

THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy



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energy

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world



Energy in Industry

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ENERGY:
Solving the policy jigsaw

Tuesday, 22 September 1998

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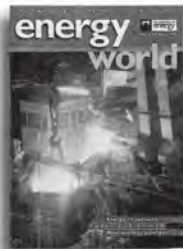
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Key speakers from Government, EU, the Regulators, Environment Agency and consumer agents, will draw together UK energy policy in a lively debate.

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THE MAGAZINE OF THE
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info@ioe.org.uk
eworld@ioe.org.uk
www.instenergy.org.uk

EDITOR
Steve Hodgson
Tel/Fax: 01298 77601

ADMINISTRATION
0171-580 7124

**MEMBERSHIP, AND
JOURNAL SUBSCRIPTIONS**
Tel: 0171-580 0077 Fax: 0171-580 4420

ART EDITOR
Louise Collins

DESIGN
Steven Stoner, X-Design
0181 948 2405

ADVERTISEMENT SALES
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Pam Bourne Tel/Fax: 01424 883110

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Her Majesty The Queen

PRESIDENT
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J E Ingham, CEng, MInstE

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COVER

Advised by NORWEB, the Bolton-based Beloit Walmsley has replaced three coke-fired furnaces with two electric induction melting furnaces as part of a £4million investment programme. The company now meets tough new emission limits, produces a better product with less wastage and expects to recoup its investment in just over two years. It was also highly commended in the environmental achievement category of the Electricity Association's Business Energy Awards.

See page 13 for the winners

Clean coal technology - using fuel diversity as a bridge to the future

by Dr Andrew W Cox, editor, UK Coal Review

During the last general election campaign several leading politicians in the Labour Party repeatedly stressed their support for the development of clean coal technology. However, nearly a year has now passed and no concrete action has been forthcoming from the government on this issue. The important future role of clean coal technology cannot be underestimated - for without the construction of a new generation of coal-fired power stations, coal will rapidly decline and possibly disappear as a major fuel source in UK electricity generation.

The requirement for developing clean coal technology in the UK has intensified due to the tightening of power station sulphur dioxide (SO_2) and nitrogen oxide (NO_x) emission limits. These new limits are necessary in order for the UK to ensure full compliance with recently ratified international agreements. As the UK has carried out only a limited programme of installing flue gas desulphurisation (FGD) equipment at coal-fired power stations, the impact of emission limits will be greater than in countries such as Germany where FGD has been widely adopted.

The Environment Agency caused dismay in the UK coal and electricity sectors in January this year when it published a consultation paper which proposed even tighter emission limits. The Agency believes that coal- and oil-fired power stations should cut SO_2 emissions by 84% by 2001 (compared with their earlier target year of 2005). Whilst fierce debate is expected over these proposed emission targets (possibly leading to their partial modification), a further reduction in SO_2 and NO_x emissions is probably inevitable over the next decade. But the impact of the new SO_2 emission limits cannot be overstated. Coal-fired power stations are the UK coal industry's principal market, consuming over 80% of total output.

Several prospective clean coal projects are currently on various drawing boards. RJB Mining (together with Texaco and National Power) are carrying out a detailed feasibility study for a 400 MW power station on land adjacent to Kellingley Colliery, near Wakefield. This plant would utilise integrated gasification combined cycle (IGCC) technology. Celtic Energy and ABB have proposed a similar-sized plant in South Wales based on pressurised fluidised bed combustion (PFBC) technology. In other parts of the UK there are considerable opportunities for clean coal - including coal-based combined heat and power schemes which could provide the energy for district heating schemes or for industrial purposes.

In the longer term, energy efficiency measures and the increased use of renewable energy sources (such as solar power) may provide a substantial proportion of UK energy needs. However, the development of clean coal technologies can, and should, provide the bridge to that sustainable future. But without a programme for

commercialising these new technologies the future outlook for the UK coal industry is very bleak indeed.

Urgent action is now needed to kick start a new generation of clean coal power stations fuelled by UK-produced coal. Clean coal stations will meet the new SO_2 and other emission limits. These power stations will ensure a long term market for UK produced coal (especially the embattled deep-mine sector) as well as continuity of employment at many mines and ancillary industries. New coal power stations will ensure that the UK retains a secure, safe and sustainable energy supply - preventing an over-reliance on gas and imported energy supplies.

An action programme from government and industry is also required. Currently gas-fired generation (based on tired and tested combined cycle gas turbine technology) has a significant cost advantage over clean coal power generation. However, the experience gained from the construction and operation of new coal plant will help reduce costs and allow future plant to become competitive.

In order to bridge this financial gap, it has been proposed that the existing Fossil Fuel Levy should be extended to help fund a programme of clean coal power stations (as well as other coal-based technologies, including combined heat and power). Lord Ezra has drafted and introduced the necessary legislation in the House of Lords, although it seems unlikely that it will reach the statute book unless it obtains government support.

Other action required involves private sector and European funding being levered into a clean coal programme to help ensure maximum impact. Most importantly, government support is urgently required to bring together power generators, regional electricity companies, coal producers, equipment manufacturers and other appropriate bodies to design and launch the clean coal programme.

Unless this programme is rapidly commenced, the UK coal industry will disappear and any security of supply and economic benefits obtained from its continuing operation will be lost. It is also worth noting that for many years, the UK has been a leader in this field, yet no new power stations using these technologies have been commissioned. The UK is viewed as being almost alone among industrialised nations, especially those with significant coal reserves, in failing to develop a new generation of clean coal power stations.

The Yorkshire Coalfield Communities Campaign and the Yorkshire Coal Task Force have issued a leaflet outlining the case for clean coal technology. Copies of Clean Coal Technology -

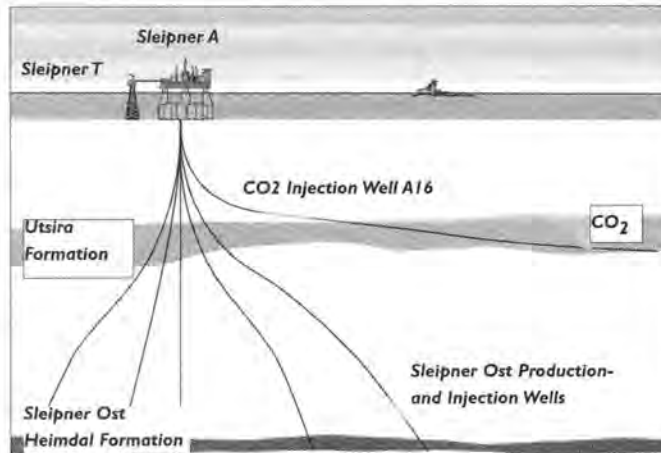
The Burning Issue can be obtained from: Andrew Towlerton, Economic Development Service, Rotherham MBC, Bailey House, Rawmarsh Road, Rotherham, S60 1QS

Tel: 01709 823812 Fax: 01709 823810

Norway pioneers aquifer storage of carbon dioxide

The first commercial-scale storage of CO₂ in an aquifer is now in operation offshore in Norway. This system has been designed and installed by Statoil, the operator of the Sleipner West gas production field, to store CO₂ extracted from the natural gas produced by this field.

The owners of the field have agreed that an international programme can be formed to monitor and research the performance of this facility, so that the underground storage of CO₂ can be fully investigated. The IEA Greenhouse Gas R&D Programme is working with Statoil to establish and manage the programme. The first step



The Sleipner CO₂ injection scheme (Courtesy Statoil)

was a two-day workshop held at Statoil's research centre with the aim of identifying monitoring requirements, prioritising research topics and outlining

plans for future work. This was attended by 70 people representing many different technical disciplines and organisation, from ten countries

and the European Commission.

The major task of monitoring is to record the stability of the reservoir and to observe the development of the expanding CO₂ bubble. It will be important to follow the development of the expanding CO₂ bubble to check if the preliminary storage model corresponds with the real situation, and to ensure that the CO₂ remains in the reservoir.

A future issue of Energy World will cover research work being undertaken around the world into the 'sequestration' of carbon dioxide as a method of controlling emissions of CO₂ and climate change.

Georgia to modernise its hydro-power plants

Japan's Overseas Economic Cooperation Fund has signed its first loan agreement with Georgia to assist in funding a power rehabilitation project to modernise two hydro-power plants. The loan agreement will provide Y5,332 million to Georgia, now the 87th country to receive an OECF loan. The project is part of a larger programme to renovate power generation facilities throughout the country.

Since the break-up of the

Soviet Union, Georgia has experienced a decline in its domestic power generation capacity to 40% of its original value, with Georgia's annual hydro-generation also being reduced to 44% of its 1989 value. The total installed capacity of Georgia's domestic power plants is about 4,673 MW, of which hydro-power accounts for nearly 60%. The deterioration in power system facilities, including hydro-plants, has been caused by lack of maintenance and proper

operation, and has forced Georgia to meet 10% to 20% of its total electricity demand via imports from neighbouring countries.

Georgia's electricity demand is expected to surge in the near future, powered by the positive economic trend the country has experienced since 1995. The Government has now made rehabilitation in the electricity sector one of the top national priorities in its public expenditure plan to meet the

increasing electricity demand. The rehabilitation of hydro-power generation facilities is particularly important, since the country is rich in water resources, but depends on imported gas and oil for thermal power generation.

The OECF assisted power rehabilitation project will renovate the 110 MW Lajanuri hydro power plant which began operations in 1962, and the 111 MW plant which started up in 1960.

Lukoil, Conoco aim to develop new Russian oil fields

Russia's Lukoil and Conoco have signed a memorandum of understanding to proceed with efforts to develop petroleum reserves in the 1.2 million-acre Northern Territories area of Russia's Timan-Pechora Region. In the memorandum, the companies agreed that Lukoil

will hold a 60% participating interest in the Northern Territories, with Conoco holding the remaining 40%.

The Northern Territories are believed to hold recoverable reserves of over 1 billion barrels of crude oil and 2 trillion cubic feet of natural

gas. Estimates indicate that full development of these resources could have a combined direct and indirect impact of as much as \$25 billion on the Russian economy during the life of the project.

Lukoil and Conoco will deliver the formal plan for

development of the field as well as the draft production sharing agreement to the Ministry of Fuel and Energy by the end of the year.

Lukoil is Russia's largest vertically integrated oil company, producing 461 million barrels of oil in 1997.

Brunner Mond's giant new CHP plant nearer to go-ahead

Construction work on a new £100 million CHP plant for leading soda ash producer, Brunner Mond, is anticipated to start shortly. The company says that final consent for the scheme, relating to Section 37 of the Electricity Act and covering connection to the 132 kV electricity distribution network has taken longer to progress.

However, objections to Section 37 have now been resolved and the consent is now being considered by the DTI.

Planning permission for the construction of the plant itself was granted in April last year, with permission for the building of a new gas main following in February this year.

The 120 MWe CHP plant

will be built, owned and operated by PowerGen CHP Ltd, and will supply all of Brunner Mond's energy needs. It will be situated on a 10-acre vacant site at Brunner Mond's Winnington works in Cheshire.

More than 400 people will work on the project to build the CHP plant which is due for commissioning late next

year. It will produce 300-400 MW of heat and around 120 MW of electricity. Brunner Mond will take all the heat produced for its manufacturing processes. The company will also use at least 20% of the electricity, with the balance being exported to the 132 kV distribution network using an existing route.

Ford installs 100 kW of photovoltaic panels at Bridgend factory



Installing photovoltaic panels on the roof of Ford's Bridgend engine plant

One of the largest solar power installations of any manufacturing site in Europe has been opened by Energy Minister John Battle on the roof of Ford's Bridgend Engine Plant in south Wales. The photovoltaic installation provides power equivalent to meet the lightning needs of the engine plant beneath.

