THE MAGAZINE OF THE INSTITUTE OF ENERGY





No.273 October 1999

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COVER

Exterior shot of Britain's first major building to incorporate 'dynamic insulation' into its fabric; the MacLaren sports centre in Scotland – see page 14 for the full story. *Energy World* this month features energy used in buildings – and in homes - from designs for zero-carbon communities, through efforts by local authorities and other housing providers to improve their energy efficiency, to innovative heat pump and thermal storage systems.

Climate Change Levy creates winners too



Viewpoint

by Andrea Cook, Director, National Energy Action

For a tax that is designed to be revenue neutral, the Climate Change Levy has attracted an awful lot of noise from some very big guns. Business and industry have lined up against the tax, claiming that it will increase their costs and harm Britain's competitiveness.

However, if there are losers in the levy lottery, there must also be winners, yet we've heard next to nothing from them.

Local authorities, for

example, are among Britain's large employers. They stand to save more on their National Insurance (NI) contributions than they pay out in the energy levy. By channelling these savings into energy efficiency programmes, they have the opportunity to make a difference to those who can benefit most from saving energy - the fuel poor.

In more than 6 million UK homes, residents spend 10% or more of their incomes on keeping their homes warm. Some 30% of UK householders on low incomes live in the country's worst and least energy efficient housing - the energy ratings of their homes are less than half of those of the middle classes. The elderly, single parents and their children, and people with disabilities are among those who suffer most from not being able to heat their homes to temperatures that are comfortable, healthy and affordable. The House of Commons Environment Audit Select Committee recently identified fuel poverty as the major cause of the 30,000 excess winter deaths that occur in every town, city and village in Britain each year.

As an organisation that campaigns against fuel poverty, NEA is all too aware of the difficulties of promoting the benefits of energy efficiency for households on a low-income. And yet for many vulnerable people, improved energy efficiency can mean the difference between affordable warmth and misery, fuel debt and cold-related illnesses.

By recycling any windfall gained from the Climate Change Levy into the development of affordable warmth strategies, local authorities have the opportunity to take the fight against fuel poverty into their own communities, where they can assist the most disadvantaged members to fight the cold in their own homes.

The positive results of affordable warmth strategies can be seen and felt locally. Money spent on the homes of low-income households easier and cheaper to heat will pay off in better health and well-being for their inhabitants. Other benefits include local job creation in the insulation industry and reduced health care costs for treating cold-related illnesses. Increasing energy efficiency can also help councils to meet their obligations under the Home Energy Conservation Act (HECA), legislation that requires local action on reducing carbon dioxide emissions.

NEA's has a wealth of experience to draw upon to show that fuel poverty can be dealt with effectively at a local level, by adopting a co-ordinated approach across a range of departments and agencies. Local programmes are particularly effective when combined with the Home Energy Efficiency Scheme (HEES), the Government grant scheme which provides energy saving measures to households receiving benefits.

Since it began in 1991, HEES has been the Government's main mechanism for providing Britain's poor with affordable warmth. An expanded and more generous scheme should be in place by April 2000, with the maximum grant for insulation measures more than doubling to ±700 .

However, NEA's experience in local projects has shown that even this increase will not eliminate fuel poverty entirely. For example, an NEA pilot project in Newcastle upon Tyne provided a maximum grant of £1080 for a range of energy improvements, offering the most cost effective materials and appliances, including such items as new and more efficient boilers and electric storage heaters. Personalised energy advice, delivered one-on-one to the client, was also an important part of the service.

After the improvements were made, the average household's fuel bill went down by of £140 per year, carbon dioxide emissions were reduced by 1.65 tonnes per property. If such a scheme were available to every UK household experiencing fuel poverty, NEA estimates that carbon dioxide savings could total some 3.6 million tonnes - certainly enough to make a substantial dent in the Government's targets.

By quantifying the energy savings which need to be made locally by developing affordable warmth strategies to achieve this and by working in partnership with NEA member organisations who provide insulation services, local authorities can make a significant impact.

The Government's proposals for a New Home Energy Efficiency Scheme place strong emphasis on the increased role of public health nurses, health visitors and the like, as people ideally placed to refer their clients to the scheme. Local authorities must therefore ensure that fuel poverty is built in to their priorities and integrated into their staff development policies. By integrating energy efficiency goals with other key policy areas, they can also link affordable warmth to their work in Health Action Zones, Local Agenda 21 programmes and social inclusion units.

Government at all levels has taken important steps toward acknowledging the impact of cold homes and high fuel bills on the health and well being of the county's most vulnerable citizens. Through creative programmes, funded by money that would become available under the introduction of a Climate Change Levy, local authorities can help millions of fuel poor claim their right to a warm, dry home.



Clinton orders government consumption cut

US federal agencies have been required to cut their energy use under an Executive Order from President Clinton which mandates a 35% cut in building energy use relative to 1985 levels by 2010, and a 30% cut in building-related greenhouse gas emissions relative to 1990 levels by 2010. By meeting these goals, the federal government expects to reduce its greenhouse gas emissions by 2.4 million tonnes, equivalent to taking about 1.7 million cars off the road.

As an example of energyefficiency improvements, the Pentagon is to award the largest federal energy-saving contract to date, upgrading 837 buildings on five military installations in the Washington, DC, area. The 18-year contract will reduce annual energy consumption by 17%, saving roughly \$219 million over the life of the contract.

In addition to making energy-efficiency improvements, the Order calls for federal agencies to make new investments in renewable energy. Meanwhile, President Clinton has signed an order creating a national initiative to accelerate the use of bioenergy. The order establishes a permanent council and advisory committee to stimulate the use of biomass to produce electricity and transportation fuels.

Coal to dimethyl ether plant opens in Japan

Three Japanese companies; NKK Corporation, Taiheiyo Coal Mining Co, Ltd and Sumitomo Metal Industries Ltd have announced that construction of a test plant to verify synthesis technology for dimethyl ether (DME), a new source of clean energy, has been completed in Kushiro, northern Japan. The three companies, jointly with Center for Coal Utilisation in Japan, have been promoting a research project aimed at advancing low-cost DME mass

production technology. The Agency of Natural Resources and Energy under the Ministry of International Trade and Industry is backing the project with a research grant for promoting coal utilisation technology.

While demand for LPG, LNG and other clean energies is expected to grow in Asia, a rise in prices is also causing concern. Thus, calls are increasing for developing a technology to convert coal, which is in abundant supply in the AsiaPacific region, into clean energy, focusing on the effective use of untapped natural resources such as low-grade coal and coal-bed methane.

DME is a relatively clean fuel, emitting less carbon dioxide than coal. It can be synthesised by making use of coal-bed methane, which has a much higher greenhouse effect than carbon dioxide. The effective use of the methane gas in this way is also conducive to curbing global warming. DME is a clean burning gas with a greater calorific value than methane and is just as safe to use, says NKK. Due to these characteristics, DME is expected to find wide-ranging applications as clean fuel, prompting the development of technology to produce it inexpensively in large quantities.

NKK has been conducting its own DME synthesis research since 1989; this has now been stepped up in scale to use, initially, 5 tonnes per day of coal from Kushiro colliery.

NamPower, Namibia's bulk supplier of electricity, has successfully energised the first phase of £100 million 400 kV interconnector project from South Africa to Windhoek, Namibia's capital. The completed section of line – implemented with help from UK consultant Mott MacDonald – includes fibre optic telecommunications cables.

Mott MacDonald's role dates back to 1997 when the company was appointed to provide engineering services to NamPower including preparation of specifications, tender evaluation, design review and contract management. The consultant has had two engineers based in Namibia assisting the contract management of the first phase of construction. They will continue through the project's second phase, which includes construction of a substation near Windhoek and completion of the power line. Completion of the entire project is expected in mid 2000.





ABB ALSTOM POWER in Mexico and Canada

ABB ALSTOM POWER has received an order worth over 100 million euros to build a turnkey 250 MW gas-fired combined-cycle power plant in Mexico. The project is the first in a series of ten being tendered to independent power producers on a build, own, and operate basis by Mexico's Federal Electricity Commission (CFE). Mexico began to tender power plants in this structure in 1998 to meet a forecast surge in electricity demand.

The turnkey project entails the construction and operation

of the power plant and associated facilities, including a 28 km natural gas pipeline. ABB ALSTOM POWER will supply a sequential combustion GT24 gas turbine and associated steam turbine, the electrical generator, the heat recovery steam generator and the power plant control systems. The company will also be responsible for the complete engineering, erection and commissioning of the plant.

The plant will be built on a site located 14 km northwest from the city of Hermosilo in

Global Energy Associates Ltd (GEA) has completed a contract with its Portuguese partner Engigas SA to convert three upfired process heaters from heavy fuel oil to natural gas. The process heaters are part of the gas reforming plant in the Lisbon gas works. The existing ageing plant, which heats steam and naphtha as part of the Town gas production process, was causing management concern with respect to stack pollution problems. The heaters have now been fully modified to use natural gas.



The controls systems were designed by GEA to meet the stringent safety requirements of Gas da Lisboa and the control panels were designed, manufactured and fully pre-tested in the UK to GEA's specifications. The whole system has been carefully specified to meet the latest European burner and control safety standards. Gas is supplied at 6 barg to the control train and pneumatic Kuhme valves control the gas flow to the burner over a wide modulation range. The plant has been fitted with process controls which GEA has linked back to the main control room in order to provide operating and performance information. the state of Sonora. Commercial operation is scheduled for middle of 2001.

