THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy world

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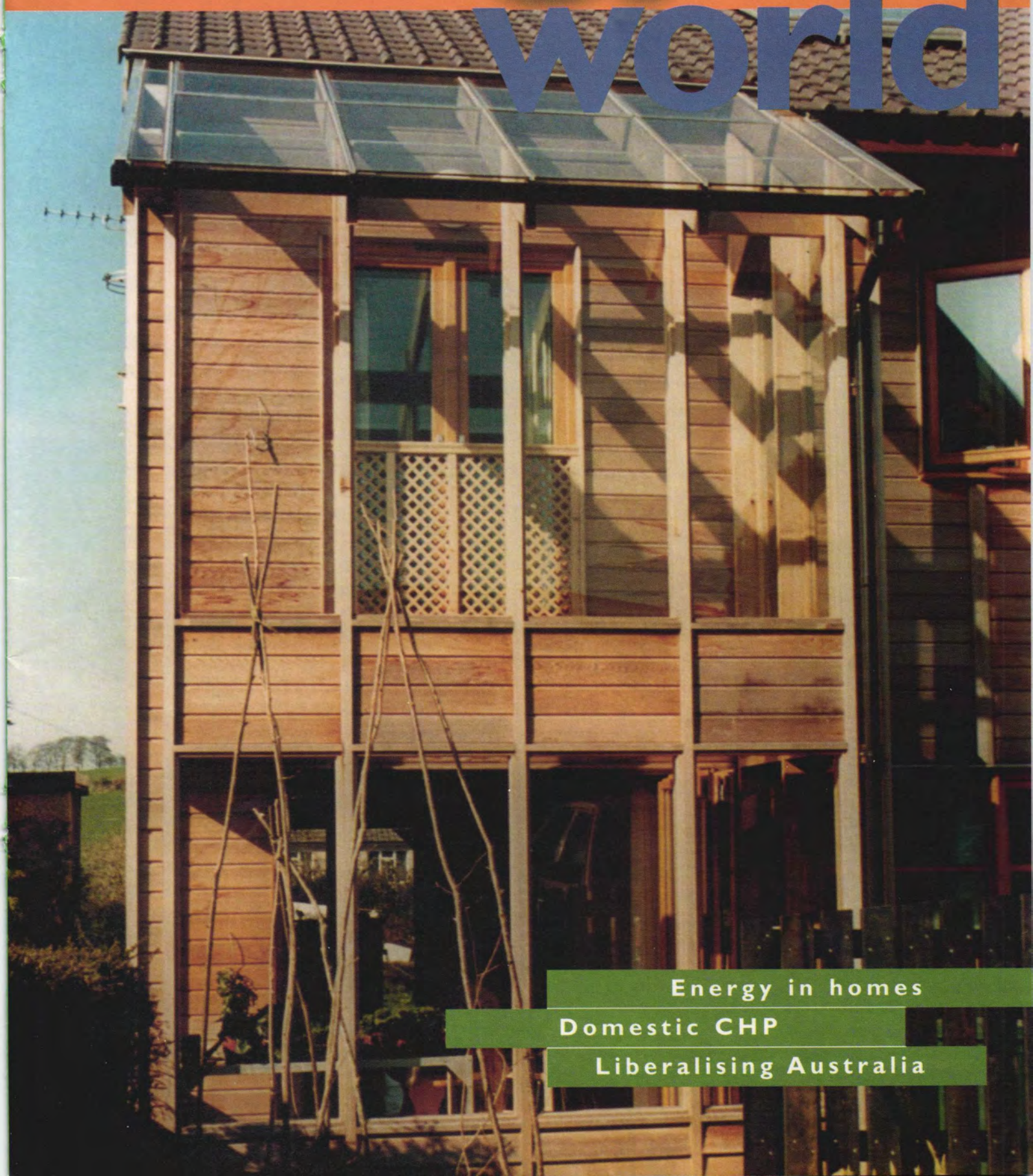
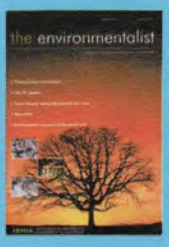


Energy in homes

Domestic CHP

Liberalising Australia



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The Environmentalist

The Institute of Energy has arranged for its members to subscribe to *The Environmentalist* magazine at the preferential rate of £25, as opposed to its non-member subscription rate of £30. The Environmentalist is the Institute of Environmental Management and Assessment's (IEMA) current affairs magazine. Published bi-monthly, it provides a practitioner's hands-on focus to the environment. Recent features have included: Environmental Supply-chain Management, Pollution Prevention and Control, Environmental Contingency Planning: a self-help guide, The Greening of Small Businesses

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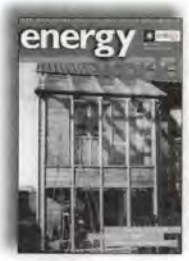
Contents



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COVER

Energy in homes – pictured is one of the first 'Integer' homes, built for permanent occupation by the Wiltshire-based Westlea Housing Association. The homes are based on a concept and design first seen at the Building Research Establishment in 1998, and include timber-frame construction, a sunspace to act as a buffer to the habitable rooms, solar water heating and some smart technology. See page 10 for news of what the housing association sector is doing for sustainability.
See also page 8 for news of the development of CHP units for individual homes.

Charging utilities for digging-up the road – a new utility tax?

Kevin Morton, Electricity Association Networks Committee, and Managing Director, London Power Networks

The UK has some of the most efficient and reliable utility services in the world. Take the electricity industry, for example, where UK customers can depend upon having power at the flick of switch for 99.98% of the time. To keep the network performing at this high level of reliability requires huge commitment and investment, both in terms of manpower and capital. Each year, the electricity industry alone spends £1.2 billion on upgrading and repairing its power networks.

In urban areas, this essential work inevitably means that companies in the electricity, gas, water and telecoms sectors have to dig up the street. Whether it is an urgent call to repair a fault, to connect more households and businesses to networks, or to upgrade existing services, these works must take place.

Coupled with this growth however, the UK is facing an inexorable rise in road traffic levels. With growing traffic jams in urban areas, the utilities have now become an easy target for those seeking to find a scapegoat for traffic gridlock - and Government, both national and local, may have found a new way of raising revenue into the bargain.

Lane rental

In August, after a change in the law last year, the Government launched two local trials of a controversial new scheme called 'lane rental' - a system which imposes charges on utilities for the road space they use when carrying out essential street works. If the trials, in Camden and Middlesborough, result in the introduction of lane rental across the country, the bill facing utility companies could be enormous.

While the cost to utilities will be extremely high, the measure will do nothing to address the main causes of traffic congestion. There are signs that the public knows this, even though decision-makers may not wish to hear.

In a recent survey carried out by leading opinion pollsters ICM for the National Joint Utilities Group (NJUG), results showed that the move to lane rental is out of step with the views of the public on the main causes of traffic jams. Instead of blaming utility companies, respondents cited too many cars on the road, a lack of affordable public transport, and poorly designed roads as the main reasons for gridlock. Fewer than one in 20 thought that utilities were the main cause of congestion - less than the number who thought local councils were themselves major culprits.

Co-ordination

Of course, nobody would pretend that street works do not at times add to existing congestion problems, but utility companies already do their best to complete these essential works as quickly as possible. To do otherwise would simply add to their own operating costs. The perception that the utilities do not talk to each other when they need to dig up the same stretch of road is also a false one. Co-ordination of these works is the responsibility of the highways authorities, and a great deal of liaison takes place. Utilities meet regularly with each other and the authorities, to give advance notice of essential works and to improve their timing.

However, not all works can be co-ordinated perfectly, as many are carried out at short notice in response to requests for emergency repairs. Electricity companies and others have a statutory duty to respond and must continue to do so.

To add to current uncertainties, the lane rental trials are not the first recent change in the law regarding utility street works. As recently as April this year, new regulations came into effect which allow highway authorities to charge utility companies for street works that run over their agreed time. It would be a mistake for the Government to introduce another new system of charges before the present system, only in force a few months, has had time to settle down.

Utility tax

In reality, if lane rental is introduced across the UK, it will be a new tax on utility companies, which already have every incentive to carry out street works in a prompt and efficient way. It would also be an unfair tax. Only utility companies are being targeted to pay the new charges, despite being responsible for only about half of all street works.

Rather like parking tickets, the scheme could turn out to be a substantial source of revenue for Britain's local councils. The public however, has shown signs of becoming impatient with new forms of taxation, or stealth taxes slipped through the back door, in this case via a hole in the road.

For customers and the general public, there are only two possible outcomes. Higher prices for their gas, water, electricity and telecoms as utility costs increase, or less reliable services - with traffic jams much as before.

When the UK Government finally studies the results of the Camden and Middlesborough lane rental trials, it should think very carefully before extending the scheme to the rest of the country. Utility companies should not be used as a scapegoat for traffic congestion.

UK emissions trading: incentives from December

Companies should consider joining the UK's greenhouse gas emissions trading scheme "sooner rather than later", says business advisory firm KPMG, adding that despite the voluntary nature of participation at the moment, the benefits of joining up could be considerable.

KPMG points to the tangible benefit of grabbing a slice of the £43 million worth of incentives to be made available for each of the next five years by the Government to encourage participation. But they suggest that the intangible benefits, experience gained and the building-up of people and management skills, may be more significant in the long term.

The Government published the final 'framework document' for the world's first national emissions trading scheme in August with a view to "cut up to 2 million tonnes of carbon a year from the atmosphere by 2010 and generate new job and investment opportunities for industry".

According to DEFRA, participants sign up to delivering emission reduction targets which can either be made by cuts in-house or by buying and selling emission 'allowances' on the market to meet those targets. If firms can reduce emissions cheaply and beat their targets, they can sell the surplus allowances or bank them for future use.

The Government has pledged up to £215 million over five years from 2003-04, to provide incentive payments for companies to join the scheme. This will be allocated through an auction next year. However, there will also be sanctions on companies who break the rules, says DEFRA. Those failing to achieve their emission reduction targets will have to pay back incentive money with interest and will face tougher targets in future years to make up the shortfall.

The programme and rules for the auction of incentive money will be published in December, and bids from those wishing to enter the auction will be invited early next year.

Environment Minister, Michael Meacher said: "The UK climate change programme could cut greenhouse gas emissions to 23% below 1990 levels by 2010. I expect our [emissions trading] scheme to make a significant contribution and at the same time benefit both business and the environment by stimulating and financially rewarding innovation and investment."

Copies of the framework are available from DTLR, tel: 0870 1226 236, or via the DEFRA website at www.defra.gov.uk

1979 North Sea field produces oil

A new 700 ft long oil production and storage vessel to be used by its owners Kerr-McGee to extract oil from the Leadon field in the North Sea has been inaugurated at the Swan Hunter Yard on Tyneside by Energy Minister, Brian Wilson.

The floating production, storage and offloading (FPSO) facility - called the Kerr-McGee Global Producer III - will be used on a field originally discovered in 1979 by the British National Oil Corporation but thought not to be economic. In 1998 Kerr-McGee took a fresh look at the geology of the field using modern geophysical testing equipment and the project has now been brought forward to the development stage.

Swan Hunter added new topside processing facilities to an existing Japanese built hull.

Brian Wilson said: "The success of Leadon, which is expected to produce some 50,000 barrels of oil at its peak, demonstrates that there is still tremendous potential to develop our North Sea oil and gas reserves".

The project has also provided a boost to the offshore fabrication industry, securing some 800 jobs for Tyneside and 40 new apprenticeships, added Wilson.

Oil reserves are estimated at 120 to 170 million barrels, to be recovered over an expected field life of 16 years.

- Meanwhile, condensate and gas production from the larger Franklin field started in August, says operator TotalFinaElf Exploration. The combined production rate of both Franklin and neighbouring Elgin is expected to reach a plateau of 14,000 barrels/day of condensate (equivalent to 5.5% of current UK production), and 13 million m^3 of gas per day (4.5% of current production). Elgin/Franklin is said to be the biggest development in the North Sea for decades.