The scheme, funded jointly by Ford, the European Union and the DTI, will be capable of providing a peak output of around 100 kW, generated by 26 solar units containing 1540 photovoltaic cells. Supplied by BP Solar, each solar unit is 9 m by 4.5 m in size and will combine to offer 110,000 kW hours annually.

The £1.5 million project generates no emissions and as such, is expected to save the discharge of a potential 4,000 tonnes of CO₂ from conventional power stations over the 30-year lifespan of the plant.

The cells cover just 8% of the roof space and allow maximum benefit of natural light

into the workplace below. "Like so many environmental initiatives, this one is not a question of immediate financial benefit, so the cost savings are minimal", said Ray Phillips, Ford's Environmental Engineering Supervisor, "but cumulatively, we believe the impact on the world around us of this type of change, will eventually be significant."

Opening the installation, Mr Battle said the company was not only showing great foresight but setting an example to the whole of manufacturing industry.

Mr Battle added that the DTI was reviewing policy on new and renewable energy and considering various options for delivering 10% of electricity demand from renewable sources by 2010: "What further support might be given to help the development of solar technologies such as photovoltaics is an important part of the review."

He also added that the response to the Fifth Non Fossil Fuel Order had been very encouraging, attracting over 700 applications, representing more than 5,000 MW of generating capacity. "This round promises to be very competitive, and I expect to see further price reductions."

Budget takes small steps towards an industrial energy tax

Chancellor Gordon Brown's budget included a few small steps towards a true environmental agenda, but was mostly disappointing - this was the verdict of environmentalists and energy efficiency campaigners. As the Energy Saving Trust's Eoin Lees summed it up: "consideration of the environment has entered mainstream Government thinking, but this has yet to produce really significant policy changes".

Yet the budget also included a clear signal that Labour is thinking seriously of imposing a carbon or energy tax. Brown announced that the president of the CBI, Sir Colin Marshall, is to head a review into "economic instruments to

improve the industrial and commercial use of energy". This will include, said Brown: "a study of whether or not new economic instruments, such as an industrial energy tax and/or other market mechanisms, should be introduced to help curb industrial emissions; and if so, how".

This the clearest sign yet that the Government may 'thinking another unthinkable', to tax industrial energy use as a way of meeting its carbon dioxide reduction target. Quite what that target is was not clarified - environment ministers have said repeatedly that the Government stands by its original 20% reduction by 2010 target, despite a much less ambitious settlement at the

Kyoto summit. But the budget statement only mentioned one figure: the 8% reduction in European carbon emissions agreed at Kyoto.

More concrete measures included in the budget were:

- VAT on the installation of energy saving materials (thermal insulation etc) under Government grant schemes is to be cut from 17.5 to 5%, the minimum allowed by Europe. This should lead to a further 40,000 homes being insulated.
- The standard rate of tax on waste going to landfill is to rise from £7 to £10 a tonne from next April, encouraging the increased use of recycling and incineration of wastes.

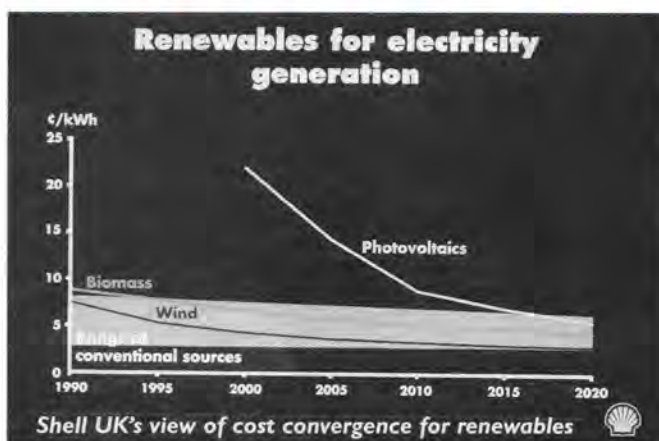
- An additional £500 million is to be invested in public transport, including £50 million a year to be spent on rural transport.
- The licence fee for lorries and buses with clean engines is to be cut by up to £500 from next January and, from next year, the fee for cars with the lowest emissions is to be cut by £50 too. This will encourage the use of gas, LPG and electric vehicles.
- The road fuel escalator (originally imposed by the last government) is to be raised so that the road fuel tax for unleaded petrol and ultra-low sulphur diesel was increased by 4.4 a litre; ordinary diesel rose by a penny more than that.

Why Shell is seizing renewables opportunities

Shell is serious about its commitment to renewable energy and sees the market as one of emerging opportunities, said Dr John Mills, Corporate Affairs Director of Shell UK Limited, in a speech in Cambridge recently.

In his first speech as Shell UK's new Corporate Affairs Director, Dr Mills told a conference on Renewable Energy that Shell believed renewables could supply 5-10% of world energy by 2020, and added: "We believe that by 2050 when you switch on the light, there could be a 50/50 chance that it's powered by renewables."

He said that locally, nationally and globally, renewable technologies had now moved past the



experimental stage and were becoming serious niche market contenders. Of the new Shell International Renewables business, which is investing up to £310 million in the coming years, he said: "No-one commits that much money just because it feels good or because it might be a nice

public relations idea. We have sound reasons for our thinking about the commercial potential of renewables, and we are serious in our investment."

Shell International Renewables brought the Shell Group's existing renewables businesses, mostly photovoltaics and biomass

under one umbrella. Shell has set stretch targets to win at least 10% of the world market for solar cells by early next century, and to grow the biomass business by 15% a year to have 250 MW of capacity installed by 2005.

"Most of this activity is overseas," said Dr Mills. "But in Britain we have also set up a team to search for domestic growth opportunities. It is casting a wide net, but is focusing on ways we can leverage the skills we already have. One skill we have fine-tuned in the North Sea is the management of large offshore installations. So we are looking at offshore wind platforms and we are also considering some of the more experimental wave power technologies."

Birkenhead buses go electric in UK's biggest clean transport project



One of the buses being trialled at EA Technology for use on the streets of Birkenhead

A fleet of six electrically-powered buses will take to the streets of Birkenhead later this year as part of Britain's biggest project yet to demonstrate the potential of clean public road transport.

EA Technology Limited has been appointed by Merseytravel to help select and evaluate the best electric vehicles to carry passengers on a 2.25 mile route between Birkenhead's central Hamilton Quarter and the town's main shopping centre.

The first of the new types of electric buses under consideration by Merseytravel - an Italian-built eight-seater Tecnobus on loan from the city

authority in Florence - has already been demonstrated in Birkenhead. The vehicles ultimately selected by Merseytravel are scheduled to begin full public operation by the end of the year.

"This will be a major demonstration of the potential of alternative technologies in public transport to reduce pollution on the streets and cut emissions on a global scale. Nothing of this scope has been done with buses in Britain to date," said EA Technology project manager John Baker.

The £1.3 million Birkenhead programme is one of eight demonstrations being

undertaken by European cities as part of JUPITER-2 (Joint Urban Project in Transport Energy Reduction) to promote clean public transport. The whole JUPITER-2 project is being co-ordinated by Merseytravel and its 45 million ECU cost is being met by the EU's THERMIE fund, together with participating public transport companies and local authorities.

In addition to using alternative power, Birkenhead's new buses will incorporate the SMART design philosophy pioneered by Merseytravel, which features low floor access vehicle, state-of-the-art shelters and real-time information technology.

Consultants join energy sources Review

The Department of Trade and Industry has appointed consultants to provide independent advice on the Government's Review of energy sources for power

generation. Merz and McLellan will provide advice on whether high levels of gas-fired generation could affect the security and stability of the electricity grid, while Wood

MacKenzie will advise on the outlook for gas supplies to the UK in the period to 2020.

Both consultants were appointed following competitive bids.

Chemicals look forward to a hydrogen economy

A switch from a carbon to a hydrogen energy economy is one of the solutions to today's environmental and healthcare problems proposed in a new report from the Institution of Chemical Engineers: *Future Life: Engineering Solutions For The Next Generation*.

Endorsed by the Prime Minister, the report highlights a number of solutions to the challenges facing the world today such as increasing pollution, global warming, the water deficit and the strain on the health service, all of which are being developed, it says, by the chemical engineering profession. On the energy front, the report suggests that:

- There is a growing need to find alternative renewable energy sources to replace carbon-based fossil fuels which are the main cause of air pollution and global warming.
- Hydrogen is one option and commercially viable methods of generating hydrogen using solar power are being explored.
- One interim solution to help move pollution away from densely populated urban areas is the introduction of so-called 'zero emission vehicles', powered using hydrogen or electricity.

Re-powering Peterhead power station



The turbine hall at Alcan's coal-fired power station at Lynemouth

Siemens Power Generation Limited has won a contract to re-power Peterhead Power Station, north of Aberdeen in Scotland, for Scottish Hydro-Electric. The contract, which represents one of the largest energy efficiency projects ever undertaken in the UK, is valued between £170-£180 million.

Re-powering will result in Peterhead achieving efficiencies comparable to those of new combined cycle gas turbine power stations, taking its current efficiency from about 38% to the mid-fifties. The investment will bring major environmental benefits, reducing the stations emissions by 85% for NO_x and 50% for CO_2 . The plant is estimated to enter service in late 2000.

Siemens' turnkey construction contract, for the design, manufacture, construction and integration of the new plant at Peterhead, is the seventh major contract won by the company in the last eight years, says the company.

Meanwhile Alcan's is to spend £15 million upgrading the steam turbines at its coal-fired power station at Lynemouth, Northumberland. The work will lead to greater efficiency and a 14% reduction in emissions. The 390 MW power station, the second youngest coal-fired station in the UK, provides the energy for the company's aluminium smelter nearby and sells surplus electricity to the National Grid.

Civils announce environmental policies

An environmental policy statement for civil engineers has been published by the Institution of Civil Engineers (ICE). Supported by six policy statements on specific areas, the initiative is a move to clarify the role of the civil engineer in the environment and to guide the ICE's 80,000 strong members worldwide in their work.

The policies demonstrate how important environmental issues are in the training, education and professional development of engineers; the six supporting statements are on: energy use in buildings, coastal management, contaminated land, transport, waste management, water resources.

The policy on energy use in buildings says that the design of new buildings should aim to minimise their whole life energy rating, within the constraints of financial and other objectives. This rating includes energy embodied in the construction materials used, the different

forms of energy used in construction, operational and maintenance requirements and refurbishment and demolition. The efficiency of existing buildings should also be improved.

Inter-disciplinary design should be encouraged, and the use of passive solar design, heat exchangers and other techniques should be developed to reduce energy used in heating and cooling. Developments in materials technology, and particularly in glass manufacture, should be exploited to reduce artificial heating and lighting requirements, says the Institution.

Specifiers and designers should be encouraged to apply the principles of whole life costing in evaluating and using new, recycled and alternative construction materials. In doing so, they should take account of the sourcing and transportation energy of the materials supplied and of the energy used in disposal.

Celtic and Tower plan new coal mine in south Wales

Celtic Energy and **Tower Colliery Ltd** say they plan to create 200 mining jobs at what would be the most exciting mining development for twenty years in south Wales by opening a new mine at Margam.

The two companies believe that the mine will have a minimum of twenty years of active life. Two hundred jobs would be created in constructing the mine and

there would be a further 100 jobs likely to be created on a long-term basis in the supplies and transport industries.

The new deep mine would be dug from the open-cast Park Slip site currently operated by Celtic Energy, who have already submitted an application to the Coal Authority for a licence to operate the new mine. Access from the open-cast mine is thought to be crucial to the

economics of the proposed deep mine.

The mine has sufficient reserves for more than 50 years. Drifts at the deep mine could begin in three years and production could commence shortly thereafter. Annual output from the deep mine is expected to be at least 400,000 tonnes, with overall estimated reserves of some 27 million tonnes.