Meanwhile, the same company has been awarded a turnkey contract to re-power a conventional oil-burning thermal power plant unit in St John, New Brunswick, Canada. The contract, with a value in excess of 100 million euros, was placed by independent power producer Bayside Power Inc.

The re-powering of the power plant will increase output from 100 MW to 265 MW and substantially increase thermal efficiency up to 56%, says ABB. The plant will supply power to New Brunswick during the winter months and to the deregulated merchant power markets in the northeastern US in the summer.

The re-powering concept involves using the plant's existing steam turbine. The oil-fired boiler will be replaced with one of ABB ALSTOM POWER's natural gas-fired GT24 advanced gas turbines, an electrical generator and a heat recovery steam generator.

Irish gas network to expand

The Irish gas distribution network is about to be expanded to reach the bulk of the countries people.

"The natural gas supply network in Ireland will require investment of up to IR£1 billion by the year 2025 and over IR£800 million of this could take place within 10 years", according to Dr Michael Conlon, Chairman of Bord Gáis, speaking at the publication of the Gas 2025 study. The project was initiated by Bord Gáis and the Department of Public Enterprise to evaluate the necessary strategic investment in the national gas transmission infrastructure until the year 2025.

Dr Conlon also announced that Bord Gáis is planning to extend the national grid to all major population centres in the country; in particular a pipeline from Dublin to Galway and the rest of Ireland.

The report predicts that natural gas will become increasingly important to the energy sector arising from the efficiency of combined cycle gas turbines (CCGT) in electricity generation. It expects that initial locations for CCGT plants would be in the Dublin area. In the longer term, it foresees CCGT powered electricity generating plants in the south and west of the country.

The Gas 2025 study analyses several future gas supply scenarios and identifies three principal options to meet the forecast increase in demand:

- a second gas interconnector from Scotland direct to Dublin,
- a pipeline between Belfast and Dublin, and
- accessing additional indigenous gas discoveries.

Confirmation of a commercial gas discovery in the Corrib field off County Mayo would provide additional gas supplies, though additional infrastructure would be necessary to transmit such supplies.



Lower SO_x means urban air quality improves carbon dioxide

The Government has announced the biggest improvement in air quality since records began in 1993, and its plans for revised air quality targets for the future.

According to the DETR, the number of days in 1998 when air pollution in urban areas was above our health-based standards fell by 38% from 1997 and to less than half the rate in 1993. Rural air quality also improved by a record 25%.

Announcing the results of the latest monitoring information, Deputy Prime Minister John Prescott said: "The average number of days per site when urban air pollution levels were above the health-based standards fell to 25 days in 1998. This compares with 40 days in 1997, and 60 days in 1993. Nationally, concentrations of many key individual pollutants also fell in 1998. This is very welcome news but levels are still unacceptably high".

The improvement at urban sites has mainly been caused by a reduction in days of sulphur dioxide pollution. Emissions of fine particles, a principal cause of air pollution in urban areas, have also fallen because of tighter controls on vehicles and fuels and a decrease in the use of solid fuels for industry and heating. In rural areas, the figures show no clear trend, says the DETR, with the main cause of breaches of standards being ozone. Transboundary pollution and weather conditions are significant factors in ozone formation, it adds.

The pollutants included within the indicator are particles (PM10), ozone, sulphur dioxide, nitrogen dioxide and carbon monoxide. Trends are presented separately for urban and rural sites because a more limited range of pollutants is measured at rural sites.

IPPC includes regulating

The Pollution Prevention and Control Act 1999 has received Royal Assent. The Act paves the way for action to cut a wide range of pollution from factories and other installations, some of which have not been regulated before, and will also help meet national targets to tackle climate change, says the DETR.

For the first time, many installations will have to improve their energy efficiency, helping to cut emissions of carbon dioxide. Further improvements include measures to cut noise pollution and to ensure operators clean up after they leave a site.

The Act enables new regulations to be made which will:

· implement the requirements of the Integrated Pollution Prevention and Control (IPPC) Directive;

- extend integrated control to around 5,000 extra industrial installations;
- take a far wider range of environmental impacts into account such as noise, use of raw materials, accident prevention, site restoration and energy efficiency; and
- provide a consistent framework for the regulation of LAPC installations not covered by the Directive.

The new regime will maintain the current systems' central concept of a flexible, case by case approach to regulation which balances cost with environmental benefit.

The Government also intends to use the Act to improve the environmental regulation of offshore oil and gas installations including the implementation of the Oslo and Paris Commission's (OSPAR) decision on the use and discharge of chemicals offshore.



The 31m long blades of the new Britain's biggest wind turbine built at the Ecotech Centre in Swaffham, Norfolk have started turning to generating green electricity to power local homes. The turbine was granted unanimous planning permissionn and has enjoyed enthusiastic public backing locally.

The Enercon E-66 1.5 MW machine is the world's most technologically advanced wind turbine, says the Stroud based wind development group - Next Generation which brought it to the UK. Designed in the offices of celebrated British architect, Lord Norman Foster, the Ecotricity turbine is the tallest and most powerful wind turbine in the UK and will provide enough electricity for around half of the local town's residents, approximately 3,000 people. Even more remarkable, it features a unique public viewing platform, so for the first time ever, people can experience the workings of a wind turbine, from the inside of the machine.



The Government has

reintroduced free on-site energy surveys for businesses and organisations wanting to save energy and money a decade after it closed the previous survey programme. Run by the DETR Energy Efficiency Best Practice Programme, the new programme - called *Site Specific Advice*, is designed to help find out where energy is being wasted and how to put things right.

Successful applicants will receive a visit from an independent energy efficiency consultant who will carry out a survey of the site and deliver a clear, practical action plan. The consultant will be selected to meet the organisation's requirements, including energy management, buildings

> An emissions analyser from Telegan is proving an important aid to minimising emissions of pollutant gases at Medway Power Station in Kent. By analysing turbine exhaust gas, the



management, transport and selected process industries and technologies. Follow-up advice will also be available to help put the action plan into practice.

The amount of free advice available will vary from between a half-day and five days, depending on the size and complexity of the site. Where appropriate, more advice in specialist areas, such as CHP, transport and buildings design, may also be available.

Amongst organisations that have already taken part in trials of the programme are Nestle and construction company Henry Brothers.

Contact the Energy Efficiency helpline for further details, tel: 0800 585794

portable Tempest 100 helps to ensure that emissions from the station remain within EA requirements.

Situated on the Isle of Grain near Rochester, the 688 MW power station is operated by AES Medway Electric Limited. The analyser is used by the company to monitor levels of carbon monoxide, nitrogen oxides and oxygen in exhaust gases of two gas turbines. The analyser is used both to validate readings from permanently installed monitoring systems, and to provide a vital back-up should those systems fail.

Electricity transmission and distribution equipment manufacturer VA TECH Reyrolle has been awarded a switchgear contract, worth approximately £2.5 million, by the National Grid Company (NGC) to extend two substations in North Wales. VA TECH Reyrolle's contract involves the project management, design, manufacture, site installation and commissioning of 400 and 132 kV air insulated switchgear, together with the associated protection systems.



Trust finances local energy services

Two organisations are taking advantage of Energy Saving Trust funding to deliver energy services initiatives to householders.

Scottish Power is to set up 'ScottishPowered Energy Solutions', offering residents energy services that deliver long term energy, financial and environmental savings, and helping the company to gain and keep customers in the deregulated market.

Meanwhile, GLEEN, the Greater London Energy Efficiency Network, also received funding to set up 'HelpCo', an energy service scheme, in partnership with a chosen supplier, targeting owner occupiers initially in nine London Boroughs.

The two organisation will receive £249,000 funding for projects that will target over two million domestic customers over three years, giving them the opportunity to reduce bills, improve the comfort of their homes and help the environment. The projects offer energy surveys, finance packages and installation of energy efficiency measures and are predicted to realise savings of over 20,000 tonnes of carbon dioxide over the next three years. If successful, they offer the potential to be widely replicated leading to much greater savings.

The Trust also launched an information pack on energy services to encourage more sharing of best practice and key lessons from previous projects.

Call the Energy Services Office on 01908 558209 to order a copy.

Debate votes in favour of Climate Change Levy

A high-level debate

organised by the Royal Institute of International Affairs on the government's proposal for a Climate Change Levy saw the audience vote in favour of the tax. However, there was general consensus that the current proposal needs improvement; emissions trading should have a role and there needs to be a clear policy on the relationship between the tax and emissions trading.

The RIIA organised the debate The UK Climate Change Levy: Breakthrough or Banana Skin? in recognition of the considerable interest from many quarters (see Energy World May, July/August and September issues). Within the UK the debate has been about the direct impact of the introduction of such a levy, while other countries have viewed the UK implementation of this tax as a rare example of real action by any government under the Kyoto Protocol.