Brian Wilson - Energy Minister

Turbines to be built in Scotland

The UK's first wind turbine factory is to be built for Danish company Vestas Wind Systems on the former NATO Air Base near Campbeltown on the Mull of Kintyre, Scotland, creating 160 jobs. Location of the plant in Scotland has been facilitated by European funding of £3.6 million from the Highlands and Islands Special Transitional Programme.

The opening of the new facility will enable Vestas to supply not only the Scottish market, but also the rest of the UK and the Republic of Ireland to meet the steadily growing market for wind turbines there.

The Scottish Executive says it will raise the target for renewable energy in Scotland from the present 12% to around 18% by 2010.

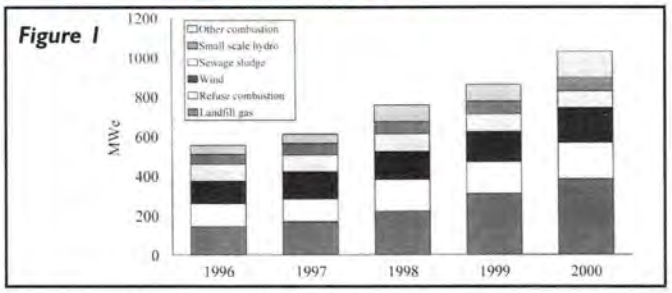
Renewables growth rate not strong enough

The current rate of growth of renewable energy in the UK is not sufficient to meet Government targets, according to the DTI's Digest of UK Energy Statistics, 2001.

Figure 1 shows that progress towards the 2003 and 2010 targets of achieving 5% and 10% of total UK electricity generated from renewables looks unconvincing – suggesting that the rate of deployment of new schemes will have to be increased if the targets are to be met. Total output is far from smooth, reflecting the variability of output of hydro schemes. However, the graph also shows that the use of 'new renewables' (ie wind, small hydro, landfill gas and refuse combustion) has grown to match the output of well-established large-scale hydro schemes over the last decade.

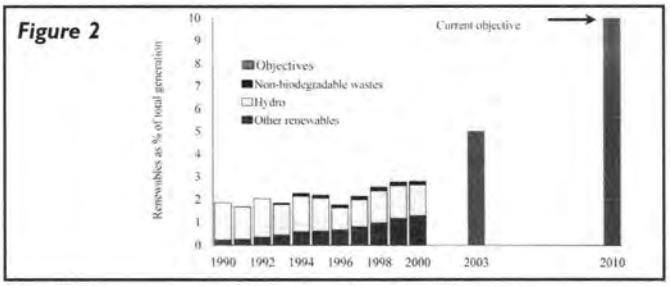
Figure 2 illustrates how the successful development of refuse, landfill gas and 'other' combustion schemes increasingly dominates the 'new renewables' sector. Photovoltaic schemes do not register. However, wind power is expected to enter a new growth stage soon as offshore schemes begin to be built.

Figure 1



Growth in electricity generation from renewables since 1990

Figure 2



Electricity generating capacity of renewables (excluding large-scale hydro)

Farmers encouraged into wind power

British farmers are to be helped to develop small, typically two or three turbine, wind farms under the new 'WindWorks' initiative launched by National Wind Power. The service will help farmers and landowners to develop a low-risk income stream from the wind, says National Wind Power, and make important contributions towards the UK's renewable energy targets.

The WindWorks package replicates a formula which has been successfully implemented in Denmark for years – the world's leaders in wind energy. It will, says National Wind Power, provide farmers with the financial rewards associated with ownership of a wind energy project, whilst avoiding exposure of farmers and landowners to new financial risks at a time when great uncertainty exists in the farming industry and rural economy. It also avoids the problems that can be caused by the high cost of financing small wind energy projects.

The National Farmers' Union is in favour of the use of renewable energy and sees wind farming as an opportunity for farmers to supplement their depleted incomes. Likewise, the Country Land and Business Association (previously known as the Country Land Owners Association) supports the development of renewable energys, and sees them as an "opportunity for a profitable contribution to the reduction of greenhouse gases."

Heating and air conditioning for the new £250 million ExCel Exhibition Centre in London's Docklands will be supplied from a 1.35 MW CHP generating set installed by Cummins Gas Projects Division. The Centre – which is larger than the nearby Millennium Dome – has broken a number of records by becoming the largest single roofed structure in the UK and the largest single building for the UK's events industry. However, a limited grid supply and the high cost of local grid reinforcement led to the formulation of an alternative energy strategy.

The ExCel Energy Centre, which is operated by Scottish & Southern Energy, also includes three 6 MW boilers, two 2.5 MW absorption chillers, and one 3.9 MW vapour compression chiller, together with two diesel powered standby generating sets that can also be used in peak lopping mode for up to 250 hours a year.

Operating 365 days a year and 24 hours a day, the CHP unit is able to provide hot water at 130°C generated by waste heat from its exhaust system, which is used for heating the Centre in winter. As well as providing electricity, the CHP unit also provides chilled water for air conditioning during the summer months. In the event of a mains power failure, the CHP unit is automatically stopped and a circuit breaker is opened, isolating the unit.

Ofgem cuts connection costs for wind farm

Renewable energy consultant Econnect has won a major victory for green generators by cutting proposed grid connection costs for a Scottish wind farm.

The future of the 15 MW Deucheran Hill Windfarm was threatened by an initial connection quotation from Scottish & Southern Energy (SSE) of almost £5 million. However, the wind farm on the Mull of Kintyre, is now under construction after Econnect were able to prove that Powergen Renewables should not foot the cost for reinforcement of the transmission system. The revised connection quotation, issued under the direction of Ofgem, excluded the cost of transmission reinforcement and amounted to less than 5% of the original connection cost.

Econnect was able to draw from direct experience of previous embedded generator connections in England and Wales under NFFO contracts, similar to the SRO contract that Powergen Renewables had for Deucheran Hill. The innovative solution was achieved by development with SSE of a generator management scheme that will constrain the wind farm generation for very short periods each year.

This was introduced in order to secure the transmission system in the event of a circuit outage, or summer periods of high wind speeds, that could lead to power flows exceeding the firm capacity of the transmission circuits. In its ruling, Ofgem recognised the principle of constraint as a technically and commercially acceptable method for connection of embedded generation.

Interfacing with NETA - Seabank Power's 1140 MW combined cycle gas turbine power station at Hallen, north west Bristol, has made a smooth transition to operating under the New Electricity Trading Arrangement (NETA) earlier this year with the help of the 'genesisplus' software developed by ABB Energy Information Systems.

NETA, which went live on March 27, was a radical overhaul of Britain's £7.5 billion wholesale power market, replacing the England & Wales electricity pool with a liquid and transparent commodity-type market, complete with long and short term forwards markets as well as a balancing mechanism and settlement process. Power generators such as Seabank Power, who wish to take part, must have approved trading software which can communicate intelligently with NETA central systems.

The software, which acts as the front line trading interface between Seabank Power and its exclusive customer, Scottish & Southern Energy, provides four core modules to cover the mandatory areas of NETA – administrator, operational management, contract volume notifier and settlement. Seabank Power has also purchased a number of optional modules, including the energy balancer module, the generation monitor module and the fuel manager module.

In operation, Seabank Power uses genesisplus to negotiate on-line with the Scottish & Southern Energy trading team based in Perth, Scotland to prepare a generation plan for a day ahead divided into half hour segments.

British manufacturers export generation plant

Two UK companies have won substantial orders to supply electricity generation equipment overseas.

Steam turbine manufacturer Peter Brotherhood Ltd has won a contract to supply seven new machines to Thal Industries in Pakistan for its Layyah Sugar Mills subsidiary. Completion of the order, valued at more than £1.6 million, will take the total number of Peter Brotherhood turbines operating in Pakistan to over 150.

The seven machines in the current order comprise two 3 MW multi-stage turbine generators which will produce electrical power for mill machinery, four single stage 650 kW mill drives and a single stage 1.7 MW shredder drive. All the machines will take steam from boilers fired by burning bagasse, the waste material left after sugar cane processing - making this a particularly green form of energy.

Meanwhile, micro-turbine manufacturer Bowman Power Systems Ltd has shipped out its fifth micro gas turbine (MGT) cogeneration unit to Japan. The 80 kW CHP system will undertake site trials in Japan as part of a worldwide pilot programme.

The trial programme is being undertaken by Kubota, one of three partners in Bowman Power's Japanese joint venture. Together with Mitsui and NTT-F, Kubota is working with Bowman to jointly market and support the company's CHP systems in Japan.

"We are focused on being a major player in Japan's emerging distributed power market," said Bowman Power managing director, Jim Campion, adding that the deregulated Japanese power market is expected to grow rapidly, especially for energy-efficient CHP systems.

Bowman Power is also developing the Turbogen family of small scale compact power generation systems ranging from 25 kWe to 80 kWe, for distributed power generation and for mobile power applications.

Smit Maritime Contractors is to use its multipurpose offshore installation vessel Smit Pioneer (pictured) to complete the installation contract for the Espoir floating production, storage and offloading (FPSO) vessel to be stationed offshore Jacqueville, Ivory Coast. The FPSO will be operated by Prosafe Production, on behalf of Ranger Oil Cote d'Ivoire SARL.

Smit's contract involves a series of four operations: the mooring installation, followed by the installation of subsea infrastructure, hook-up and testing of the FPSO and the installation of a pipeline end manifold, connecting the existing pipeline to the FPSO. The FPSO for the Espoir Field is currently undergoing conversion at Keppel, Singapore and is scheduled to arrive in the field at the end of this year. Water depth at location is 120 m.

The FPSO has a crude oil production capacity of 40,000 barrels per day (bpd), a water injection capacity of 60,000 bpd and a gas compression capacity of 60 million standard cubic feet for gas lift and export. Oil will be exported by shuttle tanker and gas will be exported to shore, where it will be used to generate electricity.

New hydrogen cars, fuelling stations in the US

The Toyota Motor Corporation has unveiled a new prototype fuel-cell vehicle based on the Highlander sport utility vehicle in the US. The FCHV-4 is powered by a 90-kW fuel cell in combination with a nickel-metal hydride battery and regenerative braking, which uses the energy of braking to recharge the battery.

Running on high-pressure hydrogen, the vehicle achieves a top speed of nearly 95 miles per hour, has a range of more than 155 miles and achieves triple the fuel efficiency of a regular gasoline-powered car. Toyota is road-testing the vehicle in Japan and the United States, with the US tests being carried out through the California Fuel Cell Partnership.

Meanwhile, the Ford Motor Company has also launched a hydrogen-fuelled car in the US, but this one uses an internal combustion engine. The P2000 concept vehicle achieves extremely low emissions using a modified version of the 2.0 l engine found in the Ford Focus. The engine's efficiency is 25% to 30% better than the gasoline-powered version. Ford believes the vehicle can help lead to a hydrogen infrastructure while fuel cells continue to be developed.

Hydrogen-fuelled vehicles became a step more feasible as both the American Honda Motor Company and BMW have opened hydrogen fuelling stations in California for their fuel cell powered vehicles.

Located at its research and development centre in Torrance, California, Honda's station uses solar power to extract hydrogen from water. Solar panels on the station generate enough hydrogen to power one fuel cell vehicle, but additional electrical power from the power grid is used to increase the hydrogen production capacity.

BMW's new liquid hydrogen fuel station is located at its Engineering and Emissions Control Test Centre in Oxnard, California, where the company is taking a different approach to most car companies by burning hydrogen directly in advanced internal combustion engines.

New CCGTs for Australia, Malaysia and Bahrain

Paris based power company ALSTOM has been awarded orders for the turnkey supply of three new combined cycle power plants; at Perlis in Malaysia, at Al Hidd in Bahrain, and at Kwinana in Australia.

The projects involve a total of seven GT13E2 gas turbines and have a combined value of approximately 820 million Euros.