Meanwhile, **Magnox Generation Business Group** has been in talks with the Consolidated Coal since late 1997 concerning the possibility of developing a 350 MW clean coal technology generation project near Neath. A spokesman from Magnox confirmed that preliminary talks are taking place but that a planning application was still a long way off.

Energy for industry:

by Steve Hodgson

This month - May 1998 - was to have been the second in which small business operators and even individual householders energy users enjoyed the option of choosing their electricity and gas supplier, having joined larger users in industry and commerce. Many readers will already have talked on the doorstep to representatives of gas suppliers who herald the imminent arrival of competition in the domestic gas market. Those who have not will be talking to them soon. We all know that the final stage of electricity liberalisation has been delayed until later in the year but, barring further accidents or delays, by next summer we should all have reached the competitive nirvana - just ahead of the arrival of the year 2000 bug.

The domestic energy markets are very different, of course, from those in which commerce and industry operate - many more customers, much smaller consumption - but much can be learned from the process which delivered company energy managers and buyers into a competitive market. And the message from corporate buyers is that it hasn't all gone smoothly.

Energy buyers from business and industry were reminded of this at a conference: *Energy for Industry* held in London in March.

STRANGLING COMPETITION

One of the two main energy buyers' organisations, the Utility Buyers' Forum, had set out the background at its AGM the previous week. Here, chairman Peter Rost talked of the "red tape that is strangling competition". Rost's point was that the cost and effort involved in dealing in competitive energy markets is prohibitively high for many customers: "Competition must benefit all business users, not just those that can afford its overheads", he said.

Meanwhile the other lobbying group, the Major Energy Users' Council has revealed what it calls the real cost of buying electricity

in the competitive market. Electricity Group Chairman Don McGarrigle confirmed that some MEUC members have been advised by their electricity suppliers that the settlement charge - the charge levied for 100 kW+ electricity buyers to cover consumption data collection and analysis costs - will be increased from last year's £565 to £780 a year. The charge is actually levied by the Pool onto electricity suppliers, who tend to regard it as a legitimate 'pass-through' cost.

The UBF is claiming credit for forcing a Government review of how electricity trading and the Pool operate. Announcing its terms of reference in March, Energy Minister John Battle confirmed that the review would take a hard look at the extent of competition in electricity generation as well as power trading arrangements in England and Wales.

QUIZZING THE REGULATORS

The format of the March conference asked the gas and electricity regulators to respond to the complaints of representatives of gas and electricity buyers.

Dr Lyndon Davies, director of group purchasing and engineering for Coats Viyella plc, expressed his thanks to the gas industry and regulator who between them had already delivered a 20% reduction gas prices, worth £1.3 million a year to Coats Viyella and £100 a year to himself. But he also complained of the unnecessary hassle of changing gas suppliers, often sufficient to cause customers to stay with their current supplier, and the unfair power held by incumbent suppliers to block moves by their customers. Davies painted a picture where chaos still had the upper hand: "when I last changed my supplier, the incumbent supplier objected to the transfer on the grounds that I had not paid - the objection was withdrawn when they were reminded that we pay by variable direct debit".

Davies also complained of lack of access to the database of customer sites and consumption held by Transco. Discrepancies

in the database are the cause of endless delays, he said: "fourteen months on from my last change of supplier, one of our sites has received no meaningful bill at all and I still get interruption notices for a site which is being demolished". Davies then questioned the competitive edge to the industrial gas market: "a recent survey of UBF members demonstrated that on average they receive only two meaningful responses to their tenders - hardly robust, vibrant competition".

Gas Regulator Clare Spottiswoode - now nearing the end of her five year term of office she reminded the audience - agreed that problems existed but added that competition is already both more widespread and deeper than anyone could have imagined when she arrived.

She told Lyndon Davies that the problem of suppliers holding up customer transfers was unfortunate - the clause in the licence allowing them to do this was there to prevent customers skipping from supplier to supplier without ever paying their bill. She sympathised over the Transco database, suggesting that: "its about time Transco took some more notice of its customers here".

Looking at achievements over the last few years, Spottiswoode said that:

- competition is firmly established in the commercial/industrial gas market, with BG now having less than 25% of the market,
- prices have fallen dramatically,
- UK firm gas prices are lower than anywhere else in Europe,
- domestic gas prices fell by 24% between 1986 and 1996, with another 20% due to arrive with domestic competition.

Prices have fallen further than could have been expected, she said, partly due to the unwinding of the myriad of cross-subsidies which existed previously. It is also true that, contrary to expectations, domestic competition had extended well beyond the high-usage, high-spending customers. Ofgas research suggests that lower consumption households had responded to doorstep selling to the point where competition

users have their say

penetration had been as high here as with high consumption households.

Spottiswoode was also keen to clarify her views on how social and environmental objectives can be achieved in a privatised energy market: "these cannot any more be delivered by a privatised industry, nor by cross-subsidies - only government taxes or levies can do this now".

ELECTRICITY PRICE FALLS

Moving on to electricity, Pedigree Petfoods' energy buyer Ian Dobson, also spoke of the falls in energy prices enjoyed by his company. But these are due to many factors, principally, he suggested, the gradual reduction of the fossil fuel levy from 12 to 2% of his bill. At the same time, electricity industry companies (and their shareholders) had made good profits, to the point where they are highly attractive to overseas investors.

Dobson explained why he thought that the Regulator was not doing enough to help UK consumers. He spoke of:

- a lack of real competition in electricity generation,
- insufficient price falls,
- the chaos which followed the opening-up of the 100 kW market in 1994,
- lateness in completing the liberalisation process.

Professor Littlechild saw things rather differently. On competition in generation, he said that the two main generators had seen their share of the generation market fall from nearly 80% to just 40% in eight years and the building of much new, independently-owned, generation capacity. But he added that competition was not yet fully working and he was monitoring progress carefully.

Commenting on prices, he had instituted very significant one-off price controls on both the National Grid Company and the RECs, neither of which had lowered standards of supply, he said, quoting an overall 22-29% price reduction since vesting.

It is true that the UK industry is attractive, particularly to US investors, he

added, but this was a good thing as it helped to bring new investment finance into the industry. Indeed one reason that US companies had bought into the UK electricity industry was that regulation in the US left companies with large cash flows available for investment in new markets. Littlechild added that several US players were using a move into the UK as a step into what is fast becoming a global market; involvement in the cutting edge UK market gives global companies useful experience when expanding into other countries where the privatisation process is at an earlier stage.

Littlechild attached much of the blame

for the delay in opening-up the domestic electricity market on the lack of any overall driver or dictator for the project - neither the Government, the Pool or Offer had this role - so too much effort had gone into discussion and agreement between the parties, rather than action. The project is the perhaps the largest and most complex exercise of its type ever carried out, he added, and it was never going to be easy. In the end, he said, it is more important to get this final stage of liberalisation right and avoid a similar situation to that in 1994.

Contact the UBF, tel: 01529 461555, and the MEUC, tel: 0181 997 3854

WINNING THE ENERGY EFFICIENCY CHALLENGE

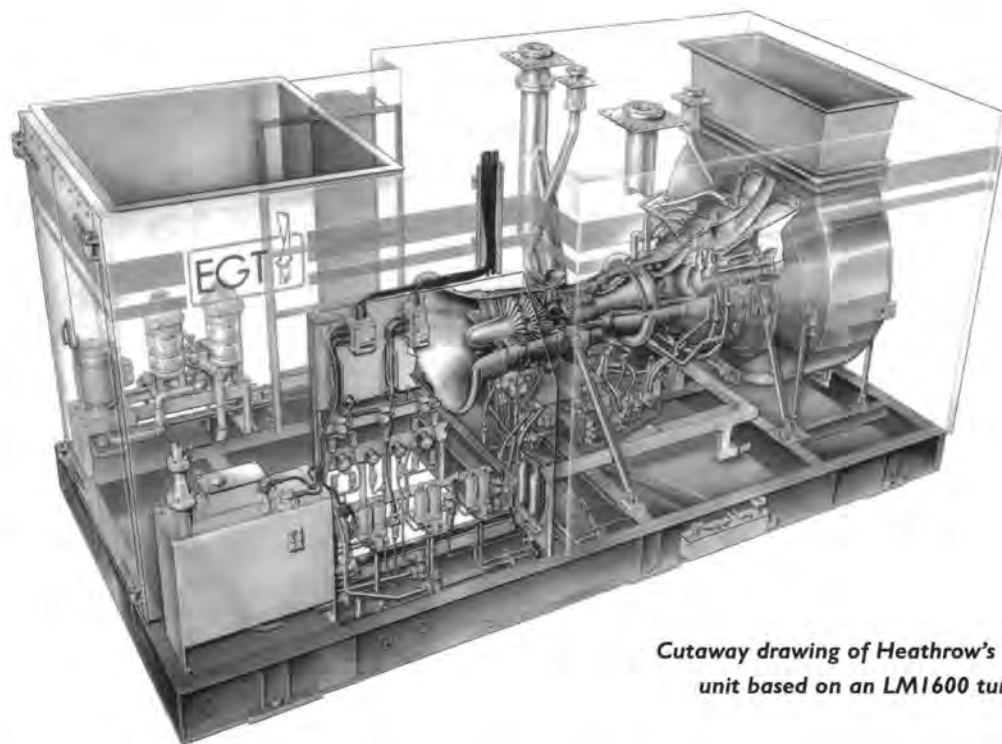
Ericsson are proud winners of the 1998 Energy Efficiency Challenge Team of the Year Award. Their team, led by Environmental Manager Stephen Hutchinson, raised the trophy and received a £1000 cheque donated by Brook Hansen High Efficiency Motors at the national final held in Birmingham in March.

The Challenge is a combined energy efficiency quiz and investment game. Twenty-two teams spanning all sectors of business were put to the test at Birmingham's National Motorcycle Museum. The organisers developed a fictional company, Handmade Soups, for this year's event. Handmade provide quality soups to the public in returnable glass jars through a national chain of retail outlets or 'Soup Kitchens'. Teams were asked to consider five investment scenarios for the company covering its jar cleaning operation, soup manufacturing plant, glass jar subsidiary and Soup Kitchens.

From left: Paul White (ETSU), Kevin White (Ericsson Ltd), Stephen Hutchinson (Ericsson), John Clark (Brook Hansen), Peter Morrell (Ericsson).



Datalogging CHP operation to reduce electricity charges



Cutaway drawing of Heathrow's CHP unit based on an LM1600 turbine

A CHP plant based on the engine used in the Stealth bomber is supplying electricity and high temperature water to the world's busiest airport, Heathrow. A single programmable data logger, a UL8 made by SHM Communications - somewhat smaller than the turbine but in its own way, almost as powerful - provides half-hour readings of the power station output which identify exactly how the CHP plant is saving the airport more than £100,000 a year.

The heart of the power station is a General Electric LM1600 gas turbine that produces 22,000 horse power at its shaft, and generates up to 15.5 MW of electricity - around a quarter of all electricity consumed by the site. The LM1600 is derived from the highly successful F404 turbofan aircraft engine. Its steam generating potential makes it particularly well-suited to cogeneration applications.

In addition to generating electricity and supplying heat to surrounding buildings, the CHP plant has one other less obvious but very welcome benefit - it dramatically reduces the site's electricity supply charges.

Transmission Use of System or 'TUOS' charges are levied by the Grid on the electricity suppliers. A component of

these charges is the Triad, a type of maximum demand charge calculated annually for the whole National Grid from the average of the three half-hour periods when demand across the grid is at its highest. These periods invariably occur during the winter, usually between 4 pm and 6 pm. But they are only identified historically and the charge - calculated according to the consumer's actual demand at these times - is passed on by the supplier to the consumer.

The Triad element of TUOS charges is levied at around £7 per kW. In the case of Heathrow airport, the power plant has reduced site demand and hence TUOS charges by around £108,500. The exact saving is identified from reports generated by Stark RT energy monitoring software on power station data delivered by an SHM UL8 Universal Data Logger. This saving is shared 50:50 between Heathrow Airport and the operators of the power station, Thames Valley Power.