The debate (with participants representing industry, government, academics and NGOs) was chaired by Roger Berry, MP, a member of the Select Committee on Trade and Industry. It started with a slight majority of people opposing the Levy. Chris Hewett, of the Institute of Public

Policy Research, and Michael Grubb, of the Royal Institute of International Affairs, made strong points in favour of immediate action and convinced some of the participants. David Porter, of the Association of Electricity Producers, and John Mitchell, of the Royal Institute of International Affairs, argued that the problems of the proposal were so significant that it should be scrapped and alternatives such as an emissions trading scheme - introduced instead. After a two-hour debate the majority opted for the tax (breakthrough 52%, banana skin 32%, don't know 16%), despite all its imperfections.

"The most significant outcome of the debate. however," said Duncan Brack, Head of the Energy and **Environmental Programme** at the RIIA, "was the scale of agreement in both camps. Both agreed that there needed to be action by government, that there needed to be a package of policy measures, which would eventually include both carbon taxes and emissions trading, and that the current proposals leave much to wish for - and that the proposal has to improve to take effective action against climate change."

National power sells giant Drax power station

National Power has reached agreement to sell the 4,000 MW Drax power station to US energy company, the AES Corporation, for up to £1,875 million. The price is subject to a maximum possible adjustment of £175 million depending on the terms of other commercial arrangements to be finalised by AES.

Drax is being divested through the sale of shares in a newly-formed company, National Power Drax Limited, into which the assets of the station, including all of its 580 staff, have been transferred.

In addition to the purchase of the shares of National Power Drax Limited, AES has entered into: a 24-month contract with National Power for the supply to AES of up to 18.2 million tonnes of coal and a transitional contract for differences to cover a proportion of the output of Drax to 31 March 2000.

The disposal, expected to be completed later this year, is conditional on Government and regulatory clearance, and will be subject to public consultation under UK legislation. If approved, the sale will reduce National Power's UK generating capacity from around 18,000 MW to around 14,000 MW. The company also has interests in over 22,000 MW of capacity overseas.

National Power announced its intention to sell Drax in November last year to meet Government requirements for the practical disposal of 'good quality' plant. National Power believes the disposal will meet one of the draft undertakings required by Government in relation to the Company's acquisition of Midlands Electricity's 2.2 million customer supply business. Drax, located in Selby, North Yorkshire, is Western Europe's largest coal-fired power station and is the most efficient coalfired plant in the UK. It was fitted with a flue gas desulphurisation plant between 1994 and 1996, which removes around 90% of the station's sulphur dioxide emissions. In 1998/99, Drax produced 24,792 GWh of electricity. When its six 660 MW generators are on full load, it can produce enough electricity for four million people and can supply up to 10% of the electricity demand in England and Wales.



Zero carbon homes for sustainability

by Lynne Sullivan and Nigel Craddock, ECD Architects

The winning entry in a DETR-sponsored competition to design 'zero carbon diaxide emitting' homes was designed by Lynne Sullivan and Nigel Craddock of ECD Architects, who describe their entry below.

he brief for the competition called for a design illustrating a housing scheme for a riverside site in central Newark which met the requirement for sustainable development whilst meeting, as a minimum, zero CO2 standards for dwellings and possibly zero heating and autonomous criteria (all as defined in the DETR's General Information Report 53: Building a sustainable future - see box). The brief also stated that whilst the Report suggests a density of dwellings to meet the autonomous requirement, in the case of an urban brownfield site such as this the target planning density would be nearer double that figure, and it suggested that the higher density should be aimed for whilst not sacrificing the environmental criteria.

As designers we were excited by the challenge of a key site on the riverside in Newark combined with the exacting requirement of the energy/environmental brief. As individuals and within the context of ECD Architects we are accustomed to aim for the highest energy conservation standards and wherever applicable to use renewable sources of heat and power.

FITTING HOMES TO THE SITE

Once we had visited the site we began to analyse the characteristics and potential of the place - a largely instinctive process which we immediately tested with sketches and discussions, and later with threedimensional models and sunpath modelling. At the same time we began to consider and discuss options for heat and power within the scheme. We decided to incorporate a wide mix of dwelling types which we felt would attract a good mix of inhabitants and skills, encouraging skills sharing and day-round usage of the site - as far as possible a 'sustainable' community in terms of social mix with opportunities for home working to minimise travelling. Also, we felt that as much as the site as possible should be given over to productive ecology - allotments and an apiary - in order to reduce the CO₂ emissions resulting from a

lifestyle based on packaged and processed food consumption.

We felt we should utilise the special opportunities which the riverside location offered - but declined to use the river itself as a primary power source, eg via a heat pump, on the grounds that the benefits from temperature differentials were variable. Our conclusion was that we could propose to use the river as a means of transporting biomass fuel to the site, and this gave us opportunities to create riverside wharfs, as in Newark in a by-gone age, as a new model for bringing goods into the town and, if possible, to revive the functioning of a river which appears to have become little more than a scenic backdrop to the town. (We also proposed to use small river-powered turbines to pump water to the top of our tallest structures).

We decided that a CHP plant on the site would be justified if we could use the power for on-site activities during the day, and if surrounding uses on the riverside would offer possible sharers of the energy generated. We also decided that for reasons of lifestyle flexibility and diversity across the site, we would not pursue the zero-heating or autonomous option throughout the site (although one of the family housetypes was designed to permit an autonomous option). We therefore included many opportunities for home-based work spaces, 'lifetime' homes which could be easily adapted for the elderly, and also proposed an earthsheltered creche and community centre as well as a retail/covered market area for the sale of organic produce from the site. We felt these features were essential components of a sustainable and interactive community. We also included batterycharging points in the garage/workspaces at the edge of the site to encourage the option of electric car use.

BIOMASS FOR ENERGY

We ascertained from discussion with MAFF and others that agricultural setaside land in the Newark area represents approximately

10% of arable area, and that short rotation coppice (provided that all the setaside land on a typical farm was utilised for coppice fuel) would attract 100% setaside cover grant. In addition, we found that the Forestry Commission has further grants available to meet up to 50% of the cost of establishing coppice woods. We concluded therefore that it would be an attractive option for local farmers to provide biomass fuel to our site, whilst also providing an opportunity for local employment. Poplars and willows for coppicing would need to be established as soon as development agreements were in place, however, as we assume the crop would not come on-stream for 2-3 years after establishment. We suggested that the coppiced wood be stacked and then chipped at the planting site, to reduce quantities for transportation to the site by barge. We designed a minimum of 3-7 day storage capacity on the site underground.

We assumed that because of its use in recent years as a scrap metal yard, the site will be contaminated and would need some stripping of the soil - in this context the laying of community heating pipework, underground storage for various resources and waste/water recycling facilities, etc. made a virtue of the necessity for excavation of the site prior to development.

Although there was some disparity in the various sources of design guidance we used to calculate the area of plantation required to power our site, we estimated that, assuming the woodchip is air-dried down to 20-40%, and an electrical load for the site of 615 GJ, that 15 ha of short-rotation coppice would supply our needs based on a yield from a three-year rotation of 12 dry tonnes per hectare per annum. We proposed a system based on gasification technology (although our subsequent discussions with British Biogen suggest that wood oil technology is now a viable alternative) with an estimated output of 35-40 kWe.

The option of biomass fuel also seemed appropriate for our zero CO_2 housing as the coppice sites themselves would attract



butterflies and small birds in the surrounding countryside. We did include small arrays of photovoltaics around the site to power demonstration loads, but our calculations of area required and current costs precluded its more widespread use. However, our choice of roof forms across the site could permit some retrofitting of photovoltaics at viable orientations.

BUILDING FABRIC AND SERVICES

We designed our homes to consume approximately one-third the energy of a typical Building Regulations-standard home, with superinsulation standards such as 0.1 W/m²K for roofs. We also proposed to minimise embodied energy by using softwoods in their construction and cellulose insulation, and by proposing locally sourced materials for infill partitions, including recycled clinker and aggregates, to minimise transportation to the site. A high degree of prefabrication, and the use of cross-wall construction to allow future flexibility of partitioning, was also proposed in order to minimise wastage of materials now and in the future. This led us to propose a construction type which could offer a self-build adaptation - again, a feature which we believe offers social and economic diversity within the development. Controlling incidental air leakage through the built fabric and using humidity-controlled passive stack ventilation was also included as a way of reducing energy consumption.

Although we set out to utilise passive solar gains within the dwellings wherever possible, we believe that this should not be an overriding factor in urban townscape, where superinsulation standards apply. (The SAP calculations included as an appendix to the report included a comparison of a family housetype placed to maximise passive solar gains in a northsouth orientation, and the same housetype on an east-west axis. The estimated difference in the anticipated fuel bills was in the order of 3% per annum maximum.)

Combined with the desire to create south-orientated sunspaces where opportunity permitted, we came up with the idea of a series of six-storey 'turret' blocks containing one and two-bedroomed flats along the rivers edge, each with their own south-facing balcony and sunspace.

When we carried out studies to test the sunpath, we found the four turrets created minimal overshadowing of the site, and whilst allowing us to increase the density of the site considerably (the overall resulting density was some 240 habitable rooms per hectare), and reserve the central area for our productive gardens, did not result in an unsympathetic scale or form. We were delighted that the assessors recognised this as a 'very successful urban strategy' - and it was interesting to discover that none of the other entrants had suggested building high along the waters edge.