The fleet of over 60 operating GT13E2 units has already achieved more than 1,000,000 fired hours, says ALSTOM. The gas turbine is a proven, high reliability, machine with low environmental emissions.

Teknologi Tenaga Perlis Consortium Sdn Bhd has awarded a contract for over 330 million Euros for a 675 MW plant to be located in the state of Perlis, in the northwestern part of Malaysia. ALSTOM will be responsible for engineering, procurement and construction of the plant, which is scheduled to commence operations by March 2003.

This contract award follows an order won recently by ALSTOM to expand Lumut power plant, the largest combined cycle plant in Malaysia.

The State of Bahrain's Ministry of Electricity & Water has awarded a letter of intent for a turnkey contract, valued at over 350 million Euros, for a similar plant to be located at Al Hidd in the state of Bahrain.

The Western Power Corporation placed an order worth more than 140 million Euros, for a 240 MW plant in Kwinana, Western Australia. Commercial operation is scheduled for the end of 2003.

Algeria increases gas and oil export capacity

Algeria is to increase the export capacity of its Pedro Duran Farell pipeline, a 1,400 km gas line connecting Algeria to Europe through a link under the Straits of Gibraltar.

Global technology company ABB has been awarded a contract worth $93 million to design and build a gas compressor station in Algeria which will increase the pipeline's flow rate from 8 billion to about 11 billion cubic metres of gas per year.

The pipeline is owned and operated by the state-run oil and gas company, Sonatrach.

In June, ABB won a $70 million contract to upgrade a key oil pipeline in Algeria, also owned and operated by Sonatrach, increasing its capacity from 17 to 23 million barrels per year. The 290 km oil pipeline links the Hassi Berkine oil field with the dispatching terminal of Haoud El Hamra, located around 1,000 km south east of Algiers.

Both projects will be managed and designed at ABB Lummus Global's office in Milan, while construction activities will be carried out by Sarpi, a 50% joint venture company owned by Sonatrach and ABB.

The project should be completed by 2003.

The Vilvoorde coal and oil-fired power plant, located in the vicinity of Brussels, has been converted into a gas-fired combined-cycle station and increased its rating, with the Siemens Power Generation Group supplying the complete gas turbine-generator. The upgrade has increased the total power output of the plant from 135 to around 386 MW. Repowering has also increased Vilvoorde's efficiency, from previously 38% to about 56%. The station is operated by the Belgian utility Electrabel, with management of the power plant project being handled by Tractebel Energy Engineering.

A new heat-recovery steam generator, with heat input provided by the gas turbine exhaust gases at a temperature of around 580°C, has replaced the old coal-fired steam boiler. The new steam generator now raises steam for the existing steam turbine.

A decisive factor for the operator opting for the Siemens solution was the fact that Vilvoorde can now also be used for grid frequency stabilisation, says the company. It is now possible to increase or decrease gas turbine output at a gradient of 44 MW per minute. Furthermore, for example, in the event of a grid disturbance, the plant can switch over from full load to auxiliary power supply (load rejection). The gas turbine remains operational and can immediately feed power into the grid again as soon as the disturbance has been rectified, adds Siemens.

NE America and Canada sign climate pact

Notwithstanding the US federal Government's non-cooperation stance on tackling climate change, State Governors in New England and the Premiers of eastern Canadian provinces have agreed to reduce greenhouse gas emissions in their region. The Governors and Premiers adopted a Climate Change Action Plan that includes measures to increase energy efficiency in the region, increase the use of renewable energy, and decrease the impact of transportation. It also sets the groundwork for exploring a regional system of trading emissions credits for greenhouse gases. The agreement was adopted at the annual Conference of New England Governors and Eastern Canadian Premiers.

The region's Climate Change Action Plan sets a short-term goal of reducing greenhouse gas emissions to 1990 levels by 2010, and sets a mid-term goal of reducing the emissions to at least 10% below 1990 levels by 2020. The short-term goal is less restrictive than the Kyoto Protocol, which calls for a US reduction of greenhouse gases to 7% below 1990 levels by 2012. The plan's long-term goal, which has no specific timeframe, is to reduce greenhouse gas emissions to 75% to 85% below current levels.

Meanwhile, President George W Bush has signed an executive order that requires federal agencies to buy electronic devices that use only one watt or less when not turned on. Devices with an external power supply, remote control, or a clock display can draw as much as 20 W of power when turned off. In many cases, this 'standby power' is much more than necessary and can easily be reduced by the manufacturer. The executive order requires the US Department of Energy to compile a list of products that either meet the one-watt standard or have the lowest standby power for that product line. Agencies must buy electronic products from that list unless doing so would not be cost-effective or practical.

- The US has a new 80 MW hydroelectric power project operating commercially in Summersville, West Virginia. Gauley River Power Partners (GRRP) built and is operating the plant, which is located adjacent to a US Army Corps of Engineers dam on the Gauley River and owned by the City of Summersville. Appalachian Power Company is buying its output.

Domestic-scale (heat and) power stations?

by Steve Hodgson

Domestic consumers could cut their annual energy bills by £150 or £200 and their emissions of carbon dioxide by a quarter - by replacing their central heating boilers with tiny, indeed micro, CHP systems which would then also generate part of their electricity needs. Around 13 million homes could incorporate their own (heat and) power stations in this way within a couple of decades, delivering a very significant proportion of national carbon dioxide reduction targets in the process.

Indeed, the widespread adoption of gas-fired, domestic CHP is more likely to fill Britain's 'energy gap', ie replace the output from ageing nuclear power stations, than renewables, according to some attending a conference organised by the CHP Association and the Society of British Gas Industries in London in the summer. Steve Hodgson was there.

There it was, lurking in the corner of the room, the first micro CHP unit that most delegates arriving at the CHPA/SBGI conference in July had seen – an 'ecopower' unit designed and built in Switzerland and now available in Britain from CHS Limited in Camberley, Surrey. Not a true domestic unit at 4.7 kWe (electrical), the ecopower unit is large enough to serve several adjoining homes or a large single house with its own swimming pool, or a small commercial building. It has a UK retail price of some £8,000, which CHS is keen to reduce. Nevertheless around 250 units already deliver heat and power to buildings across Europe, says the company.

According to CHS, the ecopower unit runs on natural and propane gas, has a (thermal) output of up to 13 kWth and claims an overall efficiency of 90% or more. The design of the Otto single cylinder (just 270 cm^3 in size) reciprocating engine is well tested and has a service interval of 4,000 hours.

However, single home energy loads are smaller than 4.7 kWe and much of the day focused on even smaller devices designed to replace domestic gas boilers and convert individual homes to power stations. The replacement of just a fifth of Britain's central heating boilers with CHP would reduce national emissions of carbon dioxide by 5%, said Peter Lehman of the Energy Saving Trust.

This kind of penetration of new technology is not without its challenges, though: developing reliable equipment, electricity network issues, metering and training enough people to service the units – added Lehman. There is already a shortage of people trained to service today's heat-only boilers.

But perhaps the bigger barrier will be capital cost to the consumer – CHP units cost considerably more than boilers to buy - and this may need to be bypassed using a leasing or energy services approach, said Lehman.

Equally important, if the technology is to take off in a big way, will be a sympathetic regulatory environment. The current work of the Embedded Generation Working Group will be crucial here, said Lehman, if new, 'embedded' generation technology is to thrive. The two key factors are the regulation (both technical and commercial) of connection agreements and of workable metering, settlement and trading arrangements.

Domestic CHP would deliver an important benefit to the electricity system by exporting power to the grid at times of peak demand, typically winter daytimes, so Ofgem must both recognise and reward this, added Lehman.

Speaking of the current energy review, Lehman said that the simplest analysis points to a choice between promoting and building CHP stations and expanding nuclear power.

BG's Stirling engine unit

Perhaps the most important developer of true domestic-sized micro CHP in the UK is the BG Group which, said spokesman Mish Tullar, had been looking at units based on a Stirling engine for seven years now. BG's product will be, once it is available, a mass market proposition rather than to fill a niche, he added.

BG intends to put its unit (pictured) on the market by 2003 and is currently seeking support for a large-scale trial to be carried out next year. The 1.1 kWe unit represents a domestic base load, not peak, said Tullar, and the modulating unit, able to run on LPG and oil as well as natural gas, will also supply 5 to 50 kW of heat. BG sees units controlled in heat-led mode, with the unit producing electricity as a by-product.

BG calculates an annual energy cost saving of around £200 (from a typical annual bill of £670), most of this from the electricity bill, and carbon dioxide and primary energy savings both of 28%.

An additional benefit to householders would be added security of supply of both heat and power, said Tullar, remembering that winter gales can upset heating as well as power supplies as central heating systems cease to work without power.

Tullar agreed with Peter Lehman that high capital costs would mean that units would mostly be installed under energy services agreements of partnerships with energy suppliers. Although the 'fuel rich' might just as well pick up a domestic power station from B&Q!

So what is holding-up the emergence of domestic CHP? Not technical issues – these are "cracked" according to Tullar, but work still needs to be done on the range

BG's 1.1 kWe 'concept demonstration' unit

of regulation already described by Peter Lehman. Another barrier was bound to be a natural resistance from installers, until confidence in the new technology was established. Without a programme of active support measures, domestic CHP could end up confined to a "green-aware, fuel-rich" market, added Tullar.

Electricity industry view

Electricity research company EA Technology is another enthusiastic supporter of micro CHP, having produced a major report on the subject for the Trust. EA's Jeremy Harrison spoke of the need for large numbers of units, deeply embedded in the electricity system and an EU potential of 1 million units (worth 3 billion Euros) annually. The UK potential was to install a similar amount of micro CHP capacity as we currently have nuclear power stations, although CHP would actually generate less power as it will not operate as base load. He foresaw perhaps 250,000 UK installations per year by 2010.

According to Harrison, only one-per-home units can be called micro CHP. Domestic power loads start from around 0.15 kW with appliances switched off, to an average of around 0.5 kW and rising to a peak of 20 kW or more when kettles and electric showers are used simultaneously. So the size of a domestic unit has to be chosen carefully and no unit will satisfy all power requirements.

Harrison added that a 1 kWe unit is viable for 13 million UK homes while 5 million of these could use a 3 kWe machine and export more power. The economics of micro CHP are so good, potentially, that electricity companies will find themselves helping the technology to market rather than obstructing it.

What do electricity companies make of micro CHP? TXU Europe's John Curran offered a surprising analysis. Curran suggested that a new generation of gas-fired CCGT power stations cannot replace the current mix of nuclear, coal plants said to be on their way out. Why not? As well as worries over fuel dependency, Curran listed some technical issues including:

- problems with electricity grid stability,
- problems with high pressure gas connections to CCGT stations, and
- national gas transmission system capacity limits.

The alternative is micro CHP, said Curran. But he finished on a discordant note, suggesting that, with fuel cells said to be waiting in the wings, Stirling (or reciprocating) engine-based CHP might not be the technology to back.

District energy supplies homes in Manchester and the Docklands

Domestic-scale CHP is not the only way to deliver locally-generated heat and power to homes, as certain people in Manchester and the Docklands area of London are now experiencing. While community heating has been used on local authority-owned housing estates in London and the north of England for many years, some of these systems are now being refurbished, and upgraded with the addition of CHP in order to supply generated electricity as well as heat.

The addition of 150 kWe CHP units to each of two existing community heating systems serving 400 homes in Manchester helped CHP supplier Powerminster Ltd to win the CHP Association's Community Heating Award this year. The resulting reductions in fuel bills are worth an average of £180 per year, says the CHPA.

The new systems, which serve six high rise blocks in Rusholme and Newton Heath, have replaced old and inefficient warm air and electric storage heating systems with new radiator systems incorporating individual controls, metering and smart card prepayment technology.

The systems were developed and are now operated by a new company, the Manchester Energy Company, established in accordance with Manchester City Council's affordable warmth policy to alleviate fuel poverty on the two estates. The company used the Government's PFI initiative as a more cost-effective route to success than the Council undertaking the work itself.

