration projects. The reason: in comparison to traditional methods of generating electricity, high-performance fuel cell plants are still too expensive; either because they are complex plants with extensive peripheral equipment, or because they require very expensive materials such as platinum. For some technologies, the manufacturer's cost for the equipment to produce each kW of output is 20,000 Euro or even more.

The HotModule fuel-cell system of DaimlerChrysler's subsidiary, MTU Friedrichshafen, costs only a fraction of that figure, even today. But the cost must be reduced even further according to Michael Bode, head of New Technologies at MTU: "The market sets strict demands. Gas-engine plants are available today for less than 1000 Euro per kilowatt output; they have considerably lower efficiency than our HotModule, but they set the standard."

Even though the HotModule today can already be produced at much lower cost than other fuel cell systems, MTU is aiming at 1000 Euro to 1200 Euro per kW output over the medium term, making the HotModule competitive from the economic standpoint as well.

To reach this target, MTU is expending effort in several areas. They want to further simplify the construction of the fuel cell itself, deleting superfluous material and reducing the cost of the core component to one-half of its present figure. The greatest potential for savings, however, lies in volume manufacturing. Today, each HotModule is a unique, hand-made piece, which makes it impossible to compare it with standard products such as engines. When the unit reaches production maturity in the medium term, Michael Bode believes that another 50% can be saved, making it possible to reach the costing target.

Could outsourcing improve your effectiveness?

by Jes Rutter, Jes Rutter Partnerships Ltd

Does your company know how effectively it is delivering utilities services (eg steam, compressed air, effluent, water and refrigeration) and infrastructure maintenance services? If it has carried out an evaluation, how detailed was the study? Could outsourcing the total service be more beneficial? Jes Rutter reports.

There are several real reasons why a company might consider outsourcing:

- to enable investment,
- to deliver improvements more quickly (eg culture change),
- to enable focus to improve the service,
- to pass the onus of responsibility (and liability) to specialists, and
- to reduce headcount.

All of the above ultimately need to lead to reduced operating costs.

One method to decide if outsourcing could be a possible strategy is to follow a typical improvement process of comparing the gap between visioning (the 'to be') and current performance (the 'as is'). Once you can determine what the ingredients are for moving successfully from 'as is' to 'to be' and more importantly what ingredients your company are missing, the way ahead becomes clearer.

So, where is the best place to start? Assessing existing energy and service provision against some form of benchmark is essential. More data is available for industry than people generally consider but if you have little company data then detailed benchmarks can be produced relatively easily from someone taking an outside perspective on existing performance and methods.

A thorough review of each supplier arrangement is needed (including any internal service delivery team). This should be conducted in the same way, so enabling comparisons and prioritisation of potential improvements. It is important to consider from the results if you could improve internal resources in an equally effective manner (cost, efficiency, innovation, timeliness etc) or, instead of sub-contracting, consider bringing these services in house. If the decision is to consider outsourcing, read on.

Outsourcing review

An early part of the process is to check (or develop) all necessary internal and external service level agreements (SLAs) so that they are optimised. The next step is to go out to the market place and widely assess potential suppliers. One way would be to invite suppliers to make presentations of their capabilities to the team of stakeholders assessing the outsourcing project. It is important to have a pre-designed scoring system and to weight this to critical factors.

If the decision is to consider outsourcing, read on.

The next stage is vital to get effectiveness in terms of value and service delivery. Having assessed what the drivers of the service under consideration are, a request for proposals (RFP) written in the style of a modern output specification can be completed with a view to presenting this RFP to four potential future partners. Give suitable time for evaluation by the suppliers. During this period invest time into two important investigations:

- determine the key performance indicators (KPIs) that are critical but practical to measure, and
- undertake a detailed audit of the suppliers office and on-site systems of work.

A 'mixed bag' of KPIs is ideal although the weighting needs to be biased towards what is important; typically energy reductions and aspects of service delivery. The KPIs should be linked to a relatively substantial risk and reward sum where the targets set would mean that both parties aspire to the same target. The most effective way of picking up the issue of cost reduction is via the need for continuous improvement. This will give added benefits to the company but with good monetary incentives to the supplier to identify continuous improvement projects throughout the term of the agreement (eg help to overcome some of the requirements of the CCL).

Only when your company can actually 'touch and feel' each potential supplier via a physical audit can a real measure of service delivery be benchmarked. Measurement models exist to compare different organisations including the company currently undertaking the service, which may be the company itself.

Having previously decided on the basic buying criteria you are in a position to score the proposals and presentations from four or five suppliers. Ideally a decision should be made putting costs to one side. The objective is to reduce to one supplier, though it may be necessary to get further clarifications from the two best suppliers. By this stage the investigation would be approximately half way; the next stages are negotiation, generation of the internal business case and then final negotiation.

Last year a leading aerospace company followed a similar process with remarkable results. A multi-million pound long-term agreement was signed. It is delivering the expected benefits and the framework is now built to exceed expectations based upon a true partnership arrangement.

The process works and results follow quickly but clearly it needs expertise and focus as well as the investment of time and resources. If you are looking for cost reductions in 2002, it could be a good time to start this type of review now.

Jes Rutter is an independent consultant in managing and delivering M&E and CEM services,
tel: 01454 238451, 07074 238451.

Buying energy in the new century

The UK energy scene seems to have been in a state of constant change for as long as anyone can remember. But for energy buyers, two events dominated the year 2000 – the doubling of gas prices and the collapse of electricity supplier Independent Energy. Steve Hodgson reports from a conference organised by purchasing consultant John Hall Associates.

Gas prices to business users hovered around 12 p/therm for the first three months of 2000, but started to rise in March, eventually reaching a high of 26 p/therm by last November, since when they have settled to oscillating around 23 p/therm.

One cause of the price rise is now understood to be a reversal of flow in the UK-Continent gas interconnector pipeline, so that instead of importing gas, the UK began exporting in order to cash in gas prices on the continent which had risen considerably with international oil prices. The squeeze on supplies to the UK was made worse by low levels of stored gas last year and gas production problems.