In summary, the competition allowed us

to design for a lifestyle with a greater emphasis on sustainability, conservation and productive ecology (our design also incorporated extensive water and waste recycling and conservation proposals which we will not elaborate upon here). Our proposal to use biomass fuel in a decentralised power plant, if widely replicated, has far-reaching implications for agriculture, sylviculture and indeed landscape in this country, as indeed has our choice of construction materials which maximises the use of softwoods, and proposes the use of hemp as an internal material. New techniques of forming prefabricated 'I' beams made of softwood products allow the designer greater freedom of clear spans in domestic architecture whilst keeping material use and embodied energy to a minimum. Natural products are also undergoing a revival for reasons of minimising toxins in the internal environment.

Whilst our scheme placed emphasis on economy of materials, standardised components, etc. we believe that these should form a kit of parts which provides a language for the designer to use in diverse forms. We are committed to an environment which celebrates a diversity of architectural expression: variety is the spice of life!

We hope our design may actually be built but a way forward is not yet agreed. Contact Lynne Sullivan and Nigel Craddock at ECD Architects, tel: 0171 405 3121, e-mail: ecda@ecda.co.uk

Building a sustainable future

The DETR document, largely written by architects Brenda and Robert Vale, describes the characteristics of homes and communities designed to three levels - to emit no net CO₂; to require no heating; and, hardest of all, to be

autonomous in energy and water requirements. It is illustrated by descriptions of a projects to be built at Sherwood Energy Village, and an autonomous house already built, also in Nottinghamshire. Copies of General Information Report 53: Building a sustainable future are available, free, from the BRECSU Enquiries Bureau, tel: 01923 664258, fax: 01923 664787, e-mail: brecsuenq@bre.co.uk

Domestic energy efficiency

Passed in 1996, the Home Energy Conservation Act, is one of the main mechanism by which energy efficiency in homes will be improved. While its implementation is in the hands of local authorities, the scope of the Act extends to all housing within the authority's area, including privately-owned homes and those owned by other providers. Here, Denise Marsdon looks at how implementation of the Act by local authorities is improving year-by-year, and Victoria Wiltshire looks the role for a key group of housing providers - registered social landlords.

Improving local authority efforts

The Home Energy Conservation Act (HECA) provides a focus for local authority activities in the energy field, bringing together housing investment programmes, environmental issues and ways to alleviate fuel poverty.

The Act originated as a Private Member's Bill, sponsored by Baroness Maddock with cross party support. It received its Royal Assent in June 1995 following an intense two year campaign spearheaded by the Association for the Conservation of Energy. The Act finally came into force on 1st April 1996. The potential benefits of the Act were at that time identified as a significant reduction in carbon dioxide emissions (it was estimated that a 30% improvement in energy efficiency could generate a 20% reduction in emissions), a significant improvement in housing conditions and the establishment of a national energy efficiency database with accurate data on public and private housing.

The Act made all district, metropolitan, London and unitary authorities into 'Energy Conservation Authorities' (ECAs). Every ECA was required to prepare a report setting out the energy efficiency measures that it considered practicable and likely to contribute to a significant improvement in the energy efficiency of its residential accommodation. So what is a qualifying measure? The definition provided by the Act includes "information, advice, promotion, making grants, loans and carrying our works".

IMPLEMENTATION OF THE ACT

Implementation of the Act has varied widely between ECAs. Initial reports to the DETR ranged from five pages in length to 300, with 29% failing to meet the statutory requirements. However over the interim years significant progress has been made and the Act has generated much enthusiasm and activity. The DETR has further encouraged authorities to form local fora to exchange ideas and pool resources. In April this year a National HECA Forum was held in Leeds. This, the second national forum, was organised by National Energy Services Ltd at the specific request of the chairs of the Regional HECA Fora.

One of the main attractions of the event was the presentation of the exclusive pre-publication results of the research commissioned by the DETR into HECA progress and local authority performance. This report drew the following broad conclusions:

- HECA is having an impact more resources are going into energy measures,
- insufficient resources are being devoted to HECA for the 30% target to be met,
- a substantial injection of resources would be required for this to change, and
- the rate of progress is unclear, due to the low quality of monitoring data.

IMPROVEMENTS TO MONITORING

HECA monitoring is clearly a major concern in this the third year of the Act. Feedback from the National Forum suggested that the main reason for this was the lack of understanding among HECA Officers of DETR requirements. The general conclusions from the Forum was that the reporting requirements should be revised generally and better guidance should be provided by the DETR on how to tackle the problem of monitoring.

Speaking after the forum, Mike Summerskill of the DETR confirmed that the forum had highlighted to them a number of problems which would be addressed in due course: "The messages

by Denise Marsdon, at National Energy Services Ltd

for the DETR arising from this event, and the duties and requirements on local authorities to deliver the energy efficient improvements identified in their strategies, are being considered. We hope to be able to deal with them in a sensible and structured manner." This is encouraging news as the feedback from the Forum clearly identified a lack of understanding of the requirements of the DETR.

Many delegates also identified lack of resource as an issue, both in terms of finance and personnel - indeed most of the delegates attending the forum had been in post for less than 12 months. The lack of funding for implementing HECA has been alleviated to some degree by the HECAction programme. Administered by the Energy Saving Trust, £11 million was originally made available to be awarded on a competitive bid basis in three tranches -1996 (£5 million), 1997 (£3 million) and 1998 (£3 million). Recognising the benefits that this programme has brought to kick starting HECA, the Government has recently approved a further three year phase of the scheme. In response to concerns from a number of authorities, the programme now encourages greater dissemination of good practice among authorities.

A number of other approaches to assist ECAs in their HECA activities are also under consideration. In particular, the DETR is supporting the development of a partnership - the National Home Energy Efficiency Partnership – of those involved in the promotion of domestic energy efficiency, including local Government, manufacturers, energy suppliers, installers and consumer organisations, to enable the UK to reduce its carbon dioxide emissions from the domestic sector.

The Government recognises that the

- towards 2000

task set is not an easy one but the Home Energy Conservation Act is an important piece of legislation which has encouraged local authorities to bring about real improvements in living conditions and affordable warmth for all householders and the community as a whole. Evidence suggests that, while the potential is not yet being realised, the Government is acting to address the issues raised by those tasked with the implementation of the Act. It is clear that the Act will offer a significant contribution to meeting the UK's climate change targets.

Contact Denise Marsdon at National Energy Services Ltd, tel: 01908 672787, e-mail: enquiry@nesitd.demon.co.uk

A role for registered social landlords

by Victoria Wiltshire, Association for the Conservation of Energy

HECA places a duty on those local authorities with a responsibility for housing provision to draw up a strategy to increase domestic energy efficiency in their area by 30% over 10-15 years. This duty extends to registered social landlord (RSL) properties as well as local authority stock and privately owned households.

RSLs can play a significant role in the implementation of HECA and in doing so can help to increase the comfort and health of some of their most vulnerable tenants.

Innovative examples of partnerships between RSLs and local authorities can be found in some of the schemes funded under HECAction. This programme, funded by government and administered by the Energy Saving Trust, provides pumppriming money to authorities on a competitive basis, to assist them with HECA implementation.

A number of case studies from the HECAction scheme, presented in a report recently produced by ACE for the Housing Corporation, provide examples.

PROVIDING ENERGY ADVICE AND EDUCATION

All HECAction schemes should include an element of advice provision. The types of advice programmes that RSLs have been involved in within HECAction schemes generally involve sending members of their staff to attend training sessions provided by the local authority. This allows RSL staff to become familiar with energy efficiency issues and, because they are already in contact with their tenants, they can pass on this advice more cost-effectively than employing someone to do this as a stand-alone service.

In several schemes, the RSL is also involved in providing advice to other householders, including owner-occupiers, in the area. For example, Bradford & Northern Housing Association has teamed up with Blackpool Borough Council to provide a comprehensive programme of energy advice to targeted households within the city. In this case, Bradford & Northern operate a renewal agency locally, and this role allows them to obtain publicity for this service.

BULK DISCOUNTS

Bulk discounts can be an extremely effective way of encouraging people to invest in energy efficiency measures. In return for promoting or endorsing a product, local authorities can negotiate substantial discounts on insulation materials and efficient appliances.

Where schemes involve appliances, the RSL may wish to promote the offer to its tenants (who are often responsible for supplying their own appliances). An example of this can be found in a scheme in the Vale of White Horse. In this case the partnership approach of the two local authorities plus the RSL provided a large target market, encouraging the manufacturer to offer a substantial discount.

REVOLVING LOAN FUNDS

HECAction grants can be used to set up revolving loan funds to offer low or no interest loans to householders who might otherwise be unable to obtain credit. Local authorities cannot legally offer such loans but they can sign a HECAction grant over to a charity or an RSL to administer the loan on their behalf.

As a result, there are several HECAction schemes with an RSL administering a loan fund on behalf of the local authority. The London Borough of Tower Hamlets was awarded a HECAction grant to set up a revolving loan fund, which is promoted alongside a discounted package of insulation measures. Bethnal Green & Victoria Park Housing Association, which was already a licensed credit broker, agreed to take on the administrative role on behalf of the Council.

TRAINING AND EMPLOYMENT

A number of HECAction schemes involve setting up a company to train and employ previously unemployed people in the installation of insulation. Such schemes have the dual benefit of generating local employment while also improving the energy efficiency of local homes.

One such scheme involves two local housing associations, Ridgehill and Aldwyck, working with Hertsmere District Council, providing a market for the company's services and also office space for company's staff.