Residents have experienced fuel reductions of up to £20 per month and the two schemes have also cut annual emissions of carbon dioxide by more than 1,200 tonnes.

Meanwhile, the 'Eastenders' own power station', the Barkantine district energy scheme in the London Borough of Tower Hamlets was commended in the same awards. The new CHP/community heating scheme is said to cut annual energy bills for the residents of the Barkantine Estate in London's Docklands by an average of £90.

Also developed under the PFI, the new CHP/community heating system supplies heat and power to a local swimming pool and school as well as 700 homes on the

Manchester homes now supplied with combined heat and power

estate. At the heart of the scheme is a new 1.4 MWe CHP unit and two thermal storage vessels housed in a previously derelict electricity substation. The CHP units and two additional boilers distribute hot water using 2.4 km of new heating mains.

Householders gain from both lower heating and electricity bills – on average saving a total of £90 per home each year, or nearly £50,000 in total. The scheme has also reduced annual carbon dioxide emissions by 2,500 tonnes.

Housing associations take lead towards sustainable homes

by Martin Rowbottom, Director, Sustainable Homes

Housing associations have for some time pioneered low energy and sustainable housing designs and refurbishments. And, as associations are now landlords to more people than local authorities, they form a crucial part of the housing mix. Here, the late Martin Rowbottom rounds-up some of the work being done by the sector, including that done by his own association, Hastoe HA.

First published in 1988 by the then National Federation of Housing Associations: *Warm Home: a manifesto* set out the need for energy conservation in housing association properties. Since then England's 2000 housing associations have made a patchy response to energy efficiency issues. A number have adopted energy saving measures with a will. They understand their potential for cutting greenhouse gas emissions, reducing demands on finite resources and providing affordable warmth for their tenants, most of whom live on very low incomes.

But many do little more than meet their statutory obligations. Convincing them of their responsibilities is an important task, particularly those among the 150 larger associations who own 80% of the 1.3 million homes in the sector and build most of the 22,000 new homes added to the total each year. The potential of housing associations as energy efficiency champions will grow rapidly over the next decade, during which the Government hopes to see them take over 2 million council homes.

Associations are part of a domestic sector in England that uses around a quarter of the total energy in the country and is responsible for a similar proportion of greenhouse gas emissions. Reductions in emissions from the domestic sector have been largely the result of the switch to the use of gas in generating electricity. An increase in the number of households and an expanding demand for electricity is eroding any savings made by increasing insulation levels and producing higher efficiency levels in heating and hot water systems.

Overall, the domestic sector is responsible for greenhouse emissions of between 40 and 45 million tonnes of carbon (MtC) a year. The Government's Climate Change Programme identifies a potential saving of around 5 MtC by the year 2010. However, unless further action is taken at that point, the increase in the number of households and the demand from lighting and appliance use will increase energy consumption and emissions.

Tackling fuel poverty

Publication of the Government's Fuel Poverty Strategy at the beginning of this year was the first official recognition of this pernicious problem. Fuel poverty is responsible for an annual winter cull among the old and the infirm, the result largely of an increase in heart and respiratory problems caused by cold homes. Fuel poverty exists officially where a household has to spend more than 10% of its disposable income to achieve a winter comfort level of between 18 and 20°C. Some 20%, or 5 million, of the households in England are in this situation. The poorest 20% of the population spends 10–12 % of their income on energy, compared with 4-5% for the population as a whole.

Households suffering from fuel poverty are concentrated either in rented or older owner-occupied housing. With poor quality housing and limited incomes, many people are unable to heat their homes to an adequate level in winter, resulting in a reduction of comfort and deterioration in their health. About 25% of households in the housing association sector live in fuel poverty.

The challenge for associations is to achieve sufficient improvements in their older housing to meet the target of eliminating fuel poverty by 2010 in all vulnerable households containing older people, disabled men and women and families with younger children. The Warm Homes and Energy Conservation Act 2000 places an obligation on the Government to put in place a strategy to eliminate fuel poverty in all households by 2016.

Significant increases in energy efficiency will be needed to achieve these targets, but this will not necessarily produce comparable savings in greenhouse gas emissions. A large part of the potential energy savings will be absorbed by increased comfort. Affordable warmth will not be provided by inefficiently heating empty roof spaces or allowing heat to leak through poorly fitted doors and windows and walls without insulation.

Increasing SAPs

Housing associations have shown the potential for energy savings in older housing stock. South Yorkshire and the Arches housing associations, for example, have insulated Victorian houses and

A scheme of 50 energy efficient houses built by Ealing Family Housing Association in Reading and partly funded by the Thermie programme. Highly insulated timber-frame construction was used, and a mixture of gas combination or condensing boilers installed. Solar panels were fitted on some of the homes to pre-heat water in the hot water systems. On average, they produced 50% of the hot water. SAP energy efficiency ratings ranged between 96 and 100. Detailed monitoring over 12 months showed an average reduction of 31% in gas consumption.

installed high-efficiency gas heating systems. Some of the properties were fitted with solar panels. SAP scores (a measure of energy efficiency ranging from 0 = very poor, to 100 = very efficient) of up to 94 to 97 were achieved, creating increased comfort and a reduction in fuel consumption. While these are extreme examples of what can be done with older property, they do demonstrate that existing housing can be improved where there is the will and the resources are available.

Resources are a major issue. The Government is proposing to harmonise housing association and council rents. In some cases this will reduce associations' rental income and make it extremely difficult for them to improve energy efficiency in their existing homes.

The Housing Corporation, the Government agency which finances and monitors the work of housing associations, has set minimum standards and recommended standards of energy efficiency for newly built and refurbished housing based on the experience of those associations who have been innovators in the field. The standards are established by reference to SAP scores which take into account the levels of insulation and design of the property, together with the efficiency of heating and hot water systems. It does not take into account lights and appliances. The target SAP figures vary with the size of the property.

The minimum requirements for new homes, higher than those in the Building Regulations, range from a SAP of 71 to 85. The recommended levels are 77 to 91, higher than proposed revisions to the Regulations. The standards for refurbished housing, the only set in operation for existing homes in England, range from minimum requirements of 56 and 70 to recommendations of between 62 and 76. To obtain grant aid for new projects from the Housing Corporation associations must meet the energy efficiency standards.

Furthermore, the Housing Corporation requires associations to report annually on the average SAP score for their whole stock, and to report on year-on-year changes in that average. The Corporation expects associations to produce energy efficiency strategies to improve their existing housing and deal with fuel poverty.

Action by associations

Responses to the need for increased energy efficiency have ranged across the spectrum of passive to active measures. Several associations have investigated the benefits of solar water and space heating. Some have installed photovoltaic panels on selected houses, some of them as part of the Department of Trade and Industry's 100 roof trial.

Focus Housing Group scheme at Castle Vale, near Birmingham, demonstrates the potential for the passive approach and the use of prefabrication to improve build quality. The timber frame houses maximise passive solar gain. Passive stack ventilation is used throughout, and a SAP energy rating of 100 was achieved. The prefabricated construction was delivered to site as complete wall panels with the floor and roof in cassette form.

Several housing associations have participated in national and European programmes to promote research and dissemination on energy efficiency, among them the Best Practice Programme run by Building Research Energy Conservation Support Unit (BRECSU) on behalf of the UK Government and the Thermie Programme run by the European Commission. Recently, associations have become involved in the Integer initiative, which looks at the issues of energy efficiency, construction and new technology in housing.

As designs, insulation levels and heating systems improve, build quality becomes even more significant in determining the energy consumption of homes. Through the Housing Forum, many housing associations have become involved in the Egan agenda of partnership, benchmarking and continuous improvement in the construction industry. Egan has revived interest in prefabricated systems of housing with the scope to produce a tighter fit in the structure, reducing energy losses through cold bridges and unintended ventilation.

Good design and accurate construction, together with high levels of insulation, will reduce the demand for space and water heating in new housing. This creates new issues. With the low demand for heating, there is a need for a simple, efficient and robust heating system with a low output, and controls that are easy to use.

Once heating and hot water systems have been tackled, the major areas of energy consumption in the house are lighting and appliances, areas that are under the control of the householder rather than the housing association. Some associations provide low-energy lighting. Sheltered housing and supported housing schemes apart, few provide appliances, particularly low energy appliances.

However, associations do have a major role to play in providing energy advice to their customers. In some cases, front-line housing and maintenance staff are trained to provide energy advice. Simple leaflets provide an understandable alternative to

the sometimes-unintelligible instructions and advice offered by manufacturers. Nottingham Community Housing Association trains tenants as 'energy advocates' to give energy advice to their neighbours. Many associations sign up to energy efficiency campaigns and initiatives organised by the Energy Saving Trust and fuel companies.

The Hastoe experiment

A scheme developed by Hastoe Housing Association in Milton Keynes, also as part of a Thermie programme, illustrates some of the problems which can be encountered when complex technology is used to achieve potentially limited gains in efficiency.

The houses were constructed to maximise solar gain and thermal mass. They have high levels of insulation: 200 mm in the roof and the external wall cavities, and 150 mm in the floor. Windows are double-glazed. Solar heating was used to pre-heat the hot water, and the ventilation and heat recovery system was supplemented by pre-heating the ventilation air in roof top sunspaces. As a result of the low level of heating demand expected, single communal boilers were installed to serve the individual terraces of three to four houses.

Hastoe Housing Association developed rural housing at Elsenham, Essex to test various water conservation measures and as a trial of environmental assessment using BREEAM.

Wiltshire-based Westlea Housing Association produced the first Integer houses for permanent occupation. Although simpler in design and technology than the demonstration house at the Building Research Establishment, the houses embrace the principles of the project. Timber-frame construction was used with a sunspace to act as a buffer to the habitable rooms. Solar water heating has been provided, and some smart technology has been incorporated into the services of the house. Encouraged by the success of the project, Westlea is planning two more schemes, including one of more than 50 houses on a brown-field redevelopment site in a Wiltshire market town.

A comparable terrace was built to the same levels of insulation, but with a standard gas boiler heating system and radiators. It achieved similar levels of low energy use.

Problems with complex on-site controls and the off-site monitoring system created management and maintenance difficulties for the association, resulting in a poor service for residents. It proved difficult to recruit maintenance contractors prepared to take on the day to day management of the communal systems. When services were secured, detailed knowledge was normally limited to one or two operatives who were not always available to deal with site problems.

Eventually, it was decided to replace the communal boilers with a separate gas boiler in each house. The solar water heating and ventilation systems have been retained. A fresh round of monitoring is being undertaken to assess the impact these changes will have on fuel consumption, but already residents are enjoying a better service.

Sustainable homes

Energy efficiency is part of wider concern about environmental issues among a growing number of housing associations. Some have been active in promoting water conservation, which can have environmental benefits and produce lower bills for residents. Associations use materials from renewable sources and avoid using those, like PVC, whose production is harmful to the environment. Many of them put forward their schemes for environmental benchmarking through the national Building Research Establishment Environmental Assessment Method (BREEAM), the EcoHomes scheme, which is run by BRE Ltd.

More than 12 associations are members of the EcoHomes Club run by the Sustainable Homes project, which disseminates good practice to other associations. By 2004, 50% of all new-build housing association schemes will have to achieve an EcoHomes rating, or equivalent, of good or better, says the Housing Corporation.

The Sustainable Homes project is managed by Hastoe Housing Association and funded by the Housing Corporation to promote environmental awareness and action among other associations. Set up in 1997, it carries out a programme of research, training and dissemination over a series of environmental topics related to housing. It also maintains a directory of good practice and organises national conferences and seminars.

Further information on the project can be obtained from its website: www.sustainablehomes.co.uk

Martin Rowbottom, Director of Sustainable Homes. Martin Rowbottom died suddenly and unexpectedly in the time between writing this article and its publication. Among his many achievements in bringing sustainability into the work of housing associations was the 'greening' of Housing Corporation policy.