Meanwhile, in September, thousands of companies lost their low-cost electricity supplier as Independent Energy called in the receivers. Innogy's npower stepped in to buy large parts of the Independent business, but the timing was unfortunate as, with the majority of annual electricity supply negotiations having just completed for an October start, around 15 TWh of industrial and commercial sector energy consumption went back into the market. Electricity prices subsequently rose by around 10% in just five days.

John Hall Associates' Jonathan Guy gave a presentation on firefighting – or how buyers can cope with major events like these. His first reaction to rising gas prices was to sit tight and wait, either for the 'blip' to go into reverse, or for the Government or Ofgem to come to the rescue. Most buyers did the same. But gas prices stayed high and buyers on fixed price contracts started to look for ways to minimise their exposure. Buyers feared signing a new, fixed price contract towards the top of the curve, and thus being left paying top dollar when prices fell again, as most people then expected them to.

The figures tell the story. In January 2000, before the rise, less than 1% of JHA's 20,000 sites had market related gas contracts, but by this January 14% of firm gas volume and 24% of interruptible sites were on market related gas contracts. These sites will now see their bills fall if the wholesale market falls.

With hindsight, all gas buyers should have signed five year fixed price contracts in 1999, said Guy, and electricity buyers should have resisted Independent's low, low prices and gone with someone else. The lessons are clear: prices can go up as well as down, the experts can get things wrong, and neither Ofgem nor the Government is going to help.

Guy went on to describe how a large industrial gas buyers could reject both fixed price and standard index gas contracts in favour of a matrix of prices linked to various indexes – the sort of approach which requires considerable purchasing skill, or the help of an external consultant.

NETA and the Levy

The big events so far this year in energy purchasing have been the introduction at the end of March of new, market-based electricity trading arrangements (NETA), and the introduction of the Climate Change Levy. Another of JHA's consultants, Andrew Crawford, talked about the first two months of NETA.

Replacing the centrally-managed electricity Pool with a decentralised system of bilateral forwards markets, power exchanges and a short term balancing mechanism, NETA has – so far – kept the lights on. Clear winners so far are EME's pumped storage businesses at Dinorwic and Ffestiniog, said Crawford, while operators of small generators such as CHP and renewables had been squeezed (See also Home News, *Energy World* June 2001).

NETA had delivered wholesale price visibility to buyers, said Crawford, but he was disappointed that, so far, only very limited new contracting options for buyers had emerged. As with gas, retail electricity prices increasingly resembled wholesale prices with an extra element added as a risk premium.

The energy manager at Boots, Andrew Jones, described his experience of the new Climate Change Levy, which has added to £1.5 million to Boots plc's annual energy bill, even after allowing for savings in reduced National Insurance contributions. The company will have to increase turnover by some £15 million in order to stand still, he added. But Boots is one of the better-organised companies, added Jones, with a solid corporate commitment to responsible energy management in place. Perhaps more significant as an incentive, the annual pay bonus of 20% of Jones' colleagues depends on his meeting the kWh reduction target. The link to bonuses has certainly moved energy management up the agenda!

The shocks of last year at least helped to refocus minds, until recently accustomed to steadily falling prices, on the fundamentals of buying energy. JHA's advice is to:

- understand what is important to the company – budgetary certainty or always achieving the best price;
- choose a supplier with care, not just on price;
- work hard on contract terms and conditions; and
- separate these from price – to allow longer tem supplier/buyer relationships to develop.

Contact John Hall Associates on tel: 01403 269 430, e-mail: jhassociates@jha.co.uk

Domestic savings

The average householder is paying out £129 less a year than five years ago on bills for electricity, gas, telephones and water, assuming similar usage volumes, according to DTI data. A household with average bills in 1996 will now be saving £55 on telephone bills, £42 on gas bills, and £43 for electricity - although the annual water bill would have risen by £12.

Climate change and the

by Mike Koefman, co-ordinator of the Hydrogen Energy Association of the UK and Ireland

Renewables and hydrogen – the energy sources of the future; providing power for buildings, industry and transport. At least this is the vision of many, including the newly-formed Hydrogen Association of the UK and Ireland. Here, HEAUKI's Mike Koefman explains the case for hydrogen, starting with some history. This rather theoretical view is complemented by news, on pages 12 and 13, of fuel cells in use in Germany.

Until quite recently we have been served by organic carbon. As a hairless, bipedal, mammalian species slowly migrating from water ancestral African lands, we would certainly have needed sources of body heat greater than that furnished by our own metabolism, however robust this may have been millennia ago. The burning of gathered timber would have served the purpose well. Indeed, this resource is still crucial in large parts of the world: at least one billion tonnes of carbon equivalent in timber-form is consumed each year. Later, as besuited and mathematical engineers, we would put coal to work (having nearly exhausted native timber-fuel in Europe and elsewhere), thus launching that transformation in society whose effects, for good or ill, constitute the grounding of all our recent history.

However, this apparently useful journey which organic carbon takes through human hands has been the subject of increasingly worried speculation, almost since the inception of the industrial revolution itself. By 1820, both Thomas Young in England and Joseph Fourier in France had demonstrated the existence of 'dark heat', our infra- red, and by 1837 CSM Pouillet, an outstanding French pioneer, had established convincing links between solar radiance, atmospheric transmission and absorption, and the deduced temperature of extraterrestrial space. By 1861, John Tyndall was able to demonstrate at the Royal Institution the key roles played by atmospheric 'aqueous vapour' and carbon dioxide in holding the earth's mean temperature well above the sub-zero which would otherwise be its fate.