The HECAction schemes summarised above demonstrate how local authorities and RSLs can work together for mutual benefit. Partnerships such as these are essential for achieving the targets set under HECA.

The ACE report: Local Authority & Registered Social Landlord Partnerships to Implement HECA is available for £5 from ACE, tel: 0171 359 8000. Contact Victoria Wiltshire at the same number.

Reducing carbon emissions from buildings

The contribution which energy used in buildings makes to climate change is both very large – and rising, while the scope for corrective action is enormous. In this edited version of a paper first delivered to a conference earlier this year, David Strong outlines measures which Britain is taking to reduce that contribution.

winston Churchill once stated that: "We shape our dwellings and afterwards our dwellings shape our lives". Today, he might have added that buildings not only shape our lives but also our environment - since buildings account for about 70% of UK carbon emissions (excluding transport).

The energy performance of the majority of the UK building stock is woefully poor. Saving of between 20%-30% technically are achievable in many buildings through the adoption of best practice, with significant reductions often being achievable through the implementation of no cost and low cost measures.

CLIMATE CHANGE - EFFECTS ON BUILDINGS

The potential extent of climate change effects on buildings is difficult to assess. However, based upon current predictions of the future climate, it will affect most areas of both human and natural activity. The challenge that faces the construction sector is to identify what the most significant effects will be and to develop solutions which minimise the risks these pose.

The broad range of issues that may affect the building fabric are summarised in Table I. Note that, as much of the current UK building stock will still be in service in 60 years time, future impacts are of relevance now.

IMPROVING THE SUSTAINABILITY OF UK BUILDINGS

The Government's manifesto commitment to reduce CO_2 emissions by 20% by 2010 (compared with 1990) implies a reduction in carbon emissions of 33.6 mtC per annum from 2010 onwards. The Climate Change Consultation Paper suggests that savings of 11.4 mtC (ie 34% of the target) can be

Impact	Caused by	
Storm damage	More frequent storms	
Flood damage	Rising sea levels, more storm surges, increased precipitation and heavier rainfall events	
Foundation movement	Increased drying of soils	
Corrosion of metals	Increased precipitation and higher temperatures.	
Timber degradation	Increased precipitation and higher temperatures. Also spread of insects that attack timber.	
urability of concrete Increased carbon dioxide concentrations, high temperatures, and increased precipitation.		
Masonry damage	Increased precipitation, higher temperatures, and higher wind speeds.	
Degradation of plastics Increased exposure to UV-B radiation.		
Rain penetration	Increased precipitation and higher temperatures	

Table 1: Some impacts on the building fabric (source BRE)

achieved from energy savings in all building sectors. BRECSU's own estimate of the potential for energy saving from buildings is 20 mtC (ie 60% of the Government's 2010 target could be achieved using economically viable measures) with savings of 28.3 mtC (ie 84%) being 'technically' achievable from the building stock alone.

Since buildings account for a significant proportion of UK energy consumption it is vital that a highly targeted approach to saving energy is adopted on a sector by sector basis.

The Government has currently ruled out any policy instruments that will increase energy costs in the domestic sector. In the industrial and commercial sectors increased competition in energy supply is likely to result in further cost reductions. With world oil prices expected to stay low at least into the middle of the next decade, and probable price reductions from the liberalisation of energy markets, the incentive to save energy in order to save money is unlikely to increase over most of the period to 2010. However, because of the commitment to deal with climate change, new pressures and priorities will develop and may incluce the following:

- carbon taxes/trading,
- mandatory reporting of energy/environmental performance,
- requirements for landlords to upgrade tenanted buildings to a minimum standard of energy performance,
- compulsory energy audits and/.or energy rating at transfer of building ownership, and
- retrospective and increasingly

demanding Building Regulations. Yet there is substantial evidence, from BRECSU, the Energy Saving Trust and others, that even at current low energy prices, energy use in the buildings sector could be substantially reduced at no net cost.

The recent UK Climate Change Programme consultation paper suggests that domestic CO2 emissions for 2010 on the basis of current policies, will fall (from 43 mtC in 1990) to 38mtC, a reduction of 12%. However, this reduction is only partly due to efficiency improvements in the building stock (and equipment/related appliances). It is mainly due to the reduction in carbon emissions from power generation, largely as a result of the switch away from coal to gas, which has been allocated to the other sectors on the basis of their electricity use. Recent forecasts from Cambridge Econometrics show that the direct carbon emissions from households are actually due to increase by 2010 by 13% over 1990 levels, the highest percentage increase of any sector, including transport.

ASSESSING ENERGY AND ENVIRONMENTAL PERFORMANCE

With Government support BRE has for many years been developing techniques for assessing the energy and environmental performance of buildings. Of particular importance are SAP and BREEAM.

Standard Assessment Procedure (SAP)

An energy rating aims to inform householders of the overall energy efficiency of a home in a way that is simple and easy to understand. Many different

- the UK programme

technical definitions for such a rating are possible, and several have been used to date in the UK. The Standard Assessment Procedure (SAP) is the Government's standard for home energy rating. A SAP rating of 100 is excellent, conversely a rating of 1 is exceptionally poor. Since 1995 DETR has been promoting the SAP 80 Plus initiative which aims to raise standards across the industry. The scheme rewards builders who achieve a SAP rating of 80 or over, on a whole development, by providing free marketing support materials backed up by a consumer awareness campaign.

The rating obtained from following the SAP depends upon a range of factors that contribute to energy efficiency:

- thermal insulation of the building fabric,
- efficiency and control of the heating system,
- · ventilation characteristics of the dwelling,
- solar gain characteristics of the dwelling, and
- the price of fuels used for space and water heating.

The rating is not affected by factors that depend on the individual characteristics of the household occupying the dwelling when the rating is calculated, for example:

- · household size and composition,
- the ownership and efficiency of particular domestic electrical appliances, or
- individual heating patterns and temperatures.

Also the SAP rating is not affected either by the geographical location of the dwelling; a dwelling will have the same rating whether it is built in Caithness or Cornwall.

Based upon data from the 1991 English House Condition Survey, there were just over 3.0 million occupied properties with SAP ratings greater than 50 and 5.9 million with ratings below 30, 2.8 million of the latter being rated under 20. The owner occupied stock had the greatest number of inefficient dwellings, but a significantly lower proportion than other sectors. Just over a quarter of owner occupied dwellings had SAP ratings below 30, compared with 35% of local authority or housing association owned properties and 63% of those privately rented. These disparities between sectors increased as the SAP threshold was reduced, a far larger proportion of the private rented stock having SAP values below 10 than the owner occupied sector.

BRE Environmental Assessment Method

The Building Research Establishment Environmental Assessment Method (BREEAM) was originally launched in 1990. It sought to provide authoritative guidance on ways of maximising sustainability whilst minimising the adverse effects of buildings on the global and local environments, together with the promotion of a healthy and comfortable indoor environment. It was a world first, and has since formed the basis for similar schemes in other countries. In the UK it has been widely accepted as representing best practice, with significant market penetration. It is an important component of the environmental policy of many major businesses.

The basis of the scheme is a certificate awarded to individual buildings on the basis of 'credits' for a set of performance criteria. The certificate provides a 'label' for the building that enables the owners or occupants to gain recognition for the building's environmental performance. The certificate can be displayed in the building or used as part of an organisation's overall environmental statement. The building is assessed independently by trained assessors appointed by BRE. BRE is responsible for specifying the criteria and methods of assessment for quality assurance of the assessment process used.

The main objectives of the scheme are:

- to distinguish buildings of reduced environmental impact in the market place,
- to encourage best environmental practice in building design, operation, management and maintenance.
- to set criteria and standards going beyond those required by law and regulations, and
- to raise the awareness of owners, occupants, designers and operators of the benefits of buildings with a reduced impact on the environment.

Energy Efficiency Best Proctice

Over the past decade, the Energy Efficiency Best Practice programme (EEBPp) has

by Dr David T G Strong, Director, Energy and Communications Division, BRE

achieved a great deal. The target set for the programme in 1990 was to reduce carbon emissions by 5 million tonnes a year by 2000. Independent impact assessment has verified that the programme will meet this target. Studies carried out at BRE show that the programme also provides the highest return on investment of any government funded energy saving initiative (in terms of tonnes of carbon saved per annum per \pounds invested). The EEBPp in buildings is managed by BRE (BRECSU) on behalf of the DETR.

The balance of the programme is moving away from Best Practice information gathering, publication and dissemination towards tailored advice. Suitably qualified consultants will be funded to provide on-site support, with site specific advice. Also, new methods of influencing and communicating will continue to be introduced, including the implementation of Energy Efficiency Agreements, the development of partnerships and where appropriate greater use of electronic media.

The Government has recognised the importance of getting the design of buildings right and has recently launched the Design Advice Service (DAS). DAS offers professional, independent and objective advice on the energy-efficient and environmentally conscious design of buildings. The service covers both new-build and refurbishment projects and is managed on behalf of the DETR by BRECSU.

Subject to eligibility, clients are offered a one-day general consultancy on their chosen building project, paid for by a cash-back scheme. DAS clients include building developers, fund providers, design teams, letting agents, housing associations, local authorities and building owners/tenants. All potential building projects must have a minimum floor area of 500 m². This simple eligibility criteria applies to both new-build and refurbishment projects. (For more information telephone 01923 664258).