Solar system

Calculating the position of the sun as it moves across the south west London sky will be among the more complex routines performed by a Trend building management system in the Natural History Museum's newly built Darwin Centre (Phase One), which opens to the public next year. Supplied and engineered by Energy Efficient Controls (EEC) Ltd, the system will use its solar tracking measurements to reduce the building's energy consumption – by automatically adjusting louvres on the south-facing glass facade. Inside the centre it will maintain a closely controlled environment for staff, visitors and 22 million specimens from the museum's collections.

This is an edited version of an article which first appeared in Trend Control Systems' own IQ magazine.

The Darwin Centre is the most significant new development at the Natural History Museum's South Kensington site since the latter opened 120 years ago. It will provide unprecedented visitor access to the museum's vast and priceless life science collections, over 99% of which are currently hidden from the public's gaze. In addition to guided tours there will be 'meet-the-scientist' sessions, when those who study the collections will explain their research work. The £27million first phase of the centre will house the zoological specimens, some of which are centuries old. A second and final phase, which the museum hopes to open in 2005, will take the entomology and botany collections.

Phase one of the centre comprises a 7-storey air conditioned building with a central atrium, to one side of which are the specimen storage facilities and to the other offices and laboratories. Each side is served by a pair of air handling units, with fan coil units in the offices and labs. The heating circuits are supplied by LTHW calorifiers that connect to the museum's main boilers. The building has its own, roof-mounted chillers. All the HVAC plant is controlled and monitored by Trend IQ controllers, each of the 96 fan coil units being fitted with an IQ212.

The majority of specimens now being moved into the building are preserved in methyl alcohol. To prevent this evaporating, the storage areas must be kept at a fairly low temperature. At the same time, humidity must not be too high as this would cause the labels on the specimen containers to peel off. The Trend system controls the air handling plant cooling and heater batteries to achieve a temperature setpoint of 13°C and a relative humidity of 55%. (+/- 5%). By applying enthalpy control, it always uses the most energy efficient balance of fresh and recirculated air.

Louvres behind the outer glass screen wall will be automatically adjusted to either reflect or let in the sun's rays

The stores occupy the north side of the building. The offices and laboratories are on the south side, which features a double-skinned facade that is designed to maximise natural daylighting while minimising heat gains and losses. Between the outer glass screen wall and the building's main skin is a 1 m wide air space, which acts as a natural chimney for venting hot air. Behind the outer glass is a series of perforated steel louvres.

Using current time and date information, the Trend system will compute the sun's height in the sky. From this continually changing altitude measurement it will angle the louvres to either reflect or let in the sun's rays, depending on whether the office and laboratory areas require cooling or heating. Readings taken from a solar glare sensor will tell it if the sun is obscured by cloud, which would make solar shading unnecessary and thus allow the louvres to be opened when there is demand for cooling.

If the air temperature in the gap between the two skins should exceed a preset maximum, the system will vent the heat by opening high level dampers. At night it will close both the louvres and dampers and the air space will then act as a layer of insulation that will greatly reduce building heat loss.

Immediately next to the centre's south face is an older museum building. As a consequence, the solar wall will not actually become operational until this has been demolished.

Trend building controls are not new to the Natural History Museum. The first were installed a decade ago and the system that has subsequently developed now covers most of the site. EEC Ltd carried out several phases of the expansion. It is planned to use the site's Ethernet network to integrate the latest controls with the existing installation.

Contact EEC Ltd on 01273 835540, or Trend at www.trend-controls.com

Fluidised bed technology takes two steps

by Geoff Loram

Two new power generating plants employing fluidised bed combustion, of a very similar size and both burning wastes, were built in Scotland within a few miles of each other and commissioned only a few months apart recently. The opportunity to visit these plants, which put the technology to use for purposes not seen before in the UK and, in the case of one of them, in the world, was very welcome. The occasion of the visit was the official opening of the Westfield Biomass Plant by Rhona Brankin MSP, the Deputy Minister responsible for the Environment. The ceremony was followed next day by a seminar on the plant organised by the Scottish Branch of the Institute with the help of EPRL.

In addition Derek Kiddie, Operations Director of Dundee Energy Recycling Limited, was kind enough to show me round his plant which generates power from municipal solid waste.

The Westfield biomass plant

Alan Blair, Project Director for Energy Power Resources Ltd (EPRL), which built and manages the plant, likes to stress the above title for the plant since it is more than just an electricity generating plant fuelled by poultry litter. Poultry litter is in some ways analogous to straw in that it can have a market value as a fertiliser but that market is seriously oversupplied in certain areas, a situation aggravated by the quantity of poultry litter produced increasing by 4% a year.

There is a significant concentration of poultry rearing in Fife, where the plant is situated and the main means by which the surplus litter from poultry farms was disposed was to spread it on farmland as a very cheap - or even free – fertiliser. Unfortunately, this led to a surplus of phosphates and nitrates leaching out into the groundwater and local streams and encouraging the growth of harmful algaes; the nearby Loch Leven in particular was being badly affected.

Diverting the litter to the Westfield plant and using it as a fuel thus had a very beneficial effect on the local environment, in addition to it being an environmentally benign fuel since it is part of the natural carbon cycle and emits no additional carbon dioxide.

Westfield is Scotland's first major biomass fired power station, the first to utilise poultry litter as the fuel there and is also the world's first poultry litter plant to employ fluidised bed combustion technology. At 10 MWe net output this is not a large plant, being about the same size as Fibrowatt's Eye and Glanford plants, but only a quarter of the size of Thetford (see *Energy World*, February 2000).

Fuel handling

Poultry litter comes from a mixture of sources varying as to the bird and whether it is being reared for the table or for egg production. The feedstock to this plant is appreciably drier than that going to the English plants but otherwise the analyses are very similar. The average moisture content of the former varied from 47% for turkey, to 30%, as opposed to the average of 30% at Westfield. The average net CV at 10.5 MJ/kg is similar for the same moisture content (MC). The plant handles 110,000 tonnes of this fuel a year at a rate of about 14 tonnes per hour.

The fuel handling system is reminiscent of that used at Eye and Glanford but modified to try and eliminate some of the large quantity of dust created when using grab cranes to handle the material. The fuel supply system is split into two parts – labelled east and west – each supplying one side of the boiler. Each half consists of a reception pit into which the incoming lorries tip their loads and from which an overhead grab crane with a large bucket grab transfers the fuel into a large, shallow bunker common to both halves.

The cranes are normally computer controlled, being fed with data from a number of sensors which tell them when fuel is in the reception pits, when a lorry is unloading, and when it is needed in the feed hoppers. They are also programmed to spread the fuel evenly across the main storage bunker and lower the grabs until a sensor tells it, it is close to the surface and can open with the minimum amount of drop so limiting the amount of dust created. These sensors also relay the depth of the bunker at that point back to the computer for level control.

The sequencing achieves a fair degree of mixing – which can be augmented by lifting and re-spreading the fuel - to mitigate the effect of variations in MC and CV and to allow the operation of a rough 'first in, first out' system.

The cranes load the fuel into hoppers fitted with push-floors that feed, via dosing screws, to vibrating screens that eliminate any oversize material and drop it onto a belt conveyor fitted with belt-weighers and overband magnets. The belt feeds elevating chain conveyors, which lift the fuel to a common boiler day bunker, from which it is fed into boiler on either side by a set of three double screw conveyors. The first is the dosing screw which controls the fuel supply and is governed by the boiler control system, the second is merely a conveyor running at a steady speed and the third is a 'chopper' running at a faster speed to inject the fuel into the furnace.

The fluidised bed boiler

The boiler was supplied by Austrian Energy – once SGP-VA – a subsidiary of Babcock Borsig Power. It has a simple bubbling bed contained in a tall rectangular waterwall envelope which comprises the evaporator section and contains the superheater banks. From the superheaters the gas passes through five economiser banks and then on to the flue gas cleaning plant.

The bed is operated sub-stoichometrically to improve the temperature control system which also involves some flue gas recirculation. The bed temperature is set at 850°C which limits the production of thermal NOx. Fuel NOx is comparatively high but NOx production generally is reduced by the presence of ammonia in the fuel and the plant emits around 150 mg/Nm^3, half its limit of 300 mg/Nm^3.

forward in Scotland

The configuration of the combustion and evaporation section of the boiler is interesting; immediately above the bed the combustion chamber widens out slowing the gas stream down, the residence time in this sub-stoichiometric area is 2 seconds and 70%-90% of the fuel is burned in the bed and this area. After the injection of the secondary air the combustion chamber is reduced in depth by a waterwall membrane with a consequent increase in gas velocity so that the residence time in this much longer section is also 2 seconds.

A downward pass completes the evaporator section and the gas is then returned vertically through the superheater section; this flow reversal acts as a drop out point for the heavier ash and bed particles entrained in the gas stream. The gas is then passed down through a bank of five economiser sections before entering a bag filter gas for gas cleaning.

Due to the dusty nature of the gas, the tube bundles are kept clean by the routine use of steam soot-blowers.

Generating system

The simple and rugged condensing steam turbine typifies the way in which the component sourcing was orientated towards obtaining the required standards at the keenest price. It was noticeable that UK nameplates are very rare. The steam temperature is set at 460°C to avoid high temperature chlorine corrosion but the pressure is a healthy 62 bar; the turbo-generator produces 11.8 MWe gross, at 11 kV and the plant exports up to 10 MW to the local grid via a step-up transformer. The overall energy efficiency given was a modest 21%, but one of the engineers from the company that designed the control system said that measuring it was complicated and he thought that it was really 24-25%.

The steam is condensed in an air cooled condenser in which the steam is circulated through a membrane of tubes arranged like a gable roof with the air blown through it by three large, slow speed fans. It is, therefore, very quiet in operation.

One operator from a single computer terminal controls the entire operation of the plant; the hardware is, of course, duplicated to guard against electronic malfunctions. The boiler controls are governed by the turbo-generator output settings and all functions upstream of the turbine are controlled automatically by the computer.

Flue gases, ash

Since the majority of the sulphur in the fuel is retained in the bed and the chlorine is effectively neutralised by calcium in the ash, the flue gas is simply cleaned by bag filters. The comprehensive flue gas monitoring arrangements are integrated into the central control system.

Ash is gathered from four points: the FBC purge which removes the surplus bed material, the two bag filters, the drop out point before the superheaters mentioned above, the bottom of the economiser bank and the bag filter. Because the ash from the various sources has different chemical and physical characteristics it is conveyed pneumatically to a compartmentalised silo. From here it is drawn off at six chutes and sent via screw conveyors to a mixer chute that drops it into a drum in which it is conditioned with water to 8% MC and then loaded by a scraper conveyor into lorries. The blending system is controlled by the central computer but is switched on and off manually to load the lorries. This elaboration is justified because the ash is high in Potash (K_2O) at 18%, Phosphate (P_2O_5) at 30% and Nitrates (N_2) at 6% - all on a dry basis – and has a considerable market potential as a fertiliser. But to be marketable its composition must be consistent.

Economics

With a capital cost of £1.86 million/MW gross or £2.2 million/MW net, a positive – just – fuel cost (as opposed to wastes with a negative cost of around £3/MJ) and despite comparatively low operating costs, a small generating plant such as Westfield is not going to be commercially viable at today's electricity prices. It is supported by a hefty subsidised electricity price dating from NFFO 3 – it was a project which had failed to get off the ground but was taken over by EPRL who took it forward to good effect.

EPRL and its Engineers, McLellan, undertook the overall conceptual design and the latter acted as project managers; Babcock Borsig was selected to supply the boiler and generator and the detailed design and construction contract was awarded to a Spanish company, Abener Energia Ingieneria y Construccion Industrial S.A. This company was responsible for the very refined and comprehensive control system that is a major feature of the plant. The O&M contract was awarded to Mitsui Babcock, initially for seven years.