To maximise the savings, the CHP plant must be operating at or close to peak power when the three highest demand half-hour periods occur. To ensure this happens, critical aspects of the CHP plant are monitored round the clock

by the SHM UL8.

The UL8 has eight universal input channels, each of which is configurable for pulse, analog or status monitoring. In this application, four collect pulsed kWh readings from high voltage meters, monitoring the power station output. A fifth channel collects readings from the gas meter supplying the turbine.

Turbine output varies with ambient air

temperature and this can easily mask a deterioration in performance, so a further UL8 input collects ambient air temperature readings, enabling turbine efficiency to be calculated and service shutdowns to be scheduled.

Before the UL8 was installed, it was necessary to manually read and record power and heat output. The UL8 is capable of storing up to 25,000 readings giving considerable flexibility over data upload times and providing security against computer down time or power interruption. The UL8 is also networkable giving options to extend the monitoring system in future.

The decision to install an SHM/Stark system was made jointly by Thames Valley Power, the venture company which operates and owns the CHP plant, and Heathrow Airport Limited. The deciding factor was that the technical synergy between UL8 and Stark RT energy information software would deliver the performance and system reliability that Heathrow required.

For further details, contact SHM Communications Ltd,
tel: 01962 865142

DC drive compressor cuts chocolate factory energy bill



Cadbury Ireland's chocolate crumb production plant at Rathmore, County Kerry

Cadbury Ireland Limited, the country's most energy efficient production plant, has chosen a CompAir Broom Wade Cyclon 475 SR to help further reduce energy consumption at its award-winning plant in Rathmore, County Kerry. The plant has reduced its consumption of energy by 15% since 1995 and is planning to achieve a further 3% by the end of 1998.

The Cyclon 475 SR is a rotary screw compressor designed to consume only the amount of energy required to compress the required volume of air. The speed regulation drive enables a single 75 kW machine to operate at pressures from 5 bar to 13 bar, with outputs from 1.8 m³/min to 12.2 m³/min. Speed regulation achieves such flexibility because, unlike other energy efficiency systems, it employs a digitally controlled switched reluctance DC drive, rather than an AC drive and frequency inverter. The switched reluctance drive system is manufactured under licence from SR Drives Limited as part of a technology co-operation agreement.

The Rathmore plant produces chocolate crumb which is then transferred to the company's Dublin plant to be manufactured into its famous chocolate bars which include Time Out, Flake and Boost. The plant received sugar processed in Mallow from local sugar beet, milk from local dairies and cocoa mass, derived from imported cocoa beans and processed at its Dublin plant. The ingredients are combined, cooked and dried to produce the chocolate crumb.

The new compressor provides air to enable valve actuation, milk agitation, aid sugar discharge and to operate reverse jet dust control units. The plant has a normal requirement for air at 6.5 bar pressure with a varying demand throughout the day of 4 m³/min to 11 m³/min. The compressor speed varies instantly to produce air to the exact volume required.

For further details, contact Graham Coats at CompAir BroomWade, tel: 01608 605300

Energy information system monitors Caledonian Paper

An energy management information system supplied by Faros Limited at paper manufacturer Caledonian Paper is providing management with important details of utility consumption. Information from the system is intended to be used both to reduce energy costs and to improve in the efficiency of the paper production process.

Caledonian Paper is one of Scottish Power's most important customers. Scottish Power operates a joint improvement group with its largest customers to develop new solutions to energy efficient operation which help to save energy and money.

The first phase has been the installation of a fiscal metering system using dataloggers designed to provide on-line access to the meters on which Caledonian Paper's monthly billing is based.

The major consumers of electricity at Caledonian include four grinders which grind logs as one of the raw ingredients of the paper-making process. Faros submetering systems have been installed on each of the grinders in order to monitor energy consumption and identify anomalies in their performance.

The energy management information system will also convert signals from existing 4-20 mA steam and water meters. Signals are logged in the Faros 2000 datalogger which provides half-hourly consumption figures for departmental billing purposes. Both real time and cumulative consumption information is provided.

In addition, by monitoring mains water, the Faros datalogger has already identified possible leakage from the mains and this is currently under investigation.

All the information collected by the dataloggers is displayed, reported and analysed using Faros software. Further phases of expansion are planned with Faros energy management information systems including departmental electricity submetering and further analysis of production consumables such as compressed air.

For further details, contact Faros Ltd, tel: 01908 241811, fax: 01908 241812

New heat pumps overcome summer overheating

The introduction of reversible heat pumps to solve overheating problems in its 1960s-built Milton Keynes offices has earned the Jervis B Webb Company a commendation in East Midlands Electricity's Energy Awards.

Jervis B Webb is a US-owned company which designs, manufactures and installs material handling systems. They range from simple, continuous chain delivery conveyors to complex finishing, automated assembly and flexible manufacturing systems.

The company has its European head office in Milton Keynes and it was in the design office, where bespoke conveyor installations are devised and drawn-up, that conditions in summer grew particularly hot, causing staff much discomfort.

Wrap-around windows in the U-shaped, open-plan design office meant that temperatures often peaked at 42°C. However, a number of other factors in the company's refurbished premises contributed to widespread over-heating in summer for the 90 employees.

Originally built in 1968, the two-storey, 1490 m² office featured a 31% proportion of glazed wall area, with a flat roof and therefore

no overhanging eaves to create shade for the upper windows. Heating was provided by a central boiler and wet radiator system which lacked individual room controls.

As with many buildings of this type, the design also failed to allow for the computers and business machines which generate significant heat in modern offices. Added to the background heat contribution from the occupants and the many light fittings, these gains produced high internal temperatures around the building in hot weather. On the south side, especially in the design office, the extra heat from the sun made working conditions seriously difficult.

To solve the problem, the company first of all fitted solar reduction, double glazing and blinds to all windows directly affected by the sun.

However, the major investment was in 27 Daikin reversible heat pumps to largely replace the central heating system. The heat pumps provide heating in winter, cooling in summer and allow staff to select the desired comfort conditions in each office area. As the system is zoned in this way, heating or cooling responds directly to individual office

temperature settings, thereby reducing the energy input throughout the building.

According to each situation, the heat pump indoor units were either wall mounted, floor mounted or in ceiling cassettes. By removing radiators and choosing an appropriate indoor unit, the system also freed extra floor space.

As cooling is now provided, the energy costs for the building have risen. However, the benefits of the system are immeasurable in terms of staff satisfaction. Everyday operations have not been disrupted by installation work and visiting clients are impressed by the change-around in the appearance and comfort levels of the building.

The company also converted the lighting system to high frequency fluorescent lamps with new diffusers, giving better light quality for a lower energy input and, importantly, a lower heat output.

The overall result of the project has been a dramatic increase in efficiency and productivity especially in the design office, where concentration and accuracy are essential to the company's tailor-made product.

New luminaire helps Do It All cut energy bills by a third

A five step, systematic strategic approach to energy management by Do It All's energy and building services manager, Alan Jauncey, has cut energy bills at the 192 stores by 33% over five years. The five step process started with getting the commitment of the board, then a period of analysis of where energy was being used, followed by planning, implementing and monitoring specific measures.

The measures include the development and fitting of a new 'Starlight' luminaire from IMP Lighting. The new, 400 W high bay fitting incorporates four 55 W PL light sources and the ability to switch to just two lamps where daylight conditions permit. Fitted on a 6 m grid, the luminaire provides 500 lux at floor level.

The whole story is told in a new Good practice Case Study brochure from the DETR's Energy Efficiency Best Practice programme.



A strategic approach has helped Do It All stores to cut its energy bills. New luminaire helps Do It All cut energy bills by a third

Energy Management - a strategic approach is available, free, from the BRECSU Enquiries Bureau, tel: 01923 664258, fax: 01923 664787, e-mail: brecsuenq@bre.co.uk Also contact IMP Lighting, tel: 01684 891211

Using electricity to increase efficiency

Each year the Electricity Association awards its Business Energy Awards to companies which have increased their energy efficiency through the use of electricity - some of the current winners are profiled below.

Environmental achievement: United Distillers

A new £7 million effluent processing project at United Distillers, a member of the Guinness Group, reduces CO₂ emissions by 74% per tonne of product produced.

The Glenlossie by-products plant at Elgin processes waste, known as 'pot ale', from malt distilling to make 'dark grains' for animal feed. In the original process multiple-effect evaporation concentrated the pot ale from 3% to 35% solids to produce syrup. After mixing with wet 'draff', a residue from the mashing process, a drying operation produced the grains.

To increase the efficiency of the

process it was necessary to remove more moisture from the pot ale during the evaporation stage, thereby reducing the energy required for the subsequent drying process. Tests on mechanical vapour recompression (MVR) plant showed concentrations of 50% solids with energy savings of up to 88%.

The subsequent installation of the new MVR equipment has doubled the efficiency of the Glenlossie plant, enabling effluent from other distilleries to be brought in for processing. The annual energy cost savings of £1 million means the MVR system will have paid for itself after seven years.

Small industry: Speyside Cooperage

Speyside Cooperage, cask manufacturers to the whisky industry, has used an electroheat technique to revolutionise the 500 year old craft of barrel manufacture.

The new energy process has been introduced at the company's Aberlour base, where 25,000 casks are manufactured yearly. Good whisky relies upon a maturation period during which the spirit is stored in barrels made from dried oak staves. The casks are traditionally toasted over an open flame to release flavour congeners within the wood, before being filled with whisky. Achieving a consistent and accurate degree of toasting has always been a problem, according to the Scotch Whisky Research Institute.

Assisted by Hydro-Electric, EA Technology, Tatlock and Thomson (analytical chemists) and the Scotch Whisky Research Institute, Speyside Cooperage has introduced radio frequency (RF) heating for the drying staves, followed by infra-red heating for the toasting process. RF heating is highly accurate, and also assists in building up the reservoir of flavour compounds, improving the maturation process.

The two-year research and development project cost £225,000, jointly funded by the DTI and Hydro-Electric. Additional benefits include a reduction in cask construction time, from 1 hour to ten minutes - a result of the semi-continuous new toasting process - a 58% reduction in labour costs, and 63% drop in energy use. Capital investment for the current equipment will be recouped in 12 months.

● The winner of the large industry category was McCorquordale Envelopes Ltd, for a new drying process that reduces both energy costs and CO₂ emissions by 84%.

Hot air blowers on the ten production lines were replaced with infra-red emitters and thyristar controls.



Winner of the housing provider's section was Angus Council, which upgraded the space and water heating in 49 of its rented homes to incorporate a mix of storage and direct-acting heaters. The new system uses the Credanet control system in conjunction with Hydro-Electric's Total Control tariff. The storage component is given a teleswitched charge which varies according to forecast weather conditions.

Commercial buildings: Keswick School

A new electric heating system for a 4,700 m² extension to Keswick School, Cumbria, provides the optimum in lower capital costs, controllable running costs and easy maintenance.

Together with improved insulation, a system of panel and storage heaters was fitted across the school. Panel heaters were installed in classrooms and offices as their low thermal inertia makes them highly responsive to temperature changes. Communal areas including stairs and corridors were fitted with off-peak storage heaters to supply a background core temperature throughout the school.

The heating system is zoned and

controlled by a central energy management system which takes account of time, internal and external temperature and is also fitted with an override facility. Within classrooms, passive infra-red sensors control both the heating and lighting. When classrooms are unoccupied, the controls maintain a background temperature and the lighting is switched off. As soon as entry is made into a room, the system detects movement and raises the temperature to comfort levels.

The independent control for each classroom ensures overheating no longer occurs, particularly when classrooms are unoccupied.