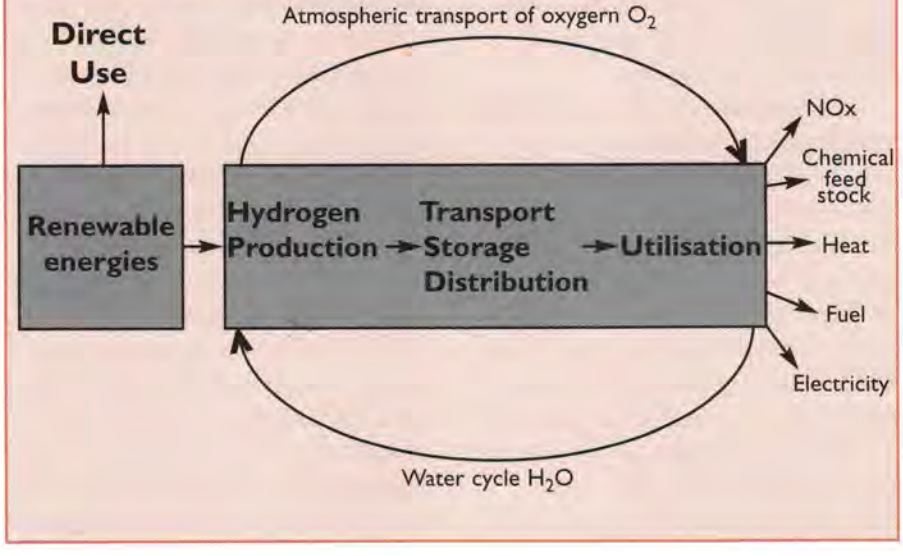
In 1896, the key figure in the greenhouse debate, Svante Arrhenius, published papers of fundamental importance, in Swedish and English, the latter appearing in that year's April issue of the *London, Edinburgh and Dublin Magazine and Journal of Science*. Summarising all such thinking to date, and acknowledging his reliance on radiometric data supplied by Samuel Langley, the American astronomer and spectroscopist, and on the carbon cycle research of the Swedish geologist Arvid Hogbom, Arrhenius put variation in the level of carbon dioxide at the centre of climate change. Here was a molecule which, if allowed to augment its concentration in the atmosphere by the ever-increasing burning of coal, would certainly bring about a warming of the global climate.

In the first few decades of the twentieth century, rare voices were heard about the mounting levels of carbon dioxide in the atmosphere, but the consensus among climate scientists was that any possible carbon-induced warming could only be of benefit to humankind (an opinion also held by Arrhenius himself). In the sixties, however, other voices were heard, culminating in the establishment in 1988 by the United Nations of the Intergovernmental Panel on Climate Change (IPCC), with a dedicated budget, a secretariat in Geneva, and a science base of about 4000 specialists from around the world. It became clear that the questions themselves needed precision. For example:

- Where was the data? Speculation and intuition were not reliable guides to future palliative action, and the wealth of data being collected on land, in the oceans, in the air, and by satellite, needed collation and analysis.
- What kind of forecasts could reliably be made for the climate of decades hence?
- What remedial action, if any, would be needed, if climate perturbation were indeed taking place? And should the key responses be adaptation, or positive counteraction, or both?

Eventually, the Third Assessment Report (TAR), published by the IPCC earlier this year, confirmed with increased confidence that the growing carbon dioxide overload of the atmosphere is intrinsically dangerous. This sombre conclusion should give us all - citizens, engineers, fuel specialists - pause for the gravest of thoughts. For if virtually the whole of our civilisation is powered by fossil carbon, which ineluctably converts to excess atmospheric carbon dioxide, do we:

The solar hydrogen cycle



case for hydrogen

- cease forthwith to burn this fuel, and thus imperil our civilisation, or
- maintain' this civilisation as well as we can, whilst steadily destroying the climatic equilibrium on which it depends, or
- seek an exit from this conundrum, by looking elsewhere for our fuel? How about hydrogen?

HYDROGEN – AN OLD IDEA, NEWLY RELEVANT

No single present-day proponent of hydrogen as a universal primary fuel can claim (or would wish to claim) unique authorship of this concept; many indeed have laboured for its acceptance. Such proponents include TN Veziroglu and JO'M Bockris, engineering chemists, co-founders in 1974 of the International Association for Hydrogen Energy and of its Journal, the IJHE. Other long-term thinkers and experimenters have spent a quarter of a century in trying to draw the attention of mainstream energy practice to the charms of hydrogen. And readers of *Energy World* will draw their own conclusions from the reluctance of our decision makers, until recently, to take these ideas seriously. One answer, given in confidence to the writer by an oil industry insider, is that there was no money to be made in it.

The claims of hydrogen were made many years before climate change became a major issue of public policy. The most 'respectable' proponent was JBS Haldane, a productive and highly practical British scientist, of huge range, who in 1923 proposed a hydrogen energy network remarkably similar to one proposed today. He envisaged the now-classic sequence of wind-turbine to AC to DC to water electrolysis to hydrogen production and distribution, and the use of hydrogen wherever coal, oil and gas were employed. He foresaw the technical and social transformations which would be called for, and insisted that all hydrogen should be produced from continuous energy flows in the natural environment, rather than from fossil carbon sequestered in a previous epoch.

Of particular interest to Institute of Energy members will be Rudolf Erren, an entrepreneurial and innovative German experimenter and engineer, who built his first hydrogen engine in 1928, and had great success in Germany, and then in Britain, with his hydrogen-powered and hydrogen-assisted vehicles. He demonstrated that the undoubted problems of hydrogen as a fuel (pre-ignition, volumetric disadvantage etc.) could be overcome with dedicated engineering. Firmly anti-Nazi, he arranged that he would be marooned in England at the outbreak of war in 1939, offered his services to the Admiralty, in 1941 was given the extraordinary honour of a Fellowship of the Institute of Fuel - and was then interned as an enemy alien: a turn of events which he apparently accepted with sweet comprehension.

Erren continued as a consulting engineer into the 1980s, whilst others took up the hydrogen baton: Geoffrey Ballard, the Canadian fuel cell entrepreneur; C-J Winter of Germany, who has the ear of senior German politicians; Tokio Ohta of Japan; leading motor-industry leaders of such groups as Ford, DaimlerChrysler and BMW; and even BP and Shell are dipping their toes into these new hydrogenated waters. A profound change in the configuration of our energy supplies is undoubtedly on the way, but the major industrial players cannot be expected to hasten the climatically necessary conversion to hydrogen without externally applied pressure from other holders of power: citizens, shareholders, media, government .... and the engineering profession.