The overall impression is of a very carefully designed plant that is constructed to high standards; the success of the design is illustrated by smooth progression of the meticulously prepared commissioning process.

Dundee Energy Recycling Ltd

The UK's first energy from waste (EfW) plant to employ fluidised bed technology was commissioned a quarter of a century after the first Swedish one and itself had a long gestation period as the City of

Fuel handling at the Westfield plant. Photo courtesy of Siemens Moore Process Automation, who supplied the process control system

Dundee District Council began considering how to replace its old Baldovie incinerator plant in 1992. Two years later it had decided that fluidised bed combustion technology was the most cost effective one for modest sized plant they needed, presented the best recycling possibilities and was the most flexible in that other wastes, notably clinical waste, could be used as part of its fuel supply.

CDDC therefore finally set up a joint venture with BICC plc and Kvaerner Investments – an early example of a successful Private Finance Initiative (PFI) – which they called Dundee Energy Recycling Ltd. Kvaerner Investments shareholding was subsequently acquired by McQuarry. A £35 million turnkey design and construct contract was signed with a consortium of Balfour Beatty and Kvaerner EnviroPower Ltd and 20 year waste supply contracts were signed with CDDC and Angus District Council. With the risks thus shared out funding was obtained from Prudential and the Bank of Scotland.

Within the construction consortium, Balfour Beatty was responsible for all the civil engineering works and also the steam turbo-generator and the electrical exporting equipment whilst Kvaerner EnviroPower provide the fuel processing and handling equipment, the fluidised bed boiler and the associated gas cleaning plant.

The plant is designed to handle 120,000 tonnes of waste a year, composed of 62% domestic waste, 12% commercial waste, 8% clinical waste, 7% industrial waste and 11% 'others'. The overall design net CV of this mix of wastes is given as 9.02 MJ/kg; since that is roughly the CV of MSW and since commercial and clinical wastes would normally be significantly higher, it must be assumed that the industrial and 'others' are low CV wastes. The hourly feed rate of 7.6 tonnes to each boiler produces an electrical export figure of 8.3 MW net of 2.2 MW of parasitic load.

Fuel supply system

The MSW is delivered to a flat floor reception hall where loading shovels transfer it onto plate conveyors feeding two 30 t/h Svedala hammermill shredders, either of which is capable of feeding the boiler. These shredders convert the MSW into a coarse refuse derived fuel (RDF). Initially the waste was reduced to a nominal 150 mm size but finer grids have since been fitted to the mills. Overband magnets are fitted to the shredder discharge conveyors to remove the ferrous metal for recycling and the RDF is conveyed to a large fuel store bunker where a tripper conveyor distributes it evenly along the length of the bunker from which it is removed by an extractor screw at the base that traverses the length of the bunker. The screw extractor feeds onto a combination of conveyors that transport the fuel to boiler feed hoppers for each of the two boilers from which it is metered into the boilers. On the way non-ferrous metals are removed for recycling by an eddy current separator.

Clinical waste is taken into the reception hall in bags and via a dedicated conveyor and slow speed shear to the boiler feed hoppers.

Boilers and generating plant

The two bubbling fluidised bed boilers are rated at 17MWth and produce steam at 400°C and 40 bar, modest figures which do no favours for the overall efficiency. The FBCs consist of a fairly tall rectangular waterwall combustion chamber with a 'neck' above the bed at the point where the secondary air is injected which helps to increase the turbulence of the combustion gases. The design easily achieves the required 2 seconds residence time after the last injection of secondary air at a minimum of 6% O_2. The evaporator section is completed by a clear downward pass leading to an upward pass through the superheater banks and on to the external economiser banks – a similar arrangement to the Westfield boiler.

The steam from both boilers is fed to exactly the same condensing turbine as is used at Westfield and which generates power at 10.5 MW. The steam is condensed in a water cooled condenser employing a hybrid, low plume, induced draught cooling tower.

Flue gas cleaning

The flue gas cleaning system is quite simple, from the economiser the gas is passed through a cyclone which captures the coarser particles which have not dropped out at the bottom of the evaporator pass and on to a simple conditioning tower in which hydrated lime and activated carbon is injected into the turbulent gas stream. The FGC plant is completed with a conventional bag filter. Measured emissions are virtually an order less than the proposed new EC limits, which are roughly half the existing limits; the only exception is NOx which, although it meets the plant's limit of 350 mg/Nm^3, would not meet the proposed limit of 200 mg/Nm^3 without resorting to a catalytic reactor. Ironically, Kvaerner say that that limit could be met if the requirement for the residence time in the combustion chamber to be at 6% O_2 (40% excess air) were to be relaxed. That requirement was designed for mass-burn incinerators but with emissions as low as Baldovie's there is obviously no need for it; boiler and overall efficiency would be increased with less excess air.

Economics

The turnkey construction contract cost was £35 million but the overall project cost is given as £42 million so this is an expensive plant in terms of capital cost per MW of capacity. However the premium price for the power paid under the Scottish Renewable Order shows only a small element of subsidy and the 'gate fee' of £29/tonne is close to being competitive with local landfill costs; so the plant provides stable, long term waste disposal at an economic cost.

The plant had some problems in the early days, including a fire in the fuel store, but they were mainly confined to the waste processing section – the combustion technology itself has worked very well.

More information on these plants can be obtained from:
EPR Scotland Ltd, tel: 01592 868 964, e-mail: ablair@eprl.co.uk
DERL, tel: 01382 483600, e-mail: derl@dircon.co.uk

Liberalising energy in Australia and New Zealand

The International Energy Agency (IEA) regularly publishes its views on the energy policies of its member countries – most recently passing judgement on Australia and New Zealand. The reviews make fascinating reading for those who spend most time concentrating on the energy picture in their own country.

Australia's electricity liberalisation 'has increased emissions'

The IEA has commended the progress Australia has made over the last decade in liberalising its electricity industry, but added that the slower pace of reforms in the gas industry has temporarily meant a higher coal-burn for electricity generation, with the inevitable environmental consequences.

Energy Policies of IEA Countries – Australia – 2001 says that Australia has been in the vanguard of efforts to introduce competition into the power industry worldwide since 1992. The country has taken far-reaching steps, separating the functions of generation, transmission, distribution and retailing, which are now undertaken by separate companies in the five states that form the National Energy Market. A competitive market has been established and features a mandatory spot market, similar to that in the early stages of reform in England and Wales. Transactions in NEM have so far been relatively modest by international standards, accounting for about 7% of total generation.

Benefits across the economy amount to at least A$1.5 billion in the year 2000, according to Government figures. Real electricity prices have decreased by 10% on average in the last ten years.

However, the reforms have not yet been completed and the pace of reform has slowed in recent years; the target date for full retail competition has slipped by a year to 2002, or even later, adds the IEA.

The IEA believes that significant price differences between NEM regions demonstrates that there is not enough trade in electricity, and a need for interconnection between states to be reinforced.

Due to Australia's plentiful reserves of cheap coal, the liberalisation of the power industry has favoured its use, especially that of Victorian brown coal, which has become the primary fuel source for generation in the four southern states of the NEM. This has displaced hydro, natural gas and hard coal, notes the IEA, and halted the long-term nationwide trend towards greater use of gas. Increased generation from Victoria's brown coal plants with their relatively low thermal efficiencies has also lowered the average national thermal efficiency of power generation, leading to a corresponding rise in atmospheric emissions.

This trend could be reversed if competition in the gas market were to lower gas prices significantly. But gas market reform began later than electricity market reform when, in 1997 all seven states signed a binding commitment to introduce competition into the gas market. By the end of 2000, all had passed open access legislation and most had developed grid access regimes. The first benefits of gas reform are now beginning to show.

The Agency commends Australia's 'Mandated Renewable Energy Target', which requires an increase in renewable generation of 9,500 GWh per year by 2010. This figure is estimated to amount to 2% of Australia's power generation in 2010. The system is market-based and compatible with the NEM, and is expected to raise consumer prices by less than 0.2 Australian cents.

The IEA also welcomes the Australian Government's commitment to spend almost A$1 billion in the 1999-2004 period on climate change mitigation programmes, many of which are market-compatible.

Copies of both reviews are available from IEA Books, tel: +33 1 40 57 65 59, e-mail: books@iea.org

New Zealand balances environmental and economic objectives

The situation in New Zealand is very different, with less than five years worth of natural gas left in the country's main fields, most electricity is generated from hydro and geothermal sources.

Releasing *Energy Policies of IEA Countries – New Zealand – 2001*, IEA Director Robert Priddle nevertheless said that the country had: "demonstrated that electricity market liberalisation can succeed in a small country".

If known gas reserves are not replaced, there will be major consequences for New Zealand, with higher gas prices expected to lead to the closure of the country's petrochemicals plants. Coal-fired power has a share of only 5% at present, but coal could be an economic replacement for gas, if gas supplies are depleted.

However, explorers and major consumers are confident that new gas reserves will be found, with exploration activity at a record high.

New Zealand is working towards ratifying the Kyoto Protocol by mid-2002; the only OECD country outside the European Union to make such a commitment.

Unlike most other IEA countries, agriculture is the main contributor to greenhouse gas emissions in New Zealand, but reducing emissions from agriculture is an uncertain area of knowledge. While New Zealand could probably achieve its Kyoto target using emissions trading and credits for sinks alone, the IEA review team considered that attention should also be focused on transport.

Since the last review in 1997, electricity transmission and distribution have been successfully separated from generation and retailing.

The previously dominant generator, the Electricity Corporation of New Zealand, has been split into three new companies.

Grasping the sustainable development nettle

by Rob Wall, Education Services Officer, Institute of Energy

The pages of Energy World often contain articles urging readers to do something about sustainable development. But what is the Institute itself doing?

Sustainable Development (SD) is not straightforward. It's fair to say that even the concept's coherence isn't universally accepted. Some argue that the term is an oxymoron: that development just cannot be sustainable. There are two points to make about this assertion. Firstly, SD demands a much broader understanding of 'development' than simply more roads, buildings and other infrastructure. It takes development to mean an increase in human *welfare*, not just human *wealth*. (The distinction is also drawn by the Prime Minster in his introduction to the UK's SD strategy: *A Better Quality of Life*.)

Secondly, nobody claims that 'sustainable' means eternal. What it does mean is admittedly difficult to define, but it must refer to a period covering many generations: hundreds or perhaps thousands of years. So SD is about trying to minimise the harmful effects of human activity on our supporting environment and our own society, so that we compromise our survival as little as possible whilst increasing the welfare of individual humans. This echoes the most widely accepted definition of SD, provided by the World Commission on Environment & Development, which says that it is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Despite the (albeit diminishing) controversy surrounding SD, the Institute of Energy is beginning to take the concept seriously. As a professional body and learned society, it has a duty to serve its members and wider society. This means that debate must be conducted and action taken to safeguard resources now and for the future. To serve these ends, the Institute has begun working on a number of SD initiatives. These include:

- publication on the web site of a series of factsheets: *Signposts to Sustainability*;
- participation in the cross-institutional Professional Practice for Sustainable Development (PP4SD) project;
- participation in consultation on the development of occupational standards for those working in SD, with a new organisation called Sustainability First;
- production of a framework and guidance for SMEs to help them to become more sustainable, in partnership with William Battle Associates Ltd; and
- development of an SD element to be included in the revised version of the TEMOL programme.

The Institute is also exploring ways of promoting the Engineering Council's new *Guidelines on Sustainability Issues* when they are published later this year. It also requires that any academic course receiving accreditation or approval should include teaching on sustainability issues.

The PP4SD project involves fourteen professional bodies. They have come together to develop ways of supporting CPD activity on SD. The project's major output is a one-day 'Introduction to Sustainable Development' course, which was piloted at the InstE last year. The course is now complete and has evaluated very well when run 'live'. I have been trained to deliver the programme, so if your organisation would be interested in taking part, please contact me.