Control electricity Pool gas-fired power stations

by Peter Lehmann,
commercial director, Centrica plc

The Government's moratorium on consents for new (mainly gas-fired) power stations is part of a Review into any possible over-dependence on gas. Indeed there is a general feeling that gas is taking over electricity generation in a way that is somehow not healthy for UK plc. Not true, argues Peter Lehmann in these edited extracts from his paper delivered by to a conference on the gas market in March. Lehmann argues that the growth of gas poses no threat and that the real villain of the piece is the continuing high price of electricity due to a lack of competition in generation.



Centrica's Peter Lehmann: "does not think that there should be restrictions on new gas-fired stations"

Table 1 Gas' share of the electricity generation market

Figures include non-centrally despatched plant

Gas share of electricity generating capacity	19%
Gas share in 2000	26%
Gas share in 2005	36%
Interruptible's share of gas to power stations	27%
Interruptible's share of fuel to power stations	6%

It seems sometimes from discussions that virtually all our electricity is generated from gas - and interruptible gas at that. This is a long, long way from the truth.

As Table 1 shows, the gas share of overall electricity generating capacity was only about 20% in 1996. By 2000 the gas share will still only be just over 25% (compared with 40% for coal) and even by 2005 it is unlikely to be much more than 35%. Most of the gas is delivered on a firm basis. Just over a quarter is interruptible and hardly any of the new stations are interruptible - so that by 2000 the interruptible share will be down to one quarter. There is a massive misconception about this. Although we do not ourselves have first hand information, we are sure that these figures are in the right ball park. All this means that the proportion of electricity generated from interruptible gas supplies is a mere 6%.

CONCERNS ABOUT GROWTH IN GAS-FIRED POWER

Several concerns have been expressed about the growth of gas-fired power generation, for example by Paddy Tipping MP, Chair of the Parliamentary Group for Energy Studies.

These can be summarised as worries about:

- limited UK supplies,
- dependence on unstable foreign sources,
- limited world supplies,
- economics - 'fairness not favours' for coal,
- long-term interruptible contracts,
- operational and hardware issues,
- employment.

Taking the first three supply worries together, there is concern that UK gas supplies are limited, that once they are depleted we will be dependent on countries which could be unstable, like Russia and Algeria, and that generally there will be pressure on gas supplies and prices will rise. On the first point, we in Centrica obviously have a considerable amount of historical and current knowledge about UK Continental Shelf reserves and it is our view that the UK still

has plentiful reserves. Despite the enormous increases in demand the UK, the production/reserves ratio is still very healthy. It has in fact not fallen for many years, even though we have used a considerable amount of gas. So we are still going to enjoy the benefits of UK gas for many years to come.

Obviously, however, our reserves are not as plentiful as those of some other countries. Here, I think, is the key point. If we do have to import some of our supplies, that should not pose any problem. Until very recently, the UK imported one quarter of its supplies from our neighbour Norway and no-one noticed. Norway has huge reserves. In addition to maintaining their current production Norway could provide the equivalent of 25% of the UK's present demand for the next 100 years. And it has recently been announced that another giant field - comparable in size to Morecambe - has been discovered in Norway.

In addition, it is worth stressing that many successful European economies are heavily dependent on gas imports - from Norway and the Netherlands, but also from Algeria and Russia. Supplies from these countries have been extremely reliable - even when the countries themselves have been in some turmoil.

Europe itself has access to around half the world's gas reserves which are very large. For example, world gas reserves in relation to demand are 50% higher than those of oil. There is little danger of pressure on European gas supplies over a prolonged period.

Britain is now very well placed in terms of access to supplies. There is a large pipeline link from Norway with a capacity of 12 billion cubic metres (bcm) per year, or nearly 15% of the UK market. Then we have the Interconnector with a capacity of 20 bcm/year, one quarter of the UK market. The Interconnector to Zeebrugge gives us direct access to any of the supply sources used by the Continental companies, to Norwegian gas landed at Zeebrugge, to Dutch supplies with

prices rather than new

their flexibility and to LNG from Nigeria, Trinidad and elsewhere, as there is a large and under-used LNG receiving facility at Zeebrugge. Furthermore, there is potential competition to supply the UK market in the long term - the Dutch company Gasunie has plans for an additional direct link to bring supplies to Britain especially in winter.

So I believe that there will be plentiful supplies. In any case it does not seem to me that there should be any concern about the UK becoming part of an open, interdependent gas system and relying in time for part of its supplies on imports.

Before I leave the Interconnector, I will just discuss one more immediate way in which the Interconnector helps supply security. If for any reason there were an emergency or shortages here (although there is no reason to think that there will be) then it would be possible to retain in Britain some or most of the significant quantities of gas, which are scheduled for export. This is not to say that we would ride roughshod over our Continental customers and unilaterally retain the gas here. This would and could be done through a variety of commercial arrangements. Thus I see the Interconnector very much as an additional source of short term supply security.

ECONOMIC ISSUES

It is sometimes argued that gas plant is more expensive than coal and that new gas plants can only be built because of unfair advantage. Hence (in part) the request for 'fairness not favours' for coal.

The position as we see it is that, on a like for like basis, new gas stations are cheaper than new coal stations. It is economic to build new gas fired stations on the basis of current and prospective pool prices - especially given the high pool prices in winter when the coal stations are running.

So the economics of gas fired stations are good, there is no unfair advantage - but if there were more effective competition in generation and lower pool prices then far fewer new gas fired stations would be economic. Those who wish to reduce new

gas build and maintain coal burn should therefore in our view be pressing hard on the review of electricity trading arrangements and should be arguing for a more efficient market and more effective competition in generation.

They should in particular be drawing attention to the figures in Table 2, which show strongly that pool prices over the last few years have been constant or rising in spite of sharp reductions in the key cost drivers.

This is in our view the nub of the issue. *Tackle the problem at source not the symptom: secure an effective market in wholesale electricity. This will reduce electricity prices and limit the growth of gas fired power. Do not interfere in the construction of new gas fired power stations - this will raise electricity prices and reduce competition, when increased competition is needed. Remove the distortion - and do not remedy the effects of one distortion by introducing another.*

I will just mention long term interruptible (LTI) gas contracts. It is sometimes suggested that the LTIs, with their take-or-pay provisions, are reducing coal burn. Whatever the history, this is clearly now not the case. The amounts which our LTI customers are obliged to take or pay for under LTI contracts amounts to just one half of their requirements. All the ten LTI stations are buying significant quantities of additional gas at market prices, because it is economical at current gas and Pool prices to run these stations at high output levels.

If the buyers had lower take-or-pay obligations, they would simply fill their requirements from the market. Gas burn would not be reduced and coal burn would not be increased.

OPERATIONAL ISSUES

Four operational and hardware issues have been raised.

First, it is argued that there may be problems with gas supplies in cold weather or because of production difficulties. However, the gas industry's record in supply security is outstanding - in part because of the safety implications of failure; production is spread over a large number of fields, supplies come through a number of different pipelines, gas can be stored and the pipelines themselves are underground or underwater, with consequent high security levels.

Second, it is argued that the output of gas fired stations cannot be increased rapidly because of restrictions on the ability of Transco to increase its flow rates. Transco has over the years changed its services to meet changing requirements and with the right commercial incentives it would be able to provide the necessary flexibility, especially via investment in compression. It seems reasonable to let the market decide whether these services are best provided by gas or other stations rather than to have some central planning intervention on this.

Next, there are other services which, it is argued, gas stations cannot provide - the ability of stations to come up quickly (frequency response) and the ability to restart in the event of a catastrophic failure (black start). Again, these services *can* be provided by gas fired stations. Indeed some of the current gas stations proposed to incorporate black start into their design at the outset at low cost, but at the time this was not judged to be worthwhile.

Finally, there is a suggestion that we

Table 2 Electricity prices and costs

*From DTI Energy Trends

	Pool purchase price £/Mwh	Gas cost p/therm*	Coal cost p/therm*	CCGT capex £/kW
1993/94	24.4	20.7	38.7	400 - 500
1994/95	24.0	19.5	36.1	
1996/97	23.7	18.4	34.8	
1997/98	24.5 - 25.0	17.2	33.9	300 - 350

are heavily dependent on a small number of gas terminals. However, there are six terminals and the larger ones have a number of separate sub-terminals so that it would be very unlikely for the whole of the gas flow through one of the larger terminals to be affected even by deliberate action.

It is worth noting in passing that there have been far more interruptions to the supply of electricity than of gas for unforeseen reasons, especially the weather. This is not a criticism of the electricity industry. It is simply a result of most wires being overground and hence vulnerable to weather. This is a far greater threat to supply security in electricity than the gas fired stations.

Having said all that, the interdependence of the gas and electricity industries is throwing up new issues. It is clearly essential that NGC and Transco establish and maintain close links on these issues. If some of the rules, eg on confidentiality, prevent a satisfactory exchange of information then they should be re-examined. We, of course, as major suppliers of gas to power stations would be very pleased to participate in any discussions on these issues and indeed have initiated the necessary contacts.

Finally, employment. I am not going to defend the way in which the run-down of the coal industry has been managed. Nor is it for me to say whether the Government of the day should pay special attention to the impact of its policies on coal miners and their communities. Two points are, however, worth making. Firstly, the number of people employed in coal mining is now fairly small - 11,000 compared with about 50,000 in downstream gas, 84,000 in electricity and an estimated 300,000 in the offshore oil and gas industry and its suppliers. Intervention to support coal may have an adverse effect on overall employment because of its possible effects on other energy industries and on overall industrial competitiveness. Secondly, support for coal may - as is well known - increase imports or open cast production rather than the demand for UK deep mined coal.

ADVANTAGES OF GAS FIRED POWER

So far as I have discussed the concerns expressed about the growth in gas-fired power and argued that they are generally misplaced. Even if they were not misplaced, there would be some serious drawbacks to intervention to restrict gas fired power and these would need to be taken into account in any decision.

We do seem to take the environmental advantages of gas almost for granted. A unit of electricity produced by CCGT produces less than half the quantity of CO₂ produced by a conventional coal station. Gas also has massive advantages in terms of NO_x and SO_x emissions. We tend to forget about this, to forget that gas played a major role in removing smog from our cities and that gas has and will continue to be a critical way of improving air quality.

It is cheaper, as noted, to build new gas than other power stations. Quite apart from its effect on competition, restrictions on gas fired power stations would raise the price of electricity - with social effects via the price to poor customers and economic effects because of the impact on industry.

The key point is, however, the effect on competition in generation. As it is, competition in power generation is not effective. In gas, reduced costs and improved technology in the production of gas upstream have as a result of liberalisation whistled through to the final customer and the consequence has been a far greater reduction in prices than expected.

In electricity this has not happened. There have been sharp reductions in the costs of generation but these have not flowed through to the final customer. There was some hope that this would change with the building of new, mid-merit merchant gas plants which would bring competition at times of high electricity demand.

In addition, an important source of pressure on the existing generators was the threat of new entry and of new stations which did a little, although not enough, to moderate pool prices. Since the Section 36 moratorium on new power stations was announced, there has already been evidence of a hardening of Pool and forward prices.

This is in the end the major reason why I am concerned about the possibility of restrictions on new gas fired stations. It does not matter very much to Centrica if a few more or less gas fired stations are built. But it does matter to us as buyers of electricity for sale to final customers and to the economy, if electricity wholesale prices are maintained at artificially high levels. I have mentioned the desirability of curing the disease not tackling the symptoms. If, in spite of this, it is in any way made more difficult to build gas fired power stations, it is absolutely essential that this should be accompanied at the same time by measures to secure effective competition in generation.