In the future being 'seen to be green' will not be enough - the time for action is now, since as Thoreau so aptly stated in 1854: "What is the use of a house if you haven't got a tolerable planet to put it on".

Healthy buildings for healthy pursuits; using 'dynamic insulation'

by Sandy Halliday, Gaia Research

'Dynamic insulation' is just one low energy technique being used by the Gala Group Scotland, which specialises in ecological design and community consultation. The Group is also currently preparing an environmental guide to the Architect's Job Book. Here, Sandy Halliday describes how dynamic insulation is working at a leisure centre in Stirlingshire.

The McLaren Sports Centre at Callander, Stirlingshire is the first major building in the UK to use 'dynamic insulation', a breathing construction technique, in which the heat usually lost in conduction to outside is collected by air drawn into the building through the insulation. The insulation acts as a counterflow heat exchanger.

Dynamic insulation is an exciting approach to the heating and ventilating of buildings which emerged as a concept in the 1960's through an interest in developing the fabric of buildings rather than the supporting mechanical systems.

The building is also the first major building in the world to use dynamic insulation in a wet environment. The building incorporates dynamically insulated squash courts, bowling hall, sports hall and swimming pool. There are a number of examples of its use in buildings with high moisture content in the internal air and a requirement for a constantly high ventilation rate. Typically in the past these were farmsteads but the idea has slowly been introduced into housing, schools, community care, office buildings and sports halls in Europe. The design of the McLaren building is the culmination of many years experience in the design and construction of moisture and air transfusive wall and ceiling systems by Gaia Architects in Scotland and Norway, where they have designed these constructions for domestic and school buildings.

The development of the McLaren Community Leisure Centre has been supported by the Scottish Sports Council who are keen to identify cost effective services solutions for buildings with high running costs in order to maintain capital and running costs of sports buildings at levels which do not create long term dependency on financial, human or environmental resources.

The Scottish Sports Council are also concerned to ensure that while encouraging and supporting healthy pursuits this is underpinned through the procurement of 'healthy buildings'. Hence this approach which, as well as controlling ventilation in buildings to reduce energy expensive air change losses, also potentially offers the opportunity to reduce reliance on mechanical systems and reduce air quality problems associated with dirty plant and ductwork. Indoor health benefits, however, which are claimed as an important aspect of dynamic insulation, are the least well understood aspect of its performance.

Breathing construction is only of a range of ecological aspects which form part of Gaia's standard ecological approach to design. The approach has brought them a number of environmental and civic trust awards. Gaia Architects in Scotland and Gaia Lista, Norway simultaneously won House of the Year competitions in their respective countries, in 1993, with moisture transfusive wall designs.

The McLaren building performance is now being monitored by with the support of the Scottish and English Sports Councils and Gaia Architects. Initial checks indicate that the dynamic insulation appears to be working effectively in both the swimming pool and the sports hall in exchanging heat between the room underneath and the incoming air, while at the same time largely resisting the backflow of moist air and water vapour. Of particular note is the decision to change the fans installed to half their present design duty with an option to have a turn down ration equivalent to 0.5 ac/h. This was as originally requested by the architect but has only been agreed to now that the performance of the roof has been demonstrated to be as designed. Data is now being gathered on a regular basis and reports will be presented to the sponsors on a quarterly basis.

Proceedings of a seminar held at the building last are available. For further information contact Sandy Halliday at Gaia Research, The Monastery, Hart Street Lane, Edinburgh EHI 3RG, tel: 0131 558 7227, e-mail:gaiagroup@aol.com

Interior of the leisure centre – the building's exterior is featured on the front cover



'Energy free' lighting for Birmingham hospital

M onodraught has moved its concept of 'energy free' lighting a stage further with the addition of a lighting control package, which acts on internal daylight levels, to its SunPipe natural daylight system - resulting in the SunScope composite unit.

One of the first projects to apply the concept is Heartlands Hospital in Birmingham, where Monodraught has installed thirty-three 13" diameter SunPipe systems. The SunPipe consists of a polycarbonate dome installed at roof level in which daylight is captured and reflected down into the space below.

Illuminating a 55 m stretch of busy corridor used by thousands of patients, visitors and hospital staff every day, the SunPipes have replaced old fluorescent tubes that were only able to provide floor level illumination of 150 lux; the minimum necessary for the main access to major departments including X-ray, intensive care, several theatres and 18 wards.

The hospital's aim was to raise this to a minimum of 200 lux; a target that has been easily exceeded, even under an overcast sky. Under full bright sunlight conditions up to 600 lux is achievable.

Philips high frequency T5 tubes of only 41 W, controlled by a photocell, supplement the system. Power is regulated to supply just enough current to reach the target illumination during cloudy periods and at night-time.

Energy savings are considerable; the SunPipes save around 85% of the electricity consumed during daylight hours and reduce overall lighting costs in the corridor by 60%, says Monodraught.

Contact Monodraught on tel: 01494 464858, fax: 01494 532465. The polycarbonate tops of SunPipes installed in Birmingham



Heat pumps, thermal storage for buildings

Gphase-changing thermal storage systems are among technologies supplied by Temperature Ltd at two buildings in the UK recently.

A range of energy saving and renewable energy based measures have been installed at Broomfield College near Derby, including a ground source heat pump system to supply a greenhouse with underbench heating for seed trays.

Ground source heat pump systems can exploit the vast resources of low-grade energy stored in the ground to provide economic heating and cooling to buildings. In heating mode, energy is extracted from the ground, upgraded and transferred to the greenhouse (or a building) by the heat pump. A by-product of the heating process is cooled water flowing through the closed ground loop circuit which is also connected to two Temperature 'geothermic' heat pump units located in the classroom and demonstration area. These units are able to provide 'free' cooling using an in-built economiser circuit. When heating is required they operate as a heat pump at very high efficiencies.

On very hot days further mechanical cooling is also available. Excess heat from the cooling duties is returned to the ground, which acts as an efficient heat sink. As well as the much lower environmental impact than conventional systems the servicing and maintenance requirements are minimal.

An example of the versatility of Versatemp heat pumps is the Millennium exhibition project 'Bristol 2000', housed in the renovated Great Western Railway depot.

Air conditioning system designer Ove Arup and Partners decided to use heat pumps in conjunction with a thermal store to air condition and heat the building. The thermal store consists of a perspex tank containing 61,000 balls, 98 mm in diameter, filled with a phase changing material manufactured by a French company; Cristopia. The balls contain a eutectic salt solution which changes state between liquid and solid, with a phase change temperature of 27°C for maximum efficiency, providing an energy capacity of 50 kWh/m³. The balls are surrounded by water which acts as an energy transfer medium.

The tank is connected to 125 Versatemp heat pump units by a two pipe reverse return system. Four large heat pumps, running overnight using economy electricity, charge the tank with either heat or coolth as required. The tank acts as an energy store for the Versatemp system which then air conditions or heats the building as required.

Contact Temperature Ltd on tel: 01489 572238.

Analysing the power

In the deregulated world of electricity supply, medium to large commercial and industrial energy users might be forgiven for thinking that all they need to worry about is finding the lowest cost utility company and signing the annual supply contract. However, there are still two major considerations for energy users which are closely connected: energy efficiency and power quality.

Good power quality (as it affects users) is the supply of consistent electrical voltage and current in a pure sinusoidal waveform. Some problems with power quality, such as surges and sags (voltage drops), have always been with us and are caused by power failures, storms, lightning, etc. Protection here is quite straightforward, if also quite expensive, in the form of UPS (uninterruptible power systems) and surge protectors.

A more insidious problem is known as harmonics - the distortion of the voltage and/or current sine waves. This form of power pollution has increased significantly over the last 20 years mainly because of the greater use of devices such as variable speed drives which have non-linear load characteristics. Harmonics cause a variety of problems such as overheating and equipment failures.

HARMONICS

Harmonics are a mathematical means of measuring this distortion by separating the distorted waveform into individual harmonic components. By definition, harmonics are frequencies that are multiples of the base frequency of 50 Hz. In other words, the second harmonic is 100 Hz, the third is 150 Hz and so on. Each of these components is in the form of a sinusoidal waveform at its own frequency and when they are added together they will form the original distorted waveform.

The following are just a few examples of equipment that can cause power quality problems: computers, photocopiers, laser printers, heating and air conditioning equipment, factory automation, variable speed drives and fluorescent lighting. And many of these power polluters are themselves most vulnerable to distortions in the power supply.

It has been estimated that by the year 2000, 60% of all electricity will be passing through non-linear loads. This trend also affects the cost of electricity supply.

Electricity is normally supplied in a three-phase alternating current - the familiar red, blue and yellow cables. At most large sites the three phases are carried into the site itself, but branch circuits at the equipment level are usually single phase.

The AC supply alternates between positive and negative at a frequency of 50 Hz and can be expressed graphically as a sine wave with a smooth graduation between the crests and troughs. Unfortunately much modern electrical equipment, particularly that which uses lightly loaded induction motors, does not make use of the power supply in a straightforward way. The relationship between the applied alternating voltage and the current consumed is known as the power factor and is such that the respective wave forms are not in phase with each other. The result is that the apparent power, expressed in kVA (kilovolt amps), will be larger than the true power consumed as measured in kW. And the generating power required will need to be based on apparent power not true power. The ideal power factor would be a figure of 1, but for a normal site the figure would probably vary between 0.7 and 0.9, depending on what electrical equipment was being used.