PP4SD has also produced a sustainability framework, outlining eight broad requirements for a sustainable society. Its original purpose was to guide the production of materials by the project – ensuring that outputs would promote the right sort of action. More recently, however, each participating institution has volunteered to audit their own activities against the framework, with some illuminating results.

There isn't room here to reproduce the entire document, but examples of the InstE's responses are shown below.

Occupational standards for SD have been proposed in response to the fact that career paths in the field are presently poorly defined and no benchmarking of the required skills or knowledge exists. Sustainability First is a new charity founded to explore the possibilities and it is currently consulting with interested parties. The InstE has expressed its interest and may pilot the standards during the coming months. If you would like to participate in this trial, please get in touch with me and I'll provide further details.

The InstE is only just beginning to acknowledge the role it must play in promoting SD. It hopes that *Energy World* readers will provide the time, encouragement and ideas that will be necessary to play this role fully and effectively.

If you would like to find out more about any of the initiatives mentioned here, or want to suggest further SD initiatives, please contact me at education@instenergy.org.uk or on 020 7580 7124.

The Institute's response on SD - one example

Any materials mined from the earth should not exceed the environment's capacity to disperse, absorb, recycle or otherwise neutralise their harmful effects to humans or the environment.

- All paper waste is recycled (usually about ten A4 boxes a week). But only after any paper used on one side has been re-used as scrap.
- Recycled paper is used for some applications, for example delegates' Action Workbooks, used at InstE courses.
- Energy efficient lighting is used where practical.
- Staff are encouraged to turn off equipment when not in use, be that lighting, drinks machines, etc.

Loss of democracy and accountability?

Sir,

As the shadow Engineering and Technology Board outlines its vision for the future of the profession, it appears that Registrants will no longer have the right to elect their representatives to either the governing body or the body that controls the standards for the Register. This is in spite of the fact that the Registrants have paid over 80% of the costs of the Engineering Council since its formation and will also be expected to pay the costs of the proposed 'Regulatory Board' (RB) and to make a major contribution towards the costs of the Engineering and Technology Board (ETB).

It seems likely that the ETB will have a number of representatives from the institutions, business, industry, training and academia amongst its members and that they will not be asked to contribute towards running costs. I imagine that, initially, the ETB will concentrate on finding ways in which it can represent the wider community of engineering as outlined in the Malpas Report. Whilst I believe that such actions would be laudable, it seems likely that the interests of the Engineering Council Registrants will not be a high priority for the ETB.

I therefore consider that there should be a number of directly elected representatives of the Registrants on the ETB who would be able to monitor the funding contribution from the Registrants subscriptions and ensure that it is primarily used in ways that would relate to the standing of Registered Engineers and Technicians.

At the time of writing, the proposal for the RB indicates that the ETB will nominate a third of its members, with the Institutions nominating the remainder. The RB will not be autonomous as all decisions require a 75% majority and in addition the RB will have to refer all matters of importance to the ETB. It seems that the RB will be responsible for the work currently done by the Board for Engineers' Regulation and its committees, together with some aspects relating to the wider engineering community.

I think that this is a significant erosion of the rights of the registrants

This proposal gives the Registrants no direct involvement in the body that will be responsible for setting and controlling the standards required for the Registration. The RB will also be responsible for issuing licences for the registration processes to the Institutions and for monitoring the way in which the Institutions comply with the rules; this may pose problems for Institution nominees.

The proposals for the ETB and the RB that I have outlined above, together with other similar proposals that are being considered, seem set to ensure that the Registrants will have no direct say in the way in which the Register is financed and operated or in the way that the standards and the international agreements are controlled.

I think that this is a significant erosion of the rights of the Registrants and should not be undertaken without the Registrants' agreement in a referendum.

The Senate will be asked to endorse the final recommendations of the Shadow ETB and to arrange to dissolve itself in favour of the proposed "Engineering and Technology Board" which would inherit the Engineering Council's income. Senate members should try to ensure that the interests of the Registrants are adequately protected and if they are not completely satisfied, they should insist that the Registrants be consulted about ways of continuing their right to elect members to the ruling and regulating bodies.

Gordon McCoombe, OBE CEng,
Registrant Elected Member of Senate 1996-2000

Institute of Energy Secretary and Chief Executive Louise Kingham replies:

I am both sympathetic and understanding of your concerns about the proposed changes to the engineering profession and the development of a successor body to the Engineering Council. In your capacity as an engineer and Engineering Council Senator you have possibly been more aware than many registrants about the proposals. However, I should say that, as a member of one of the ETB working groups developing future arrangements, the timetable for this work has been fast and furious, which has not always been helpful. As a result, proposals for the new ETB and new Regulatory Body are evolving almost daily as concerns from all stakeholders are aired and addressed.

I would urge all registrants to visit the Engineering Council's website (www.engc.org.uk) for the latest news on developments. It is in the interest of every engineer and technician to understand how their community and representative organisations may develop.

The editor welcomes letters for publication on anything that has appeared in Energy World, and on wider energy issues. Letters may be edited.

Events

October 2001

The Russian oil & gas sector - prospects & opportunities for growth
Conference, 1-2 October
Details from Institute of Petroleum, tel: 020 7467 7174, e-mail: lviscione@petroleum.co.uk

Czech power 2001
Conference, 2-3 October, Prague
tel: 020 7878 6980, e-mail: darcy@ef-international.co.uk

Gas 2001 – future commercial trends
Seminar, 3 October, London, £295 + VAT
Details from Andrea Whitehead at SBGI, tel: 01926 450459

InstE Branch event
Chairman's address by Mr K Parker
4 October, Birmingham
Details from Vian Davys, tel: 01332 666296, e-mail: vian.davys@eme.co.uk

Advances in heat treatment technologies
Conference, 8 October, Birmingham
Details from the Wolfson Heat Treatment Centre, tel: 0121 359 3611, e-mail: whtc@aston.ac.uk

Innovation exchange: developments in materials and energy
9 October, London
Details from the Engineering Council
tel: 020 7557 6440
e-mail: ccoker@engc.org.uk
Co-sponsored by the Institute of Energy

Photovoltaics and fuel cells
Conference, 10 October, London
Details from the Solar Energy Society, tel: 01865 484367, e-mail: uk-ises@brooks.ac.uk
Co-sponsored by the Institute of Energy

InstE Branch event
SITA waste-to-energy plant visit,
10 October, Cleveland
Details from Andrew Cox, tel: 0191 261 5274, e-mail: awcox@eimr.demon.co.uk

ENVEC
Exhibition and Conference
10 October, Winter Gardens, Weston-Super-Mare
Details from Clifford Talbot Partnership
tel: 01454 281607
e-mail: envec@cliffordtalbot.co.uk

International telecommunications energy
Conference, 14-18 October, Edinburgh
Details from Intelec 2001, tel: 020 7344 5472, e-mail: intelec@iee.org.uk

Coal science BCURA lecture
15 October, London
Details from David Arnold
tel: 02920 400 670
Co-sponsored by the Institute of Energy

Turning things around
British Wind Energy Association conference, 16-18 October, Brighton
Details from Alison Hill, tel: 020 7402 7122, www.bwea.com/23

Nuclear decommissioning 2001
Conference, 16-18 October, London,
Details from IMechE
tel: 020 7973 1312,
e-mail: s_love@imeche.org.uk
Co-sponsored by the Institute of Energy

Construction and building services: US issues - global impact
17 October, London
Details from IMechE
tel: 020 7973 1306
e-mail: c_ugono@imeche.org.uk
Co-sponsored by the Institute of Energy

InstE Branch event
Economics of dual fuel gas burners
17 October, Farnborough
Details from Chris Wilson, tel: 01252 374663, e-mail: cwwilson@ntlworld.com

Stakeholder conference & workshop
19 October, London
Details from the Institute of Energy
tel: 020 7580 0008
e-mail: events@instenergy.org.uk

InstE Branch event
Hydrogen -the emergence of the ideal energy sector
19 October,
Imperial College,London
Details from Joanne Wade
tel: 020 7359 8000
e-mail: joanne@ukace.org

Energy markets – the challenge of the new millennium
18th World Energy Congress, 21-25 October, Buenos Aires
Details from www.18th-wec.com.ar

InstE Branch event
Northern Ireland Yearbook launch
22nd October,
Belfast City Hall,
Details from Davis McIlveen-Wright, tel: 028 7032 4477
e-mail: mcilveen-wright@ulst.ac.uk

Trading successfully in electricity markets
Conference, 22-23 October, London
Details from Marcus Evans Conferences,
tel: 0207 436 5735

Digital power
Conference, 22-24 October, San Francisco
Details from www.powercosm.com

Coaltrans
Coal conference,
22-24 October, Prague
Details from Coaltrans Conferences,
tel: 020 7779 8945,
e-mail: coaltrans@euromoneyplc.com

Diesel particulates and NOx emissions
Course, 22-26 October, Michigan, USA
Details from Alison Whiteley, tel: 0113 233 2494, e-mail: cpd.speme@leeds.ac.uk

Events

Ultra-low energy building design
Conference
23 October, London
Details from RIBA,
tel: 0207 307 3749
e-mail:
funmi.martins-akinwotu@inst.riba.org

Understanding heat treatment
Course, 23-25 October, Birmingham
Details from the Wolfson Heat Treatment Centre,
tel: 0121 359 3611,
e-mail: whtc@aston.ac.uk

How to write a successful Energie proposal
Workshop on EU Energie funding, 30 October, London, £195 + VAT
Details from the Energie Helpline UK,
tel: 0161 874 3636,
e-mail: energie@enviros.com

NETA
Conference
31 October, RIBA, London
Details from the Institute of Energy
tel: 020 7580 0008
e-mail:
events@instenergy.org.uk

November 2001

InstE Branch event
Project management of remediation projects
1 November, Birmingham
Details from Jacky Lawerence
tel: 02476 342843
e-mail:
jacky.lawerence@tesco.net

How to write a successful Energie proposal
Workshop on EU Energie funding, 1 November, Edinburgh, £195 + VAT
Details from the Energie Helpline UK,
tel: 0161 874 3636,
e-mail: energie@enviros.com

Micropower: small-scale electricity generation
Conference
6 November, Watford
Details from Kate Perry
tel: 01923 664542
e-mail: perryk@bre.co.uk
Co-sponsored by the Institute of Energy

InstE Branch event
Energy and resources in the 21st Century
7 November, The University of Hertfordshire
Free event by ticket only
Details from Julie Huckle
tel: 01707 284 004
fax: 01707 286 040
e-mail: j.a.huckle@herts.ac.uk

UK waste: dialogue and decisions
British Nuclear Energy Society conference, 7 November, London
Details from Sue Frye,
tel: 020 7665 2315,
e-mail: sue.fry@ice.org.uk

NEMEX 2001
Conference and exhibition,
7-8 November, Birmingham
tel:020 7772 8450
www.nemex-energy.co.uk

Win market share in Italy's liberalising power market
Conference, 12 November, Milan, £1299
Details from WBR Ltd,
tel: 020 7759 9000

Engineering profit from waste
Conference, 13-14 November, London
Details from Alison Payton
tel: 020 7304 6829,
e-mail: a_payton@imeche.org
Co-sponsored by the Institute of Energy

InstE Branch event
Newel glass works
Visit, 14 November, Sunderland
Details from Andrew Cox,
tel: 0191 261 5274,
e-mail:
awcox@eimr.demon.co.uk

Gas turbine O&M
Conference, 14-15 November, Birmingham, £846
Details from Liz Curtis at ICS Ltd, tel: 020 7931 8139, e-mail: lizc@aviation-industry.com

Lazing on a sunny afternoon - the business responce to climare change
Seminar
22 November, London
Details from James Haraway
tel: 020 7632 0103
Co-sponsored by the Institute of Energy

Spark ignition engine emissions
Course, Leeds,
26-30 November
Details from Alison Whiteley,
University of Leeds,
tel: 0113 233 2494,
e-mail: cpd.speme@leeds.ac.uk

Thermal storage systems for low energy heating/cooling
Course, 28 November, London
Details from Mid Career College, tel: 01223 880016

InstE Branch event
Fuel cells
28 November, Newcastle
(Joint event with the Institution of Chemical Engineers and Newcastle City Council)
Details from Andrew Cox
tel/fax: 0191 261 5274
e-mail:
awcox@eimr.demon.co.uk

The energy forum
IEA conference, 28-29 November, London, £995 + VAT
Details from Marketforce Communications,
tel: 020 7608 0541,
www.marketforce-communications.co.uk
Co-sponsored by the Institute of Energy

Registering on an event seen here?
If you are registering on an event which you have seen listed here, please don't forget to mention to the organisers that you saw it listed in the *Energy World* Events Diary.
For further information about events, and to view the Institute of Energy's events calender please click on to our website at:
www.instenergy.org.uk/community

Can you give your approval?