CONCLUSIONS

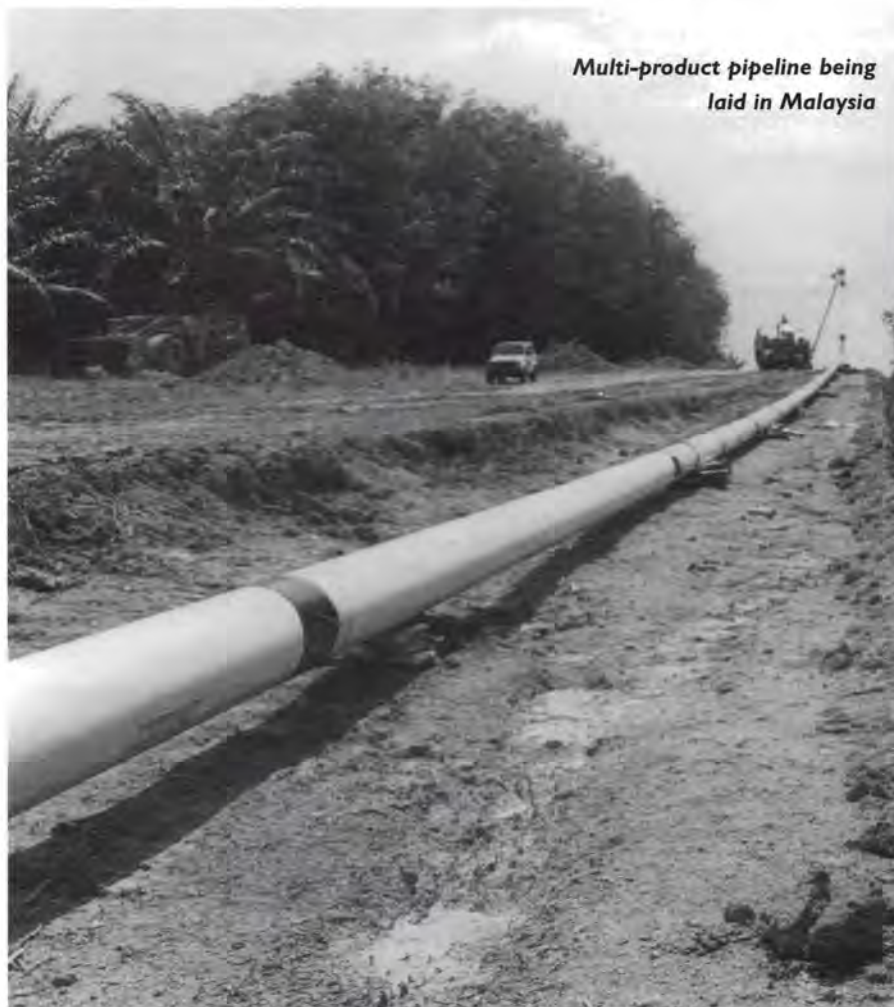
To conclude - what should, in my view, be done?

- The gas and electricity industries are increasingly interdependent and good channels of communication need to be established between the major players.
- If the rules need to be changed to facilitate a sensible exchange of information between NGC and Transco, that should be done.
- I would accept that some ultimate upper limit on the proportion of electricity generated from gas might be sensible - perhaps 65%. However, we are nowhere near that proportion and will not approach it for many, many years if ever.
- I do not therefore think that there should be restrictions on new gas-fired stations.
- High pool prices provide an artificial stimulus to new power stations. More effective competition in generation is vital.
- It is even more critical that there should be measures to increase competition in generation.
- We should pay as much attention to energy efficiency as to energy supply.
- We should not be complacent about security of supply in gas and should consider carefully any proposed changes to the current mechanisms and incentives.
- Finally, we should look forward to the commissioning of the Interconnector.

Maintaining pipeline integrity

by David Whitman, Project Manager, BPA

The existence of a 510 km pipeline carrying hydrocarbon products from coastal refineries and storage terminals to inland population centres is not well-known. Owned by several consortia of international oil companies, the line is operated by BPA, whose David Whitman writes here on maintaining the integrity of major pipelines.



Multi-product pipeline being laid in Malaysia

The cost and the environmental impact of energy transportation may seem to be two very different issues but they are often inseparably linked. Pipelines are a very good example. Pipelines can be considered the safest and most cost effective means of transporting large quantities of hydrocarbons over long distances. From an environmental point of view they have less of an impact than transportation by road or rail.

Any company operating a pipeline system has a moral obligation to protect the people and the environment of the country in which it operates, in addition to any existing national statutory requirements currently in force.

This is especially important in the UK, as the pipeline systems tend to supply product to the more densely populated areas of the country with the pipeline routes crossing over and under numerous river and other water courses.

The financial implications of an in-service failure for any high pressure hydrocarbon pipeline system of high usage would be significant. In addition to the costs of repairing the defect, loss of throughput, arranging alternative supply, and the associated clean-up operation, the operator would suffer an immeasurable setback in public opinion.

To ensure that the pipelines systems continue to perform their duty without loss of product the operator is responsible for putting in place systems to prevent failure or damage to the pipeline. Additionally systems must be put in place to reduce the consequence of any loss should this occur. The term given to this process is pipeline integrity management.

TYPES OF PIPELINE FAILURE

The volume of product lost from pipeline systems is very low. However pipeline failures do occur. In recent years, net spillage, the volume remaining after recovery, has amounted to 0.00042% of total oil transported through oil industry pipeline networks in Western Europe.

There are five types of pipeline failure.

Mechanical

These occur when stresses in the system exceed allowable limits. These can be caused by poor material quality or faulty construction. Mechanical failure represents 25% of the number of spillage incidents and 27% of product lost.

Operational

These can occur due to excessive pressurisation or malfunctions of equipment such as pressure relief or control valves. They can also occur due to human error. Operational failure represents 6% of the number of spillage incidents and 4% of product lost.

Corrosion

Pipelines can be subject to both internal and external corrosion. Internal corrosion generally occurs when corrosive products are present in the pipeline in addition to water. External corrosion is the predominant type experienced with hydrocarbon pipelines (in particular refined hydrocarbons) and usually occurs due to failure of the pipeline protective coating and/or the cathodic protection system. Corrosion represents 33% of the number of spillage incidents but only 18% of the product lost.



The UKOP multi-product pipeline system has a dedicated control centre at Kingsbury near Birmingham.



Routine maintenance being carried out at the UKOP multi-product splitter manifold at Buncefield, Hertfordshire.

The UKOP pipeline network is one of the most complex and highly loaded oil products pipeline systems in the world. The main system was built between 1965 and 1968 and connects the Stanlow refinery on Merseyside with two refineries on the river Thames; Thames Haven and Coryton, as well as serving Heathrow Airport. A second leg between Kingsbury and Buncefield, together with an extension to supply Gatwick Airport, was added in 1984.

Oil movements through the network are controlled remotely from the Kingsbury pipeline terminal in the Midlands by means of a supervisory and control and data acquisition (SCADA) system.

Overall, the system transports more than 10% of the total volume of clean oil products consumed in the UK, including more than half the aviation fuels supplied to aircraft at London's main airports.

Natural hazards

These occur due to localised natural phenomena such as ground movements. The possibility of the phenomena are taken into account during the design and planning phases and therefore the occurrence of failure due to these is low resulting in 5% of the spillage incidents and 3% of the product lost.

Third party activity

The majority of these occur due to accidental damage by third party excavations. The consequences of the pipeline damage equates to 31% of the number of incidents and 51% of the product lost.

PIPELINE INTEGRITY MANAGEMENT

The pipeline integrity management process is applicable throughout the life of a pipeline system including design, construction, operation, inspection and maintenance. Some elements of the process are a necessity for all systems, and carried out on a regular basis.

Others are additional activities to be considered for each particular situation.

WAYLEAVE MANAGEMENT

The possibility of mechanical damage to the pipeline by third parties or changing ground conditions can be reduced by effective management and monitoring of the wayleave, the channel in which the pipeline runs. Three ways of achieving this are:

Monitoring

The pipeline operator monitors the wayleave to identify any relevant activities. This is carried out during his normal day-to-day requirements to travel along the pipeline route for maintenance works etc and is also carried out by a regular aerial surveillance (often by helicopter) usually at fortnightly intervals.

Education

The works within the wayleave are either

authorised or unauthorised. Authorised works are those of which the operator is aware and has therefore been able to discuss all the necessary requirements and precautions with the third party. The activities that provide concern are those that are unauthorised and of which the operator has no prior knowledge.

To combat this, pipeline operators within the UK have embarked upon a process of education for all those companies that may, at some time, need to carry out works within the pipeline wayleave, together with the landowners. It takes the form of presentations, videos and printed literature.

Supervision

Prior to any works taking place within the wayleave the operator will mark the exact position of the pipeline. The operator will stipulate the protective measures that must be undertaken near to the live pipeline. In

most cases the operator will maintain a presence on site until the work is completed.

CORROSION PROTECTION

External pipeline corrosion is prevented by a protective coating, and by cathodic protection. This ensures that current only flows from the soil to the pipeline and that corrosion occurs at the associated ground beds where it can be tolerated. The two measures are complementary, failure of one, most commonly the coating, being compensated by the other.

Pipeline coatings

Coatings of pipelines currently in service range from site applied hot poured bitumen to factory applied epoxy. Specialist sub-contractors carry out surveys of the condition of the coating. The operator must decide upon the types of surveys to be undertaken and their frequency.

Cathodic protection

The pipeline operator must maintain the cathodic protection system to a standard at which the desired level of protection is given.

ON-LINE INSPECTION

On-line inspection is a non-destructive method of detecting defects in the metal wall of a pipeline. The vehicle (commonly known as an intelligent 'pig') is passed through the pipeline, propelled by the product, continually monitoring the wall by means of either a magnetic flux leakage or ultrasonic technique. The vehicle provides an accurate method for locating any defects and for describing the defect in terms of axial and circumferential length and pipe wall penetration depth. The most common defect that the vehicle should identify is corrosion but it will also highlight mechanical damage and material defects.

On-line inspection tools are in some circumstances a statutory requirement dictated by the pipeline Safety Notice.

From the information received the operator can make a judgement as to the re-inspection interval, what should be covered and how. This is one of the decisions required to be taken by the operator before embarking on an on-line inspection programme.

VALIDATION PRESSURE TESTING

The integrity of a pipeline system at a particular moment can be demonstrated by carrying out a pressure test. A regular pressure test may be the requirement of the pipeline Safety Notice.

The validation pressure test would normally be carried out by increasing the product to a pressure equating to 110% of the normal maximum operating pressure and held for 24 hours.

The operator must allow for the pipeline to be out of service for a total of 60 hours for the test. A satisfactory pressure test result will provide the operator with the confidence to continue pipeline operations for a limited period.

LEAK DETECTION

The detection of leaks falls into two main categories.

Visual

This relies upon the detection, above ground, of the presence of product, visible on the ground or in a water course. This information will be received during line walking, during aerial surveillance, from landowners or the public.

Technology

Application of SCADA system based leak detection has been a requirement of UK pipeline Safety Notices for a number of years.

A number of techniques are available to the pipeline operator including volume/mass balance, pressure monitoring, pipeline modelling and statistical techniques. The key element in the selection process is the assessment of the available techniques relevant to the particular pipeline.

EMERGENCY PLANNING

Safety awareness is an important part of any integrity management process because the risk of pipeline failure can be reduced but can never be eliminated.

For a pipeline the risks, consequences and method of dealing with failure can vary along the route. For example, the consequences of a pipeline failure in the centre of a field with no aquifer close by

are vastly different than that of a failure at a crossing of a fast flowing river. Therefore, an essential part of the plan is an environmental audit of the pipeline route.

In conclusion, the financial and manpower resources required make pipeline integrity management a large investment. But the management process is not an option, and ensuring that it is continually effective is vital.

PIPELINES '98

BPA is among the 90 or so companies on show at an exhibition devoted to the onshore and offshore pipeline business to be held at the National Exhibition Centre in Birmingham from 19 to 21 May. Supported by the Pipeline Industries Guild, the event will cover petrochemical, utility, water and drainage pipelines and also includes a programme of seminars. Entry to the exhibition is free - contact the organisers on 01203 426467 for further details.