Mike Koefman is the co-ordinator of the Hydrogen Energy Association of the UK and Ireland: tel: 0161 273 8595, e-mail: co-ordinator@hydrogen-heauki.org, website: www. hydrogen-heauki.org

The case for hydrogen

- If the hydrogen which we use is generated from renewable sources, no carbon dioxide can be emitted at any stage of its use. This is the primary boon of hydrogen. The exhaust gas is mere water, which enters the rain cycle and cannot then take part in any supplementary climate change.
- The combustion of hydrogen is intrinsically clean. It is incapable of emitting sulphur oxides, VOCs and particulates; and recent research has shown that nitrogen oxide emissions can be refined down to below presently acceptable levels. These advantages apply both to turbine and to reciprocating engines. And the fuel cell emits no SOx at all.
- Hydrogen functions well as storage medium and as energy vector. For example, surplus electricity production on a future North Sea turbine array need not be dumped: it can be used to electrolyse water, whose resultant hydrogen becomes part of a networked energy supply system.
- Hydrogen can be generated at suitable sites wherever there is a harvestable flow of primary or secondary solar energy. Photovoltaic and hydro-electricity, and wind power, can all separately electrolyse water, thus creating a single, predictable, transmissible, universal, all-purpose fuel.
- Hydrogen is (probably) more democratic than petroleum. Some of the poorest countries of the world have the greatest solar resource. The Takla Makan desert in Western China, the Thar desert in India, The Sahara desert in Africa could be developed to supply hydrogen both for indigenous development, and as an internationally tradable commodity
- All the technologies associated with

hydrogen are now in rapid development: fuel cells, electrolysers, automatic filling stations for vehicles, liquid hydrogen fuel tanks and the like. Moreover, should decision-makers find it impossible in the near term to derive the necessary electrolytic hydrogen from renewable sources, new technology from, for example, Kvaerner promises the cheap extraction of hydrogen from natural gas - without the inevitable carbon dioxide by-product yielded in the standard processes. Carbon black simply drops out of the pyrolyser.

- Hydrogen is restorative. Every kWh furnished by renewably generated hydrogen (RGH) displaces a matching kWh, and its concomitant carbon dioxide, derived from fossil fuels. By extension, if all fossil fuels are displaced by RGH, there is perhaps a chance - the only chance - for our atmosphere to regain its pre-industrial equilibrium, when the carbon dioxide level was 280 ppm. The present extraordinary level, 370 ppm, is expected to reach 450 ppm, even under the most severe fossil fuel restraints envisaged by the IPCC.

Hydrogen - frequently asked questions

Where would the hydrogen for the complete fuelling of a hydrogen economy come from?
Immediately, from the carbon dioxide-free pyrolysis of natural gas. Huge quantities of low-sulphur methane are available. Ultimately, the world's oceans would become, via electrolysis, our inexhaustible source of hydrogen, which upon combustion would replenish .... the ocean.

How would the electricity be generated in the necessary quantities?
It is demonstrable that a complete coverage of electrolytic needs could be met by renewable sources. Taking one particularly rich source as an example: during about six hours each day, the world's sunbelt deserts receive, per km^2, a full gigawatt of solar power. Allowing for diurnal rhythms, inter-panel spacing for access and for the preservation of the local microclimate, and readily achievable efficiencies of 12.5% for the PV units and of 80% for the electrolysers, it is not unreasonable to suggest that 100 km^2 of such terrain could furnish 1 GW in continuous average power.

The advantage for local economies does not need stating, but for the 300 million of western Europe, already accustomed to their 1 kW of installed electric power per head, a strip of desert measuring 1000 km by 30 km would suffice to keep them fully supplied. Such notions are already common currency in hydrogen circles, and have been developed to show how a quintupling of this area could satisfy nearly all of Europe's energy fuel needs as well as her electricity - provided she was willing to accept this supply in the form of hydrogen.

How much water would be needed?
If we take the hydrogen content of water as 110 kg per tonne, and the energy potential of this hydrogen as equivalent to 250 kg of oil (again, a conservative figure), then we see that 10 m^3 (10 tonnes) of water will furnish , in hydrogen, the energy equivalent of 2.5 tonnes of oil. As an annual per capita ration this would not seem generous in Britain or North America, where the range is between 4 and 9 toe, but as a universally applied ration it would seem generous indeed. Transposed into volumes of water sufficient to supply a planet of 10 billion people, expected in the year 2050, such reasoning finds that 100 km^3 of water per year should answer all needs.

Wouldn't such a quantity of hydrogen, vented as excess water vapour, constitute in itself a greenhouse danger?
No. The combustion of fossil fuels already pumps much water vapour into the atmosphere, both as exhaust and as cooling tower product. More importantly, this 100 km^3 of projected annual excess is insignificant in relation to the 400 000 km^3 turned over annually in nature's own rain cycle. And let it be additionally noted that the residence time of water in the atmosphere is a mere four days, compared with the averaged 100 years of the carbon dioxide molecule.

Do these technologies actually exist?
Yes, although like all technologies they are subject to continuous improvement. PV is still expensive, but the costs can only come down. The cost of wind power has already dipped below the key figure of $1000 per installed kW. Major motor manufacturers such as DaimlerChrysler and Ford are predicting that within four years the cost of automotive fuel cells will be no more, per kW, than the ic engines which they seem certain to replace.

Is hydrogen not dangerous?
Necessarily, all fuels are dangerous, but each is dangerous in its own way. At the lower end of the concentration range hydrogen much resembles methane in its readiness to ignite or to detonate, and at higher concentrations it is twitchy stuff indeed. However, in its favour can be quoted its readiness to disperse rapidly upwards in outdoor spills, and its small radiative signature in the crucial infra-red range: it is hydrocarbon fires, not the hydrogen flame, which cause by intense IR radiation such damage at a distance.

Is there any serious, balanced literature available on RGH as a universal fuel?
A growing amount of thoughtful material is now on the internet, and in the aforementioned International Journal of Hydrogen Energy (at www.elsevier.com). Perhaps the best places to begin are three recently established British sites: www.hydrogen.co.uk, www.eru.rl.ac.uk, and www.fuelcellnetwork.bham.ac.uk. Further steps into the hydrogen scene can be made via the Hydrogen and Fuel Cell Letter on www.hfcletter.com.