An important aspect of the Institute's education and training work is the accreditation and approval of both academic and professional courses. (Accreditation is granted for engineering programmes, on behalf of the Engineering Council, whereas approval is granted by the Institute alone, for membership, or simply for CPD purposes.) As with many of the Institute's activities, this work relies heavily on the good will and voluntary input of members. Each accreditation or approval visit requires a panel of members with the appropriate knowledge to assess the programme and decide whether it meets the relevant criteria. Many members have given generously of their time to take part in such visits, but there is always a danger of asking too much of the same reliable individuals, especially as the amount of work undertaken by the Institute of Energy in this area increases.

This is why the Institute is keen to hear from any member who would like to be involved in accreditation or approval visits. There is a particular need for members working in industry to take part in academic course visits, as we must always ensure that programmes meet the needs of employers. That's not to say that academics aren't required too, however! Your expertise is equally valuable. So if you feel that you could contribute to this aspect of the Institute's work, please get in touch.

Contact Rob Wall at education@instenergy.org.uk or call 020 7580 7124. Finally, please note that although the work is voluntary, all your expenses will be paid.

NEW MEMBERS

NORTH WESTERN

Mr N D Lenegan Student
University of Central Lancashire

LONDON & HOME COUNTIES

Oscar Faber plc.
Group Member
Mr M Davies Graduate
Innogy Technology Ventures Ltd

Mr I Malik Graduate
R P M Energy Consultants
Mr G R Jones Student
Sheffield Hallam University
Mr R M Taylor FInstE
International Hydro-Power Association

SOUTH WALES AND WEST

Mr R A Bailey AMInstE
Ministry of Defence
Mrs H Sanderson Graduate
Swindon Borough Council

SOUTH COAST

Mr R T Fowler Student
University of Central Lancashire

EAST MIDLANDS

Dr S Horsley FInstE
BRE

MIDLANDS

Mr R A A Finnie MInstE
T M Consultants Ltd

Deceased Members
Eur Ing Geoffrey James Parker FInstE

Attention members:
The staff at the Institute need your help in keeping our records upto date. If you have moved house or changed jobs, please let the Institute know. Send your new details to: membership@instenergy.org.uk

New community developments for engineers and technicians

Members of the shadow ETB's constitution and goverance working group

There is great change ahead for Engineers and Technicians in the UK. The Engineering Council's Chairman, Dr Robert Hawley, has been leading a review of the UK engineering profession and its linkages to broader technology communities and has been reporting his findings to Lord Sainsbury. Many different individuals and organisations have played their part and made contributions to shaping the new engineering and technology community and with that, the organisations and resources that will provide individuals within the community the support they need to make best use of their valuable talent.

The developing vision suggests that there will be a new organisation, known as the Engineering Technology Board, which will serve both the organised engineering technology professions and reach out to new groups within this community yet to be part of professional institutions and other formal networks. A second new organisation is also planned, the New Regulatory Body, which will maintain the distinct function of regulating the organised element of the community - UK registered Engineers and Technicians. UK Engineers and Technicians will continue to be supported by their respective professional institutions as is currently the case, but the benefits of a much broader outlook and reach than that which the current Engineering Council can achieve should deliver its own rewards for all registrants.

Louise Kingham, the Institute's Secretary & Chief Executive has been a member of one of the working groups developing these new arrangements. Her work has focused on the new constitutional and governance arrangements for both organisations. She has given her time in the interests of members and registrants to ensure that new arrangements will genuinely benefit them. As a result, she has been both a critic and a negotiator on your behalf as the work has evolved.

For up to date information on ETB/NRB developments visit www.engc.org.uk

Council report

The Institute's Council, chaired by newly-elected President John Ingham CEng FInstE, met on 28 June, and welcomed the news that the bye-law amendments which had been agreed at the Special General Meeting in April 2001 had been approved by the Privy Council. Subsequently, the Royal Charter amendments were approved on 18 July. A series of administrative changes will now be recommended in order to produce new Council regulations over the coming months.

Council was informed that the Institute now offers a new grade of membership - Technician Member (TMInstE) and Engineering Council registration as an Engineering Technician (EngTech); and approved a recommendation that a rolling subscription system be implemented.

Louise Kingham was taking a leading role in brokering discussions between institutions within the Engineering Council regarding the future regulation of the profession, and the replacement of the Engineering Council with the Engineering Technology Board.

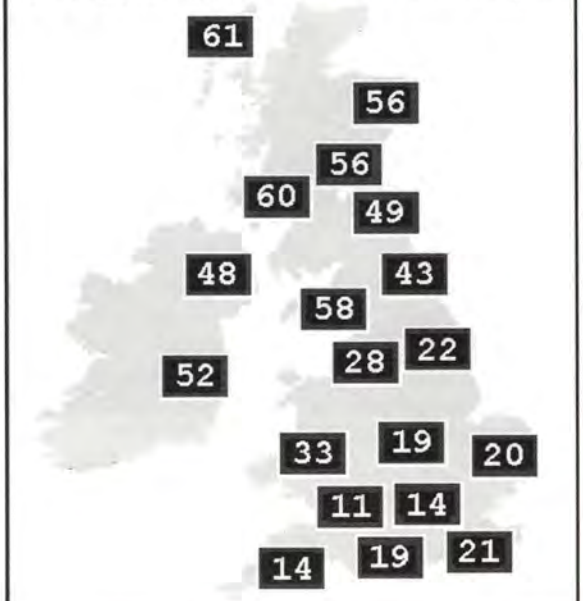
Council approved a recommendation to write to the Charity Commission regarding widening the scope of the Benevolent Fund.

Around the Branches - a number of younger people had joined the South West & West of England and Yorkshire Committees, and the highlight of the coming year for SW & WE would be the Idris Jones Lecture at Cardiff Castle on 22 February 2002. A joint conference arranged by Northern Ireland and the Solar Energy Society would take place in mid-September. Yorkshire's student contests at Sheffield and Leeds had gone well, with a high level of presentations. Tim Smith of South Coast had moved to London & Home Counties, and was thanked for his services as Secretary; and members were looking forward to a visit to Rolls Royce in Derby on 17 October. The Ellis Memorial Lecture, organised by Midlands in May, had been very successful; Mr H. Freeman had been replaced by Dr J. Lawrence as Secretary, and thanks were recorded to Mr Freeman for his long and valued service as Honorary Secretary. An event at Westfield Biomass Plant and the Scottish Energy Lecture, both organised by Scotland, had been successful. A conference jointly organised by a number of societies would be attended by 260 delegates in Hong Kong.

Members heard that the Institute's new website was fully operational and that initial feedback had been positive. Ideas were invited for suggestions to mark the Institute's 75th Anniversary in 2002. Members are welcome to e-mail their views to Joanna Heke at communications-@instenergy.org.uk

Degree Day Figures August 2001

(C) Degree Days Direct www.vesma.com/ddd



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Room Hire

the institute of energy

The Institute of Energy, set in the heart of the West End of London, is here to help you. if you are looking for rooms to hold meetings, seminars or workshops in.

Room	Rate for Members	Rate for Professional Institute/Body	Rate for Business Users
Council Room (up to 35 People)	Up to 4 hours: £120 Full day: £190	Up to 4 hours: £130 Full day: £220	Up to 4 hours: £220 Full day: £400
Members' Room (up to 12 People)	Up to 4 hours: £60 Full day: £115	Up to 4 hours: £70 Full day: £125	Up to 4 hours: £120 Full day: £220

ALSO AVAILABLE:

Catering (hot/cold buffet, tea/coffee, etc), audio/visual equipment for hire.

For further information, please contact:

tel: 020 7580 0008 fax: 020 7580 4420 info@instenergy.org.uk

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Engineering

McKinnon & Clarke are Europe's leading multi-utility specialists, offering efficient purchasing and usage of Electricity, Gas, Fuel, Water and Telecommunications. We operate within six business units throughout the UK, Europe and Asia. The Energy Services Division specifically undertake energy efficiency and utilisation projects on behalf of our industrial and commercial client base.

Energy Services Engineers

Ref: CS/LAC/01

Due to continued expansion, our Energy Services Division require outstanding Energy Services Engineers, of exceptional technical and practical experience with sound commercial acumen to work from our UK and European offices. Key roles will include conducting energy surveys, analysis and monitoring of plants, report preparation and presentation followed by the implementation and on-going management of savings. Project management skills involving utility supplies and site services are also desired.
The successful applicant will demonstrate an ability to work and deliver in an extremely competitive environment and must be able to identify technical solutions to problems, report and present results to the highest level, before project managing through to satisfactory completion. Language skills would be advantageous.

An attractive salary will be offered, commensurate with age and experience.

Graduate Energy Services Engineers

Ref: CS/LAC/02

We require highly motivated and experienced graduates to contribute to all aspects of this challenging role. You require a degree of technical and practical knowledge and commercial experience. You will work from one of our UK regional offices and have the ability to balance your workload across a variety of tasks and projects.
This is an extremely dynamic, competitive environment to work in and requires an enthusiastic and committed individual to carry out the key roles (outlined above). Full training will be provided.
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the institute of energy

Stakeholder Conference & Workshop

19 October 2001, 9am-1pm
Barbican Centre, London EC2

The Cabinet Office's Performance & Innovation Unit and the Institute of Energy are pleased to invite you to a major stakeholder event.

The Cabinet Office's PIU Unit Energy Review has already drawn significant contributions from the energy industry covering a diverse range of topics concerned with identifying the strategic issues surrounding energy policy for Great Britain to 2050.

Together, the PIU and the Institute of Energy wish to invite you to attend the next important stage of this consultation process. The Chairman of the Institute's Executive Committee, Prof. John Chesshire FInstE, has been working with the PIU team to draw out key emerging themes from the written submissions. Now the discussions must focus on developing these in more detail as conclusions and recommendations to the PIU's report.

We would welcome your participation in this important next stage of consultation of as many stakeholders as possible working in all sectors and concerned with, or influenced by, the development of energy policy. Places will be limited to facilitate workshop sessions so we would urge that you register as soon as possible to avoid disappointment.

For further information, please telephone Katie Moore on 020 7580 0008 or email: events@instenergy.org.uk

the institute of energy

NETA - where do we go from here?

31 October 2001, 9.15am - 1pm
Royal Institute of British Architects, 66 Portland Place, London

The New Electricity Trading Arrangements were heralded as the biggest shake-up of the electricity industry since privatisation. After seven months operation, industrial energy producers and consumers are reporting significant problems operating under the new arrangements.

Without changes to the market mechanisms, many suggest that Government renewable and CHP policy objectives will not be achieved. This event will expose the divided opinions on the key issues at a time that coincides with the close of the October contract round, forecast to be the biggest ever.

If you represent an organisation as a buyer, trader, analyst, generator or supplier, this half-day event will provide you with an opportunity to identify and debate the issues and future developments that are critical to the success of your business. Chaired by Martin O'Neill MP, Chairman of the Energy Select Committee, speakers include Steve Smith, Director of Trading Arrangements from OFGEM and David Green, Director of CHPA.

For further information, please telephone Katie Moore on 020 7580 0008 or e-mail: events@instenergy.org.uk