BPA has 30 years experience of managing, operating and maintaining a wide range of hydrocarbon product pipeline and storage systems on major schemes worldwide. Related consultancy services are provided to clients worldwide. Operations and engineering services are available across a range of fluid handling systems from multi product, gas, gas condensate, black oil and LPG pipelines through storage and pumping facilities to road, rail and sea loading facilities.

BPA provides expertise on any aspect of the project cycle, from conceptual studies through FEED and detail design, to construction management, commissioning and start up, and then all aspects of pipeline system operation and management.

Contact: Rhys Davies, BPA, Lord Alexander House, Waterhouse Street, Hemel Hempstead, Herts HP1 1EJ, tel: 01442 242200, fax: 01442 214077.

Can cleaner fuels achieve

By Mary Stevens, National Society for Clean Air and Environmental Protection

There has been no shortage of discussion about the use of non-conventional fuels for vehicles to reduce air pollution. Compressed natural gas, LPG and electric vehicles will undoubtedly all have a role to play, but 'cleaner' versions of conventional fuels are also available. Here, Mary Stevens summarises the results of research by the NSCA into the potential impact of their use.

Parameter	Conventional unleaded petrol	Low benzene petrol
Aromatics (%v/v)	33	24
Benzene (%v/v)	2.3	0.9
Oxygen (%m/m)	0.1	0
Sulphur (ppm)	200	27

Table 1 Average petrol composition Data for conventional unleaded petrol from the UK Petroleum Industry Association and for low benzene petrol from Tesco.

Parameter	Conventional diesel	City diesel
PAH (%m/m)	8	5
Total aromatics (%m/m)	33	18
Sulphur (mg/kg)	400	7

Table 2 Average diesel composition Data for conventional diesel from the UK Petroleum Industry Association and for City Diesel from Greenergy.

Pollutant	European agreement	Low benzene petrol
CO	-2	-9
HC	-2	-4
NO _x	-3	-6
Benzene	-18	-39

Table 3 Percentage change compared with conventional unleaded

Increasingly stringent emission limits for new vehicles and controls on fuel content have contributed to a massive reduction in pollution from individual vehicles. Since 1970 European legislation has progressively reduced emissions as technology improves.

Individual vehicles today emit 90% less than pre-1970 models. Consequently, despite massive growth in road traffic, emissions are falling for the first time. However, air quality standards are regularly exceeded, and it is predicted that without further measures to control emissions, increased traffic volumes will lead to more pollution after 2010. The NSCA Cleaner Fuels Forum, representing the main stakeholder interests in automotive fuels and air quality, commissioned a review to

address the potential for cleaner fuels to improve air quality.

Standard petrol and diesel fuels have to comply with British Standards for their composition. Diesel and petrol are blends of many different components, determined by the source of crude oil, the refinery and the demand for different oil products. In the UK, fuel quality is determined by the Motor Fuels (Composition and Content) Regulations 1994, which implement EU Directives and international agreements.

These allow a wide variation in the composition of fuel - for example the maximum benzene content for petrol sold in the UK is 5%, although the actual content of fuel on the market varies from 0.4 - 3.9%. The composition of fuels from different

refineries can vary considerably, as can different batches from the same refinery. Filling stations often obtain supplies from the nearest refinery - so fuel purchased from a brand filling station may not come from that company's refinery. Cleaner fuels are fuels marketed on the basis that their emissions are lower than is required by legislation. City Diesel and Low Benzene Petrol are trade names for fuels currently available, manufactured with the specific aim of reducing emissions from vehicles using them. These have also become generic terms for cleaner fuel formulations.

CONVENTIONAL FUELS

The fuels debate has been raging since the successful campaign to remove lead from petrol in the early eighties. However, there is still widespread misunderstanding about the impacts of available fuels.

Petrol v diesel

In 1989 diesel cars and vans accounted for 5% of UK sales, and by 1994 over 20%. Currently over 50% of vans run on diesel, and this is predicted to reach 90% by the turn of the century. Almost all buses and lorries run on diesel. In general diesels are cleaner than petrol cars without catalysts for all pollutants except particulates. In comparison with catalyst cars, diesels emit less carbon monoxide (CO), hydrocarbon (HC) and carbon dioxide (CO₂) but more nitrogen oxides (NO_x) and particulates.

Leaded v unleaded petrol

Unleaded petrol has been available in the UK since 1986, in response to concerns about the health effects of lead. Unleaded is necessary for catalyst cars. There has been concern that unleaded petrol contains more benzene than leaded. The benzene content of petrol however is limited to 5% by regulation. The majority of petrol contains considerably less than

cleaner air?

this. An EU Directive is likely to ban leaded petrol from 2000.

Premium v super unleaded

Super unleaded petrol was introduced in 1990 to meet the requirements of motorists who wanted to switch to unleaded but whose cars required higher octane fuel. There has been concern about the effects of super unleaded as it tends to have higher benzene levels than premium unleaded, although still below the legal maximum. In May 1996 tax was increased by 4 p/litre above premium unleaded to discourage use. However with a current market share of 2.5% it is unlikely to have a measurable impact on air quality.

CLEANER FUELS

Low benzene petrol has less benzene than conventional petrol, but other parameters are also changed - see Table 1.

City diesel has a much lower sulphur content and different composition to conventional diesel which results in lower particulate emissions - see Table 2.

Cleaner fuels reduce emissions of major pollutants of concern. Tables 3 to 6 show the percentage change in emissions compared with conventional fuels, and the effect of using future petrol formulations agreed by the European Council of Ministers in October 1997 under the Auto Oil Programme.

Petrol vehicles

The proposed fuel resulting from the EU agreement would result in a 3% reduction in NO_x emissions. Low benzene petrol would result in a 6% reduction and performs better for the other pollutants - see Table 3.

Light duty diesels

City diesel shows substantial reductions for all pollutants except NO_x, where an increase of 5% is given. The fuel agreed by the EU gives much smaller reductions in particulate emissions but a 1% reduction in NO_x - see Table 4.

Heavy duty diesels

For heavy duty diesels, small reductions of 1 - 2% are given by the European agreed fuel.

City diesel reduces NO_x and particulate by 6%. City diesel increases HC emissions - although these are still fairly low - see Table 5.

Buses

The table below gives the result of tests carried out by London Transport Buses on emission reduction options. Operators reported that complaints about odours and smoke from depots ceased after conversion to city diesel. For all options Euro II engines (latest technology available) were used.

CAN CLEANER FUELS ACHIEVE CLEANER AIR?

Cleaner fuels currently on the market can reduce overall road traffic emissions by up to 5% for NO_x and 15% for particulates. For light duty vans and buses, particulate emissions could be reduced by up to 30%. The UK National Air Quality Strategy sets out approximate emissions reductions estimated to be needed, in addition to those already expected from existing technical improvements, if air quality standards are to

be met by 2005. This is estimated to be 10% of current levels by 2005. The use of cleaner fuels could reduce urban road traffic emissions by 2 to 3% compared to 1995 levels, and contribute towards improving air quality. The oil industry cannot produce large quantities of cleaner fuel in the short term.

IMPLICATIONS FOR CONSUMERS

Cleaner petrol and diesel often cost more than standard grades, so unless tax incentives are provided by the government they will remain a small part of the market. Recent moves by the Chancellor to introduce differentiated vehicle excise duties for cleaner fuels have made a start in this direction. In the short term, there are limited supplies of these fuels. However, in areas of poor air quality, they could be introduced rapidly to improve air quality in pollution hotspots.

This article is a summary of information in the NSCA Report :

Cleaner Air: the role for Cleaner Fuels, NSCA, February 1998. From NSCA, tel 01273 326313, e-mail: admin@nsca.org.uk

Table 4 Percentage change compared with conventional diesel

Pollutant	European agreement	City diesel
CO	-8	-24
HC	-8	-23
NO _x	-1	5
Particulates (no cat)	-5	-26
Particulates (with cat)	-6	-30

Table 5 Percentage change compared with conventional diesel

Pollutant	European agreement	City diesel
CO	-1	8
HC	0	21
NO _x	-1	-6
Particulates	-2	-6

Table 6 Percentage change compared with conventional diesel

Pollutant	City diesel	City diesel + catalyst	City diesel + particulate trap	
LPG				
HC	0	-46	-78	-44
CO	2	-79	-84	-33
NO _x	-5	-6	-16	
Particulates	-32	-54	-88	-61

An international renewables collection

Reviews by Dr Cleland McVeigh

"Photovoltaic Conversion of Concentrated Sunlight"

by VM Andrews, VA Grilikhes and VD Rumyantsev
Published by John Wiley & Sons, 1997, £55.

This book is translated from the original Russian and gives a comprehensive treatment of the issues involved in the creation of an efficient and cost-effective power resource. It is now over thirty years since the first installations with sunlight concentrators were made in the former Soviet Union, and since then many of their developments have been inaccessible to western countries.

Their approach has evolved from two basic concepts: that the cost of the electrical power generated can be lowered by reducing the area of expensive solar cells, in proportion to the sunlight concentration, using relatively cheap mirrors and lenses, and that the photovoltaic conversion efficiency can be increased due to a higher photocurrent density provided by light concentrators.

The great value of this work is that it gives access to Russian research material which was not previously available in translation, and the aim of the authors to bridge the gap in knowledge of their advanced photovoltaic concentrator systems has been achieved in this advanced (post-graduate level) text.

The two books on aspects of the renewable energies from UNESCO are part of a series designed "not only to provide

instruction for new generations of engineers but also to foster the kind of environmental management so urgently needed throughout the world" and to "promote awareness of the environmental, cultural, economic and social dimensions of renewable energy issues". They form part of the response to the Global Renewable Energy Education and Training Programme endorsed at the World Solar Summit in Harare in September 1996.

Following what is now standard practice in the better UK post-graduate energy courses, each chapter starts with a set of aims, describing what is covered in the chapter, followed by the objectives: "When you have completed this chapter you

should be able to..." or a similar wording. This helps to focus readers' attention on the material in the text.

At the end of each chapter, in addition to a brief bibliography and a few key references, there are some "self assessment" questions. These range from questions requiring simple "true" or "false" responses, to fairly detailed post-graduate level design exercises. However, most of the answers suggested to the qualitative questions on mini hydropower do not really give much help to the reader working on his own without a tutor.

'Mini Hydropower'

by Tong Jiandong, Zheng Naibo, Wang Xianhuan, Hai Jung and

Ding Huishen
UNESCO Energy Engineering Series, John Wiley & Sons, 1997, £29.95.

Mini Hydropower (MHP) is defined as a station having an installed capacity of between 0.1 and 1 MW, in accordance with the United Nations definition. The wide ranging introduction concentrates on the practical case of rural energy requirements in China, where primary electrification by the construction of either small (>1 MW) or MHP is realistic and applicable. The main body of the text covers all aspects of MHP, including small river planning, geological problems, civil works, turbines, electrical equipment and the economic and financial appraisal.



Two new brochures from the IEA's CADDET Centre for Renewable Energy describe wind and anaerobic digestion projects in Korea. Technical Brochure 66: Food Waste Disposal Using Anaerobic Digestion covers a plant at Anyang City which has successfully demonstrated the processing by a two-phase anaerobic digestion system of municipal solid waste, including food waste, to produce compost, biogas and recovered materials. Technical Brochure 72: Wind Power Generation at Cheju Island, Korea covers the country's first wind power demonstration project, a four-turbine installation which has been operational since 1995.

Copies of these and many other brochures are available, free, from the CADDET Centre at ETSU, tel: 01235 432719, fax: 01235 433595, e-mail: caddet.renew@aeat.co.uk

'Wind Energy Technology'

by John F Walker and Nicholas Jenkins
UNESCO Energy Engineering Series, John Wiley & Sons, 1997, £22.50.