A new vision for engineering - the ETB

A major conference held in February to determine the need for a new body to represent the UK engineering community was in many ways a watershed, *writes Dr Robert Hawley, Chairman of the Engineering Council.* It saw the emergence of a new vision for British engineering. Equally important, it was a vision which won the public support and endorsement of everyone present.

The outcome was a decision to establish a new, very different sort of organisation, the Engineering and Technology Board. The ETB will have a span of activity greater than that of the many existing organisations. Indeed by providing linkages and a focal point for all of them, it should be able to help the process of gradually, and voluntarily bringing them together with a common aim to the benefit of UK wealth creation.

The project is ambitious and challenging in every respect, and most immediately in its timetable. Our aim is to have established the ETB by October this year, thus allowing it a few months to settle down, and be fully operational by the start of 2002.

Why the haste? One answer is that many people would say that we have delayed too long before launching radical reform and we must now make up for lost time. A second, more important reason, is that as the engineering and technology dependent sectors of the economy increase rapidly in importance, the need for new structures to support and assist individuals and companies in those sectors also becomes increasingly urgent.

The ETB will effectively take over, and significantly expand the promotional role of today's Engineering Council. But in doing so it will have a very different approach and focus – on what has rapidly become known as 'the wider engineering and technology community'.

To understand this wider community we need to grasp the significance of some of the work done for, and by, the Hawley Group, which completed its task in February. The Hawley Group asked Sir Robert Malpas to conduct a review of all the areas of economic activity, which might fairly be described as engineering. The resulting report was highly illuminating.

It showed that there are at least 2 million people engaged in relatively high level engineering and technology jobs in the UK. These include many of the most innovative, knowledge-based industries on which future wealth creation will undoubtedly depend – aerospace, nanotechnology, materials, biotechnology. These are the areas from which the next technological revolution will spring, just as the IT revolution which took us all by surprise because of its speed and impact sprung from the older disciplines of electrical engineering and electronics.

The distinctive feature of the highly skilled people who make up this wider community, however, is that they do not think of themselves as engineers (though many of them have engineering degrees), and they have few, if any links with the existing engineering institutions.

They are most likely, the research shows, to see themselves as 'technologists', or at least as working in the technology sectors of the economy. Of the 2 million people estimated by Malpas to be working in relatively highly skilled, science and engineering based jobs in the UK economy, only some 200,000 are UK resident registered engineers (CEng, IEng, Eng Tech). A further 400,00 people are members of the institutions, and can therefore be said to be part of 'the profession', but are not on the Engineering Council register.

Another considerable benefit coming from this fresh analysis is that there is now far greater clarity about the role of the various different organisations. The ETB will focus on the wider community. The Institutions focus on the needs of their members, who make up today's engineering profession. The Royal Academy of Engineering concentrates on engineering and engineering excellence. The Engineering Council is primarily concerned with the qualifications, standards, and auditing of registered engineers.

Clarity about different roles will be necessary in avoiding one of the problems of the past – duplication of effort. It also brings out one vital point, which has sometimes been missed by those commenting on the current process, which is the continuing need for a body to regulate the profession. There can be no dilution of the standards required for CEng, IEng and EngTech, or of the rigour with which these are enforced. The process is essential for international reasons, and indeed in order to provide the reassurance increasingly needed on safety, public health and environmental issues.

Thus there will still need to be a Regulatory Body – a successor to today's Engineering Council. The current work on establishing the ETB is also looking at this aspect of the new arrangements.

October will see the birth of the ETB, and with it a real prospect of the re-invigoration, on a far broader scale, of British engineering.

Engineering graduates make more money

New DTI figures demonstrate – for the fifth year running - that today's engineering graduates can look forward to good jobs with rewarding salaries. They can expect to earn median salaries of £18,000 pa six months after graduation – £3,000 per annum more than the average graduate.

The report also emphasises that engineering students rank amongst those more likely to find permanent employment on leaving university - at 83%, in contrast to 64% of all graduates.

The report also showed that engineering attracts better qualified school-leavers - scoring an average of 21.4 A-level points compared to the average of 19.1 points score of all graduates. This is the fifth year running that has seen a rise in entry standards for engineering degree programmes.

Events

July 2001

Energy Resource 2001
Free on-line conference and exhibition
Register at www.rmrenergyresource2001.com

Incineration and flue gas treatments
IChemE conference
2-4 July, Brussels
Co-sponsored by the Institute of Energy
Details from IChemE
tel: 01788 578215

Engine emissions and measurements
Course 2-6 July, Leeds
Details from
University of Leeds
Alison Whitely
tel: 0113 233 8494
e-mail: cpd.speme@leeds.ac.uk

European wind energy
Conference and exhibition
2-6 July, Copenhagen
Details from EWEA
tel: + 32 25461940
e-mail: ewea@ewea.org

Assessing energy use in buildings
CIBSE course, 5 July, Bristol
Details from Maggie Procopi,
tel: 01442 866378,
e-mail:
maggie.procopi@btclick.com

Wind Power Technology
Course 9-13 July,
Loughborough
Details from www.crestuk.org
or fax: 01509 610031

Domestic CHP – making it happen
CHPA/SBGI seminar, 11 July,
London, £95 + VAT
Details from Andrea Whitehead,
fax: 01926 450459

Renewable energy fair
Exhibition and events 12-14 July, Stroud
Details from Energy 21 tel 01453 752277
e-mail: info@energy21.org.uk

Inst Energy North East Branch event
Annual social event
13 July
Details from Emma Wright
e-mail:
emma_wright@pbeurope.com

Institution of Fire Engineers
Annual exhibition and conference
18-20 July, Nottingham
Details tel: 0116 255 3654
e-mail: agm@ife.org.uk

Natural gas and LPG odorisation
Conference and exhibition
23-25 July, Chicago
Details e-mail:
susan.robertson@gastechnology.org

August 2001

Renewable energy: major environmental option for sustainable development
WREN Seminar 19-25 August
Brighton
Details from Prof Ali Sayigh
tel: 0118 9611364
e-mail:
asayigh@netcomuk.co.uk

September 2001

Energy and environment
Conference and exhibition
4-5 September, Esher, Surrey
Details from WBE
tel: 01342 314300
e-mail:
admin@western-be.co.uk