If the single phase loads are not kept equal, the three-phase supply at the supply line can become unstable, causing problems such as capacitor switching and overheating of the earth and neutral wires.

Equipment such as computers, which are non-linear in their power use or in other words take constantly varying chunks of power at different points in the alternating cycle, affect both the power factor and the harmonics balance of the AC power supply.

A typical linear load would be a standard light bulb or electric fan motor where power is used relatively evenly. However, much of today's electronic equipment uses a static power rectifier which pulls current in sharp, irregular or non-linear pulses and has the effect of distorting the voltage. When distorted voltage is delivered to equipment designed to expect a sinusoidal voltage, overheating or malfunctioning can and does occur.

Ironically, it is often the very equipment which causes harmonics that is most vulnerable to its occurrence. Harmonics filters help alleviate the problem but the best future solution will probably be the design of new electrical equipment with inbuilt harmonics filtering.

MONITORING USAGE

Monitoring energy usage and the power supply is absolutely vital for cost-effective use of electricity and the reliable operation of plant. The analysis of can be carried out by portable instruments or fixed systems and there many aspects to consider such as:

- Will building or site area change in their future use, necessitating changes in power supply requirements?
- Over what time period will monitoring be required?
- What measurements need to be taken, eg. kW, kVA, power factor, harmonics?
- What is the cost of monitoring compared to the expected benefits?



supply quality

Fixed monitoring has some advantages, but portable analysers are generally less expensive, more versatile in what they can measure and will be flexible in accommodating changes to buildings and items of plant.

Information is power. An accurate and understandable profile of power consumption and quality will enable the energy manager to make informed

by David Fairhurst, Kane International Ltd

decisions on the operation of plant and energy saving measures.

Contact David Fairhurst on tel: 01707 375550, fax: 01707 393277.

Why choose half-hourly metered contracts?

by Stephen England, Datum Solutions Ltd

Arguments for and against halfhourly metered contracts have been overshadowed by the electricity regulator's insistence on the 100 kW maximum demand threshold. Indeed, it would be fair to say that the decision has obscured the real issues which the customer needs to consider when evaluating the different options facing him or her.

Any site with a maximum demand in excess of this 100 kW level must have half-hourly metering installed. Below this level, customers have the option to choose this form of contract or to settle for one based on 'profiles'.

The regulator's decision was, of course, to enable the electricity Pool to continue to operate adequately on a day to day basis with the vastly increased number of players in the market after the 1998 changes: but the customer has quite different criteria when it comes to contract selection.

For users of electricity, the primary question is how to save money on energy bills, both in purchasing it more cheaply and using it more efficiently. Here, a number of factors come into play.

All supply contracts involve the supplier in a certain amount of commercial risk. Agreeing a price with the customer without knowing the exact cost which will have to be paid through the Pool involves risk, although this can be minimised by 'contracts for differences' between suppliers and generators.

However, there is also a risk in not knowing when the customer will use the electricity purchased - this may be at times of day when electricity prices are high. Half-hourly contracts minimise this risk to the supplier because they record - and charge - the customer according to the prevailing price at time he uses power.

Profile contracts attempt to do this as well. They provide a typical consumption profile for different types of customer and suppliers charge against this. However, it can only be an approximation.

For a supplier, half-hourly contracts mean less risk and, therefore, almost invariably lower marginal costs to his customers.

For the customer, half hourly metering also offers considerable benefits. There is the possibility of load scheduling to take account of cheaper electricity at times of lower national demand.

Access to the metered data can be an invaluable source of energy management information. Actual consumption can be tracked against budget and forecasts. This can be done on a day-plus-one basis, rather than having to wait for a month or six weeks till the bill comes in. Any unexplained rises - or falls - in consumption can be investigated, in case they signify equipment malfunction or failure. These can be corrected immediately, reducing downtime and production losses.

Bills can be checked for inaccuracies and challenged where wrong. The Utility Buyers' Forum has estimated that errors on bills represent about 1% of the total. In addition, consumption data will be very valuable in future contract negotiations. The more information a potential supplier has about a customer's likely demand levels, the less risk and so the keener price.

So, the benefits of half hourly metering include: lower unit prices for electricity; the possibility to negotiate even keener rates; the opportunity to check bills and have these corrected quickly; more efficient management of the energy used; as well as the capacity to identify and correct equipment faults quickly and to minimise their effect on bills - and production losses.

Each business will have to quantify these benefits for themselves. On the other side of the equation are the fixed costs of installing half hourly metering. The metering, installation and comms links will amount to about £500. The associated meter operation and data collection costs will be about another £400: those on profile contracts will still pay these, but they will be included within the standing charges.

So, in order for a half-hourly metered contract to be financially viable, it would need to provide annual savings for the business of about £500 through the benefits mentioned above. The question of maximum demand does not even come into the equation - the issue is purely about the benefits that the contract type can offer against the £500 extra costs incurred in the installation process. Looked at in those terms, half hourly metering looks a good bet for many businesses.

Contact Stephen England at Datum Solutions Ltd, tel: 01322 295300, e-mail: datumcsd@ngc.co.uk

Labelling green electricity

By Rona Wilkinson, Intermediate Technology Consultants

Rona Wilkinson considers the various green power schemes around the world, the need for green electricity accreditation schemes and the certification schemes that currently exist in Europe, Australia and Canada.

Until recently the majority of households, in Europe, received their electricity from a state controlled source, and had no choice as to their generator or supplier. However, increasing liberalisation of the market has led to a growing number of customers who can now choose their supplier. There is a demand among consumers for electricity generated from environmentally benign sources, and suppliers are responding to this demand.

In the last few years the situation with regard to electricity generation, supply and distribution has changed, at a national and European level. The EU has three clear energy policy objectives; increased competitiveness, security of supply, and protection of the environment. The provision of renewable energy (RE) schemes is compatible with all of these objectives, and the EU has set a target for 12% of all electricity generated in the EU to come from RE sources, by the year 2010. This requires a doubling from present amounts.

In addition the EU's 1997 White Paper developed a strategy to promote RE by adopting policies and strengthening cooperation between member states, in order to encourage growth in renewable generation. This re-enforced the EU Directive 96/92/EC which concerns the internal market for electricity, and points towards facilitating electricity trading between member states, ensuring that electricity generated from renewable energy sources can be certified, by an independent body, by 2005.

There is therefore a requirement at both state and EU level to promote green generation, and there are a number of schemes that allow consumers to purchase green electricity at a premium.

COMPULSORY SCHEMES

These are normally Government controlled initiatives, involving a tax or other levy to pay for new RE generation. An example of this is in the UK where RE generation schemes are supported by the Non Fossil Fuel Obligation (NFFO). NFFO obliges the regional electricity companies to buy a certain amount of renewable electricity at a premium price, and awards generators contracts to produce that electricity according to a competitive bidding system within technology bands.

NFFO is financed via a levy (the Fossil Fuel Levy) on electricity bills for domestic consumers.

In Germany the Feeding law (Stromeinspeisungsgesetz) requires grid operators to purchase electricity from renewable sources, produced by independent power producers, for a premium price fixed by the Government on an annual basis. This price is calculated as a percentage of the average revenue per kWh from the delivery of electricity by electricity utilities to all final consumers. The percentage received depends on the specific generation technology; with wind and photovoltaic receiving 90%; small hydropower, biomass, landfill and sewage gas, 80% and; hydropower up to 65 MW, 65%. This law has been of particular benefit to the wind power industry, with Germany now having the biggest installed capacity of wind generation worldwide. This law has attracted some criticism, in particular from utilities who cannot take advantage of the Stromeinspeisungsgesetz.

VOLUNTARY SCHEMES

There are two types of voluntary schemes currently in operation; contribution based schemes and consumption based schemes. The former charge a premium for the price paid for some or all of electricity used, implying that the contribution to the scheme is directly linked to the consumer's consumption. Details vary as to the structure and content of the schemes. A number of companies in the UK (such as Green Electron, The Renewable Energy Company, Unit Energy) offer tariff based schemes. In the Netherlands, EDON launched a scheme in 1997 where customers can opt to purchase 25%, 50%, 75% or 100% of their electricity from renewable sources, for between 5% to 20% premium. In Sweden there are a number of schemes, all with different pricing structures according to the energy being produced. In Germany, there are currently 15 new power companies offering green electricity. Prices range from 0.04 ECU/kWh where the offered mix includes landfill and CHP to 0.95 ECU/kWh where the generation all comes from PV sources.

In contribution based schemes customers can contribute to a fund for renewable energy development; in these cases the schemes are promoting new generation and are not linked to electricity consumption. An example of this in the UK is Triodos Bank, which has set up a wind fund as an RE equity investment vehicle. In the Netherlands the contribution schemes are known as Green Funds where the public contribute through banks, under supervision of the Dutch Central bank, and 70% of the capital must be invested (so far this has mainly been in wind farms). Sweden has two contribution based funds where consumers fund not only RE construction but also research and development into green electricity and emission reduction programmes.