This book introduces the student to modern methods, covering mainly the almost universal horizontal axis machine. The book is divided into two parts, the first dealing with turbine theory and its application, and the second covers project assessment and engineering. This includes economic assessment, planning, environmental and social issues.

Both books are at 'broad appreciation' post-graduate level and will form a useful addition to the course literature in a wide variety of both full-time and short post-graduate university courses.

May 1998

Low energy design strategies

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

Applied combustion technology

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

Understanding heat treatment

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

Power plant management, operations & maintenance

Conference, 12-15 May, Frankfurt, £799 + VAT
Details from IBC UK
Conferences, tel: 0171 453 5491, fax: 0171 636 6858,
email: cust.serv@ibcuk.co.uk

Solar water heating

Conference, 13-14 May, Cardiff, £129
Details from UK-ISES,
tel: 01865 484367,
fax: 01865 484263, e-mail:
uk-ises@brookes.ac.uk

Industrial use of electricity

Course, 13-14 May, Capenhurst, £595 + VAT
Details from EA Technology, tel: 0151 347 2557, fax: 0151 347 2256, e-mail: db@eatl.co.uk

Central/eastern

European gas

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

UK supply workshop

Course, 18-20 May, Brighton, £1395 + VAT
Details from PowerInk,
tel: 01730 265095,
fax: 01730 260044

Energy investment - a funding guide for SMEs

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

Coal at the crossroads

Conference, 19 May, London, £250 + VAT
Details from The World Coal Institute, tel: 0181 246 6611, fax: 0181 246 6622, e-mail: wci@wcicoal.demon.co.uk

Pipelines 98

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

Photovoltaic systems

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

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

Seminar, 25-27 May, Bulgaria
Details from the UN Economic Commission for Europe, fax

+41 22 9170038, e-mail: josefine.andorfer@unece.org

Gas for power generation

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

Energie Expo

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

Interpreting utility data

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

Steam turbine governing and overspeed protection

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

Cogeneration in Europe

Conference, 28-29 May, Lisbon, £849 + VAT
Details from IBC UK
Conferences, tel: 0171 453 5491, fax: 0171 636 6858,
email: cust.serv@ibcuk.co.uk

Polish energy sector

Conference, 28-29 May, Warsaw, £899 + VAT
Details from Euroforum,
tel: 0171 878 6886,
fax: 0171 878 6885

June 1998

The future of the UK gas industry

Conference, 1-2 June, London,

£849 + VAT

Details from Business Seminars International, tel: 0171 490 3774, fax: 01424 773334

Southern European natural gas

Conference, 1-2 June, Rome, £999 + VAT
Details from SMi Conferences,
tel: 0171 252 2222, fax: 0171 252 2272

West African oil and gas

Conference, 1-2 June, London, £899 + VAT
Details from SMi Conferences,
tel: 0171 252 2222, fax: 0171 252 2272

How to do an energy survey

Course, 2 June, London, £198
Details from Mid Career College, tel: 01223 880016, fax: 01223 881604, e-mail: course@mid-career-college.ac.uk

Environmental technology 98

Exhibition, 2-4 June, Birmingham
Details from Reed Exhibitions,
tel: 0181 910 7840,
fax: 0181 910 7989

Heat exchange engineering 98

Exhibition and conference, 2-4 June, Birmingham
Details from Reed Exhibitions,
tel: 0181 910 7859

ASME Turbo Expo 98

Exhibition, 2-5 June, Stockholm
Details from ASME International Gas Turbine Institute, tel: +1 404 847 0072, fax: +1 404 847 0151

New energy efficiency service for Student Members & SMEs

The Institute of Energy is a partner in StudentForce's Fresh Faces Programme for Energy Efficiency Advice, launched on April 1st. The programme will offer energy efficiency advice to small to medium-sized enterprises. It aims to place 90 students and recent graduates into placements, to work in conjunction with current employees in developing and

promoting new and effective approaches within this area.

Louise Evans, Deputy Chief Executive of the Institute said "Fresh Faces offers our member companies an excellent chance to take that further step towards energy efficiency, in a highly cost-effective and innovative manner. The potential for long term financial savings in this

area are large and are something that all businesses should be considering."

There are now a number of high quality graduates and students ready to be interviewed. ***Companies who feel they could benefit from this specialised service are invited to contact Ian Bacon at StudentForce, on 01780 722 072 for further information.***

Investors in People - investing in you

As a learned society and a professional body, The Institute of Energy admits individuals to membership via a rigorous assessment procedure, largely based on satisfying the Engineering Council's requirements for registration. This is based on their Standards and Routes to Registration (Sartor).

Other standards the Institute subscribes to are both explicit and implicit. For example, it has shared the development of the National Standards in Managing Energy and Vocational Qualifications. Our members must comply with standards of professional behaviour and competence. Many of our members themselves work to standards in the workplace, whether British Standards, ISO Standards, or the Investors in People and Vocational Qualification standards.

As a Nominated Body of the Engineering Council, we accredit to the specified standards, academic courses

and industrial training schemes appropriate to registration.

To complement these activities, it is highly desirable that the Institute can demonstrate that its multi-skilled, hard working and dedicated secretariat also works within recognised standards. The Investors in People Standard is an ideal benchmark of Human Resources, training and development activity, and can provide a framework to ensure that staff can become increasingly effective through enhanced personal development.

The Council of The Institute of Energy has made the far-sighted decision to sign up the Institute to make a commitment to work towards the Investors in People Standard. This will involve the Secretariat in a lot of work, putting in place a wide range of mechanisms to support the staff, committees and active members in their activities.

None of these activities will happen overnight but we are

about to make a start and we plan to keep you informed of developments as we progress, and ask for your input and support along the way.

You as members will benefit from us working towards the Investors in People Standard by the staff at the Institute having a realistic understanding of your working environment. It will assist with our communication with our members, and as we progress it is hoped that your Institute will become the focal point of expertise which you could tap into for your own advantage, as we recognise other activities are important to you in your energy business lives. In addition we hope that an increasingly developed group of people managing the affairs of the Institute will allow the organisation to grow into a vibrant and lively professional body, the envy of others.

***Contact Diane Davy,
tel: 0171 580 7124,
fax: 0171 580 4420,
email: ddavy@ioe.org.uk***

Branch Events

May 1998

YORKSHIRE

Thursday, 7 May, 6.00pm
Visit to the Royal Armouries, Leeds. Family event - special group rates apply. Contact Mr A Mallalieu, tel: 0113 276 8888

NORTH WESTERN

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

NORTH EASTERN

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

EAST MIDLANDS

Thursday, 21 May, 6.30pm
Visit to Ratcliffe-on-Soar Power Station followed by refreshments and AGM in the Power Technology Centre. Contact Mr G Thornton, tel: 01509 212670

SOUTH WALES AND WEST OF ENGLAND

Thursday, 21 May, 5.00pm
Brief AGM followed by "The Role of the Electricity Trader" - Simon Wilce, IVO Energy Ltd. SWALEC, Cardiff. Contact Mr I Weslake-Hill, tel: 01222 757527

June 1998

SOUTH WALES AND WEST OF ENGLAND

Thursday, 18 June, 10.00am
Works visit and Lecture "low NOx burners and the Future of Combustion" joint meeting with the Combustion Engineering Association. Contact Mr I Weslake Hill: tel 01222 757527.

Green Alert!



The Institute of Energy has long recognised the problems the person responsible for managing has when trying to convince others in the workplace to be energy efficient. This is often due to lack of education, motivation and commitment. The Institute of Energy, with support from a variety of organisations believes it has gone one step further to providing the solution, by producing a product called "Green Alert!"

The project began in 1996 when the Amalgamated Engineering and Electrical Union, Short Brothers, Northern Ireland Electricity and The Institute of Energy, met to discuss ways of establishing an energy efficient culture in their organisations and within their membership.

To add an extra dimension the Institute invited organisations in Europe to take part in the development of this product, The Austrian Ecology Institute, The Austrian Federation of Trade Unions, Verbund, The Italian Federation of Metal workers and Ansaldo.

Having formulated the project group we then applied to the Leonardo da Vinci

programme in Brussels for funding. Once successful, we worked with two consultancies, PCS Ltd and William Battle Associates to produce the first draft. The organisations involved then piloted the material with their young workers, human resource managers and training personnel. The material had a startling effect, even without graphics and colour - and motivating those who used it gaining commitment from them immediately, whilst creating a spin-off effect as they began to work in teams in other aspects of their work. Young workers were extremely pleased to have the opportunity to learn and have an impact on their organisation's energy efficiency, waste, water usage, transport policy, and packaging codes, providing ideas and real solutions.

The Institute has just submitted the final report to the Leonardo da Vinci programme and so has to await confirmation that the product is suitable for market needs.

Then this product will be available to you,

so watch this space!

Energy Awards Ceremony

You may remember that The Institute of Energy has been managing a pilot programme in Northern Ireland, to establish the Vocational Qualification in Managing Energy to provide energy managers with professional recognition. This project is nearing its conclusion, with 13 energy manager candidates and 3 assessor candidates having handed in their portfolios of evidence.

The Institute is working with the sponsors to provide a lively celebratory awards ceremony, in which Prof. John Chesshire and other key figures will award the candidates their NVQ unit certificates.

Alongside the awards given to the professional energy managers, the Institute will also be awarding all those who took part in the piloting of the product "Green Alert!" Many young workers put a great deal of effort into producing projects from the Green Alert material, which they presented to management personnel who were extremely impressed.

If you would like to understand more about how to implement the VQ in Managing Energy within your organisation, or learn from the experience of others about how to produce a culture of energy and environmental awareness through using Green Alert, then you may wish to attend this ceremony, to hear it from those who experienced it.

Contact Louise Collins, tel:

0171 580 0008, email:

lcollins@ioe.org.uk, to find out how to attend the Ceremony on 18 June 1998.

New Members

LONDON & HOME COUNTIES

Ashurst Morris Crisp

Group Affiliate

Sure Engineering Group

Group Affiliate

Mr Cary Brayne

Graduate,

Metropolitan Police Office

Mr Elie Debais

Graduate

Willbros International Inc.

Mr Andrew Barnes

Graduate, Kent

Mr Douglas King

M Inst E, Capita Creatorex

NORTHERN IRELAND

Mr Francis Jennings

F Inst E, Rotary Group Plc

Mr Damian Mallon

MInstE, Building Management (NI)

Dr Paul Williams

F Inst E, The University of Leeds

SOUTH WALES & WEST OF ENGLAND

Ms Joanne Spencer

Graduate,

University of Glamorgan

Mr Richard Price

M Inst E, University of Glamorgan

SOUTH

Mr Paul Cottam

M Inst E

George S Hall Ltd, Staffordshire

Power Ink Limited

Group Affiliate

Mr Kim Harmer

Associate, Hampshire

SCOTLAND

Mr Andrew Glassby

M Inst E, Total Oil Marine

MIDLANDS

Mr Denys Chance

FInstE, Engineering & Marine Training Authority



Melchett **98**
edal

**This prestigious award
is made to Dr Brenda
Boardman for her
authoritative work on
fuel poverty**

The Melchett Lecture
Tuesday, 16 June 1998, 6.15pm
Royal Geographical Society, London

“Energy, efficiency and equity”

by Dr Brenda Boardman

**PowerGen Fellow in Energy Efficiency at St Hilda's College and Head of Energy
& Environment programme, Environmental Change Unit,
University of Oxford**

Admission is free

I/we () will be attending the Melchett Lecture on 16 June 1998

Name(s)

Job Title(s)

Organisation(s)

Address

Tel:

Fax:

Email:

Please state if you have any special dietary requirements.

**Return to: Maria Adams
The Institute of Energy
18 Devonshire Street
London, W1N 2AU
Tel: 0171 580 7124,
Fax: 0171 580 4420,
email: madams@ioe.org.uk**