World Nuclear Association twenty-sixth annual symposium
5-7 September, London
Details from Concorde
Services tel: 020 8743 3106
e-mail:
admin@uisymposium.com

Energy and the environment hands-on for development
6 September, free
Details from Institute of Civil Engineers
tel: 020 7665 2158
e-mail:
darlene.torey@ice.org.uk

Renewable energy in maritime island climates
Seminar
10-11 September, Belfast
Details from Christiane Buckle
Solar Energy Society
Tel: 01865 484367
e-mail: uk-ises@brookes.ac.uk

Business strategy and the environment
Conference 10-11 September,
Leeds
Details from ERP Environment
tel: 01274 530408
e-mail:
elaine@erpenv.demon.co.uk

NEA conference and exhibition,
10-12 September, Keele,
Staffordshire
Details from Trish Bell,
tel: 0191 261 5677,
fax: 0191 261 6496

Asia-Pacific petroleum
Conference,
10-12 September, Singapore
Details from Times
Conferences Ltd,
fax: +65 286 5754,
e-mail: tcefr@pl.com.sg

UK heat transfer 2001
IChemE conference,
11-12 September, Nottingham
Details from Melanie Royce,
tel: 01788 578214,
e-mail: mroyce@icheme.org.uk

Commercialising fuel cells: the issues outstanding
Symposium, 11-13 September,
London, £685 + VAT
Details from Sarah Wilkinson at
Elsevier, tel: 01865 843691,
e-mail:
sm.wilkinson@elsevier.co.uk

Environmental policy: assessing the costs of compliance
Conference 17-18 September,
London £195 plus VAT
Details from ERP Environment
tel: 01274 530408
e-mail:
elaine@erpenv.demon.co.uk

Registering on an event seen here?
If you are registering on an event which you have seen listed here, please don't forget to mention to the organisers that you saw it listed in the *Energy World* Events Diary.

VIRES ACQUIRIT EUNDO

As you read these words it is with a sense of both pride and privilege that I will have just taken office as President of The Institute of Energy and I was minded to reflect on the years since becoming a member. I joined the Institute, then the Institute of Fuel, in 1967 as a student at Leeds. These words conjure up memories of which many of you will be familiar, as we were embarking on a whole new world of education and training as fuel technologists, with so many and diverse opportunities as we graduated.

These were primarily within the established fossil fuel industries of coal, oil and gas and their respective customers in power generation, industry and commerce. Coal was pre-eminent, North Sea gas was just becoming part of our lives (with 30 years' supply then as now!) and nuclear was the high tech. baby. Now we have a vastly different energy scene following deregulation but it is true to say that the Institute of Fuel was as relevant in my early career as the Institute of Energy is now.

It is a long time since those halcyon days in 'The Houldsworth' and I have seen many changes throughout the fuel and energy industries in which my career, largely within the coal industry, has taken me over the past 30 years or so. I will not dwell on the coal industry and the way it has gone but consider only that change is the operative word and one that is predominant in any analysis of our lives - social, economic, professional, educational, industrial, political, environmental and latterly climate. The list is as endless and as personal as we want it to be, reflecting the way we have individually been influenced by a period of almost continuous change, externally throughout the energy industries and internally within the professional engineering bodies and our own Institute.

However, with change there needs to be a constant, a point of reference. I believe The Institute of Energy offers that, not only to we happy band of fuel technologists on which the Institute was built but also to all professionals involved in the energy industry at large. The list is diverse but would include economists, accountants, architects, lawyers, environmentalists, academics and many more as we recognise and encourage complementary knowledge and expertise within an expanding membership base.

The Institute of Energy offers one of the widest ranging membership criteria of all the professional bodies and we continue to seek to broaden membership access without diminishing standards. At the present time there are 4500 individual members and more than 80 Group Members and Academic Affiliates. To all of these The Institute is seen as the key professional body concerned with energy and the environment; being proactive in developing and delivering new services in training and qualification standards. The Institute's role as a learned society has not changed but of necessity the way we do it has.

I have seen these changes taking place from within the Institute, through several years of active branch committee involvement and latterly as Honorary Treasurer, being involved in the governance of the Institute. I am greatly encouraged by what I have seen and been part of and believe the Institute is setting the right course to successfully manage both internal and external changes.

There is no room for complacency if we are to meet our strategic objectives and the obligations to our membership. I believe the latter to be paramount in achieving the former, and having joined the Institute as a student, I believe strongly in the need to strengthen our academic connections through colleges and universities, developing and sustaining membership through education and training. We will continue to seek to identify the needs of our membership and provide the services required by them, both professionally and socially.

As my predecessor, Brian Chamberlain, said as he took office I also see the role of President as one of support and guidance with only a light hand on the tiller. Brian and our predecessors of recent years have all played their part in setting the agenda for the future and ensuring that we put in place the mechanism and resources to achieve the targets set within the Business Plan. We have an excellent staff team at Devonshire Street and I look forward to working with

them through my year of office as the Institute continues to move forward.

This cannot be done in isolation and I appreciate from first hand experience the hard work of the Branches to ensure the grass roots involvement of members through organising both technical and social gatherings and I will make myself available as much as I possibly can to help and support branch activities.

Talking of predecessors I am indebted to our Past President, Mark Baker CBE for his knowledge of the classics and the inspiration for this article. In the transition from The Institute of Fuel to The Institute of Energy we have a very tangible constant in our coat of arms and the motto thereon which is probably more relevant today than ever before. 'VIRES ACQUIRIT EUNDO' according to Mark is an original quotation from Virgil and the literal translation is 'At every step it gathers energy'. The short and sweet meaning is 'Strength from progress' and I cannot think of a more appropriate definition of what the Institute and its membership is currently about nor a more fitting theme for my Presidential year.

John E Ingham CEng FInstE
President, The Institute of Energy

Enhancing value for money

Members will be aware of the discounted rate car rental scheme that the Institute operates with Hertz Business Partners. The original scheme has now been replaced by the new and enhanced Hertz Gold Club. Once you have completed the simple one-off registration, your details will be housed with Hertz in all its international locations enabling you to simply jump from your flight to your prearranged rental car, saving you time, effort and inconvenience. A key feature of this scheme is that the same preferential rates are available for business and leisure travel.

Members are entitled to various preferential rental rates in the UK, Europe, the United States and Canada, Australia, the Far East and South Africa. All European rates include unlimited mileage, collision damage waiver and tax at the current rate.

Members also receive coupons entitling them to a free car upgrade and £20 off the price of a week's rental in the UK. Please contact membership@instenergy.org.uk to obtain your Hertz Club Gold Card or for information about the scheme.

Look out for future issues of *Energy World* and the Institute of Energy's website at www.instenergy.org.uk for further developments to the Membership Services Portfolio such as the On-line Bookshop which will be introduced shortly.

In the meantime, do forward your membership service suggestions to Sanjeev Kumar at services@instenergy.org.uk

Have your say

One of the many features of the new Institute of Energy website is its e-mail Forum.

The Forum is an on-line networking facility to let you interact with colleagues, make new contacts or simply express your opinion on a topic of interest to you.

It can also be used as a bulletin board where you can post queries or discuss other issues that effect you and your work.

Current topics of discussion are:

- Environmental Technology,
- Environmental Policy
- Professional Recognition.

You are also welcome to start your own discussion group., on the energy topic of your choice.

Click on to website at www.instenergy.org.uk and then go to Community then forum.

Money off your InstE energy training

The Institute of Energy is now registered as an Individual Learning Account (ILA) Provider. This means that those enrolling on its TEMOL and NVQ level 4 Managing Energy qualifications could be eligible for a 20% discount on their fees thanks to Government funding. If you wish to receive a contribution towards your study, you will need to open an ILA. You can do this by registering at www.my-ila.co.uk or you can call 0800 072 5678. The web site contains information about the workings of the scheme, but those without internet access can find out everything they need to know from the free helpline.

When you open your ILA you will be given an account number. Quote this when booking your course and you will receive the appropriate discount. The Institute will then claim the contribution from DfEE, so you don't need to do anything further. Just open your ILA today, as the savings could be quite substantial.

For more details of InstE training programmes and the benefits of ILAs, contact Rob Wall at education@instenergy.org.uk or telephone: +44 (0)20 7580 7124.

Congratulations!

You might remember that the May issue of Energy World carried a feature on non-standard routes to InstE membership and Engineering Council registration. One of those routes is via the NVQ level 4 in Managing Energy. May's article mentioned Dave Robertson, of ScottishPower, who had gained his VQ in record time. To salute Dave's achievement, here is a picture of him receiving his certificate from Brian Chamberlain FInstE, the Institute's President, along with Alan Rough, who was a guest at the Scottish Branch Annual Dinner in April of this year. Well done Dave!

HECA OFFICER OF THE YEAR AWARDS

On 21st May 2001, the President of the Institute of Energy, Brian Chamberlain CEng FInstE, presented 12 regional Home Energy Conservation Act (HECA) Officers with the HECA Officer of the Year Award at the 4th Annual HECA Conference held in York. The awards, established by the Institute of Energy and the HECA Fora, are to recognise, encourage and reward those individuals who have responsibility for home energy conservation and who have made significant and recognisable contributions towards improving the energy efficiency of homes within their region in the previous three years.

The 2001 winners, in no particular order, are:

- HECA East Network, *Ms. Heather Bruce* - Policy Research Officer with Luton Borough Council
- South East HECA Forum, *Ms. Hazel Hill* - Energy Conservation & Promotions Officer with Bracknell Forest Borough Council
- Welsh HECA Forum, *Mr. Andrew Morris* - Environmental Stewardship Officer with Carmarthenshire County Council
- East Pennine HECA Forum, *Mr. Alan Jones* - Principal Energy Officer with Leeds City Council
- London HECA Forum, *Mr. Barry Waldron* - Energy & Environmental Manager with the London Borough of Hammersmith and Fulham
- Northern Ireland HECA Forum, *Mr. Noel Rice* - Energy Conservation Manager with the Northern Ireland Housing Executive
- North / West HECA Forum, *Mr. Kevin Normansell* - Energy Efficiency Officer with Warrington Borough Council
- West Midlands HECA Forum, *Ms. Alison Crane* - Projects Officer with Stoke-on-Trent City Council
- East Midlands HECA Forum, *Mr. Martin Gadsby* - Private Sector Housing Manager with Derby City Council
- South / West HECA Forum, *Ms. Helen Sanderson* - HECA Officer with Swindon Borough Council
- Scottish HECA Officers' Network , *Mr. Andrew Marnie* - Energy Manager with South Ayrshire Council
- North / East HECA Forum, *Ms. Jackie Park* - Assistant Borough Housing Officer with the Borough of Blyth Valley Council

Further recognition of the winners' achievements and their commitment to the energy and environmental professions will be provided through a year's free membership of the Institute of Energy at an appropriate level.

To find out more about the awards and how to apply next year, please contact:
HECA Officer of the Year Awards, The Institute of Energy, 18 Devonshire Street, London W1G 7AU.
e-mail: info@instenergy.org.uk

HONG KONG MEMBERSHIP DRIVE

The Hong Kong Branch was set up on 6th May 1999, and is the youngest and the first overseas branch of the Institute. Since then, the membership numbers of the Branch have gradually increased. Currently, it has more than 100 members.

On 26th April this year, the branch organised a membership drive reception at the Mariners' Club. Individuals who are interested in becoming members as well as current members of the Branch were present. The response was very encouraging and there were nearly 40 participants.

The Branch Committee values all participants' enthusiasm, support and encouragement. It continues its hard work in building a more capable and resourceful learned society, and carry all its members to a better than ever position for the advancement of knowledge of energy technology. For the benefit of its members and the society at large.

By Albert Tang BEng(Hons) CEng MInstE

Energy Policy Conference

The CBI Conference Centre recently played host to the Institute of Energy Annual Energy Policy Conference entitled, 'Redefining Energy Policy: Junking the Meter?'.

The conference took a forward looking perspective on energy policy, debating future policy levers and opportunities. Participating in the afternoon plenary session, which fielded questions from a lively and enthusiastic audience, were Neil Hirst, Deputy Director Energy, DTI, Professor John Chesshire of SPRU and Walt Patterson of RIIA. A full conference report is published on page 11.

If you would like copies of the conference proceedings, please contact Suzanne Cooper on 020 7580 0077 or e-mail: events@instenergy.org.uk

NEW MEMBERS

NORTH EASTERN

Mr J W Clough MBE FInstE
EAGA Partnership Ltd
Mr A D Speirs FInstE
A D Speirs and Associates

NORTHERN IRELAND

Mr J D Buchanan AMInstE
Blue Circle Cement
Mr A B Dale MInstE
Queens University
Mrs L Stretton Associate
Ministry of Defence

YORKSHIRE

Mr I A Khan Graduate
University of Leeds

LONDON & HOME COUNTIES

Mr J A Kauschmann MInstE
Atelier Ten Consulting Engineers
Mr D W Littler AMInstE
DWL Associates
Mr S J Matthews AMInstE
Kodak Ltd
Mr G Srinivasan FInstE
W S Atkins Consultants Ltd

SOUTH WALES AND WEST

Mr N Godwin AMInstE
ARUP
Mr J Knight Graduate
Dulas Ltd

EAST MIDLANDS

Mr V Davys MInstE
East Midlands Electricity
Dr M A Smith MInstE
MRETT

MIDLANDS

Miss C A Cross Graduate
University of Warwick
Mr E A V Jones FInstE
Boots PLC

HONG KONG

Mr W F J Lai MInstE
Hong Kong and China Gas Company Ltd

New staff member

Dianne Bramson started at the beginning of May as the new executive adminstrator for Louise Kingham and Tracy Fisher. We wish Dianne well in her new appointment and look forward to working with her. Please do not hestitate to get in touch with the staff team, you can contact us via telephone: 020 7580 7124, fax: 020 7580 4420, e-mail: info@instenergy.org.uk or visit our web site at www.instenergy.org.uk

SITUATIONS VACANT / WANTED

energy 121.com
A bespoke Introduction Service.
PAYE Candidates to Potential Employers.
Freelance / Ltd. / Corporate Suppliers to Clients.
Under no obligation, enquire in confidence to
Steve Howe B.Sc., M.B.A., C.Eng., M.Inst.E.
e-mail:line8@energy121.com

Sales / Business Development Managers [2]
Ref. A : package up to £48 k incl. performance.
Ref. B : package up to £40 k incl. performance.
Frequent travel. Relocation assistance available from this expanding thermodynamicist.
Further details from Energy World June 2001, or Steve Howe, e-mail: line6@energy121.com

Commissioning Engineers Required
for short Contracts located outside of UK.
Both Oil Fired Water Tube Boilers
& Bagasse Fired Water Tube Boilers.
Profiles in confidence to Steve Howe.
e-mail: line9@energy121.com

Engineering Sales Agents Required
Thermal / Fluid Equipment Refurb. to :
Maintenance / Works. Eng. Departments,
Private / Public Sectors, Midlands Area.
Negotiable package from a Ltd. Comp.
Profiles in confidence to Steve Howe.
e-mail : line7@energy121.com1

Join a leading energy consultancy in Brighton, Britain's newest city!
We are expanding our operation and have the following positions to fill in our European Electricity Service team:
Sales Manager, Analyst, Research Assistant
For full details of the above positions please go to our websites
www.power-ink.com or
www.energy-directory.com or
contact Guy Doyle on
+44 (0)1273 202920,
(guy@power-ink.com).

Technical Support Assistant (Energy Management) This is a new post that will shortly become available within the Community Services Directorate of Bournemouth Borough Council to assist the Energy Manager mainly in the area of utility contracts and data processing. Full training will be available. The post-holder must be able to demonstrate excellent organisational skills with the ability to work to strict deadlines under their own initiative. A flair for accurate figure work and good communication skills are essential as the post will require extensive interpretation of data and the production of reports for building managers, Directors and Councillors. Contact: Bob Olding tel: 01202 456307 e-mail: bob.olding@bournemouth.gov.uk

This space is avaliable **free** for members to advertise. For more details or to advertise e-mail: eworld@instenergy.org.uk

the institute of energy

The Institute of Energy's new website is now live!

Its features include:

Daily energy, environmental and engineering news,

e-newsletter - your monthly digest of relevant news,

developments and information, Recruitment notices,

Fact sheets, National and regional events,

Forums for debate, sharing ideas and seeking answers

www.instenergy.org.uk

the institute of energy

NETA the Experience

How was it for you and where do we go from here?

A ONE DAY CONFERENCE ORGANISED BY THE INSTITUTE OF ENERGY,
LONDON, OCTOBER 2001
THE NEW ELECTRICTY TRADING ARRANGEMENTS, WHICH CAME INTO EFFECT ON THE 27TH MARCH 2001,
WERE HERALDED AS THE BIGGEST SHAKE UP OF THE ELECTRICITY INDUSTRY SINCE PRIVATISATION.
THE EFFECT OF THE REFORMS,
WHICH RADICALLY CHANGE THE WAY IN WHICH ELECTRICITY IS TRADED,
WILL BE FELT ACROSS THE INDUSTRY DURING THE FORTHCOMING MONTHS.
THE INSTITUTE OF ENERGY IS PLEASE TO ANNOUNCE THAT,
IN ORDER TO FACILITATE INDUSTRY
IN UNDERSTANDING THE FULL IMPACT OF THE REFORMS,
AND TO GIVE ORGANSIATIONS AN OPPORTUNITY TO HAVE THEIR SAY ON
HOW NETA HAS AFFECTED THEM.
A ONE-DAY CONFERENCE WILL TAKE PLACE
IN OCTOBER 2001 IN LONDON.
KEYNOTE SPEAKERS WILL INCLUDE JEFF SCOTT OF THE NATIONAL GRID CO
AS WELL AS GENERATORS, CUSTOMERS
AND GOVERNMENT REPRESENTATIVES.

If you would like further information in on this land-mark event, please contact Suzanne Cooper, Events Officer on tel:020 7580 0077 or e-mail: events@instenergy.org.uk