A third approach is the trading of certificates. In the Netherlands there is a Government arrangement where each kWh generated from renewable energy sources obtains a certificate. These can be traded on an open market where individuals, companies and utilities can buy and sell these certificates. International trading also started in January 1999, with National Wind Power, the UK's largest Wind Power developer, starting to trade green certificates with Energie Nord West of the Netherlands. The electricity forms a fraction of the output from National Wind Power's three wind farms which is currently sold to the UK Pool. All three schemes received NFFO

support for their construction and a favourable tariff which expired in 1998. ENW pays an undisclosed premium for the greenness of the power as a step towards meeting their target for purchase of electricity produced from RE schemes.

ENW says that they are unable to find RE generation that is suitable for this in the Netherlands.

ACCREDITATION SYSTEMS

The increasing number and type of schemes has led to a need for an accreditation system, in order to provide consumer confidence that the electricity offered is consistent with the claims relating to the resource, technologies and environmental performance. This is particularly important with electricity where, for grid connected customers, there is no way that a particular electron generated from a specific source can be guaranteed to be supplied to a certain point.

There are currently a number of green electricity schemes in Europe. Two general approaches are currently taken; based on minimum performance criteria and on life cycle assessments.

MINIMUM CRITERIA SCHEMES

Minimum criteria schemes can be based around certain models:

- an eco-labelling model where certain accreditation criteria, differentiating the best 10-20% of the market from the rest. The label will then be awarded or not. awarded. There is no ranking of products within the model.
- an energy label which is similar to the eco label model but the products are ranked so consumers can choose how green they want to be.
- minimum standard model, which sets minimum criteria where the consumer can be confident that a certain proportion of the electricity, comes from renewable sources.

The eco-labelling and minimum standard model are the two models that are currently in use at the present time.

Sweden launched its scheme in 1995, run by the Swedish Society for Nature Conservation (SSNC). It is called Good Environmental Choice and suppliers can obtain a licence to use the logo provided that they meet certain environmental criteria, concerning both the generation source and the supplier who must guarantee that the criteria are met in an annual energy balance. Records are checked by auditors. The scheme includes all generation types but with provisos on generation from hydropower and biofuels.

Germany has a number of different schemes, from one set up by the Official Certification Company and ones set up various nature and renewable energy organisations, such as Friends of the Earth and EUROSOLAR. All of these use minimum performance criteria.

In the UK an Accreditation Scheme has just been launched (see Energy World September), Future Energy, by the Energy Saving Trust. It includes both green tariffs and RE investment funds. This scheme will adopt the government definition of new and renewable sources of energy, but has limitations on the amount that can come from large scale hydro. Each tariff must identify which of the different renewable energy sources are included and the approximate percentage mix (based on a typical year). For the first three years schemes must supply 70% from renewable energy and after that it must be 100%.

Outside Europe, there are two established green accreditation schemes; in Australia, the Sustainable Energy Development Authority (SEDA) has developed a Green Power Accreditation Scheme incorporating both consumption and contribution based schemes. Both types must meet certain criteria, submit reports and are periodically assessed by SEDA. Accredited organisations are required to put revenue gained from the schemes into a separately audited accounts specifically designated for RE investment and to lead by example by obtaining 60% of their power from new sources.

In the USA there is a 'Green-e' program, and the requirements for certification include a minimum 50% of the scheme's electricity coming from RE (balanced over one year). The non renewable part of the electricity supplied by the scheme must have an emissions rate per kWh for SO₂, NO_X and CO₂ that does not exceed the average emissions rates for the fossil portion of the state system.

LIFE CYCLE ASSESSMENT SCHEMES

The Certified Environmental Product Declaration (CEPD) was launched in Sweden in 1998. Certification is based on information from a life cycle assessment (LCA), according to international procedures following ISO standards for LCA. A declaration may include information on raw materials, energy use and efficiency and other environmental impacts. CEPDs do not include any form of subjective judgement or evaluation of the environmental performance, but builds on quantitative data, that is checked and verified by an independent body according to the appropriate ISO standard. No predetermined performance levels are set but the results are presented in a clear manner allowing the consumer to make a well informed decision.

FUTURE INITIATIVES

The differences in the accreditation schemes centre on:

- What technologies should be included. All at the present include wind and PV, Most include geo-thermal and small hydropower and some biofuels. However landfill and waste are areas of controversy.
- The mix for a consumption scheme: should it be 100% or less.
- How to incorporate existing subsidies.
- Investment requirements to encourage new RE.
- Monitoring and evaluation.

As trade in electricity across member states increases, and member states work towards achieving their renewable energy targets, there will be a need for a European wide accreditation standard and this must be flexible and incorporate the above findings.

Intermediate Technology Consultants is currently involved in an EC funded project looking at developing a standard of green electricity accreditation, which will be harmonised across the EU. It involves four partners in the UK, Sweden, Spain and Germany.

Reducing energy consumption by vehicles

Sir

The letter from Professor Thring in Energy World July/August issue was a very interesting summary of likely developments in fuel and engine technology, with some very provocative points. It certainly will be very difficult to introduce a replacement for the internal combustion engine. However, two important factors suggest to me that the forecast benefits from any increases in IC engine fuel economy are unlikely to be realised.

enters

Firstly, in searching for increasing efficiency, the law of diminishing returns will apply as the ultimate thermodynamic efficiency is reached for any heat engine

The formation of engineers

Sir

I write to you to raise some points regarding the article "The Formation of Engineers: education and professional development" published in the July/August issue of *Energy World*.

While I understand the needs to promote the incorporated engineer (IEng) grade, I do not follow the logic that this should be at the expense of chartered engineer registration. If industry has a requirement for higher numbers of incorporated engineers then surely this should be achieved by the promotion of education and training for this grade rather than demoralising large numbers of hard working engineers by excluding them from their goal of becoming chartered engineers.

The SARTOR initiative is yet another misguided attempt by the engineering council to improve the status of the engineering profession. In probability the committees that developed this initiative consisted mostly of academics. In my experience most academics have a very limited knowledge of industry and its needs. As individuals they are obsessive regarding educational attainment and assume that the only road to improvement is more formal education. In reality practising engineers develop the majority of their expertise from their practical experience not from operating between two fixed temperatures. Secondly, there is that highly important factor in all environmental/personal consumption issues - human nature and the desire to have more rather than less.

Over the past 30 years, continuous environmentalist pressure has already brought a steady improvement in fuel efficiency of the IC engine. However as the fuel price has been static or reducing in real terms, there has been an accompanying 50% increase in the size of typical vehicle engine size. In the 1960s, the smallest cars had capacities of 800-900 cc and are now typically 1400-1600 cc. Family cars had capacities of 1300-1500 cc and have increased to 2.0 or

class room tuition. Classroom tuition can provide a basic knowledge of the theoretical aspects of engineering but can never provide the in depth expertise derived from professional practice.

As a practising chartered engineer who regularly interviews and recruits graduates my requirements are very straightforward. I require well educated engineers with a solid grasp of engineering fundamentals who are willing to approach work in an enthusiastic and committed manner. In my opinion the current educational standard, attainment of a BEng Honours degree, adequately prepares engineers for their future careers. I have not once in my career ever heard any colleague comment that graduate engineers needed a longer academic formation!

Introducing tougher entry standards and longer courses will reduce the already dwindling numbers applying for engineering courses. This will dramatically effect the supply of well qualified engineers and will do serious damage to industry.

The Engineering Council should be lobbying parliament to introduce legislation preventing people such as tradesmen and technicians from describing themselves as engineers. The description 'engineer' should be reserved for individuals deemed as competent to carry out engineering work as defined by the current standards 2.5 litres. There has also been an explosion in much larger capacity vehicles driven by just one person. It is one of the consequences of living in a free society.

This seems inevitable, as it is not easy to see why, in contrast to all other commodities in a free market, the demand for fuel should reduce as its real price reduces.

I wish Professor Thring every success and would also like to see fewer inefficient vehicles with large engines, but suspect that only substantial rises in the price of fuel will achieve the desired result. P H Spare (Fellow) Secretary, Nuclear Power Special Interest Group

prescribed by the engineering council and the major engineering institutions. This would go a very long way to improving the lot of the professional engineer. **Don Harrold (Member)**

Original author Dr Judith Secker replies Sir

The professional bodies which have all agreed to the introduction of the new edition of SARTOR are in complete agreement with Don Harrold. SARTOR does not affect anyone who is currently *en route* to registration. The new educational requirements only affect those starting courses after September 1999. The number of young people going into higher education now is much higher than in the past. So, success in recruiting to the new, exciting IEng courses will gradually improve the ratio of IEngs to CEngs, without altering the status of current registrants.

The SARTOR committees have very few academic members. The committees did take into account the calls from industrialists to include many more interpersonal and business skills as well as interdisciplinary work into future courses, alongside the everincreasing technical content. This was not feasible within the current course duration. **Dr Judith Secker, Engineering Council**

Events

October 99

Delivering energy efficiency

National Homes Energy Rating conference, 11-12 October, Stoke on Trent Details from National Energy Services, tel: 01908 672787, fax: 01908 662296, e-mail: nicci@nesltd.demon.co.uk

Middle East gas summit Conference, 12-14 October, Beirut Details from IBC Gulf Conferences, e-mail: ibcgulf@emirates.net.ae

CIDEX 99

Exhibition and conference, 12-15 October, Baku, Azerbaijan Details from Spearhead Exhibitions, tel: 0181 949 9222, fax: 0181 949 9869, e-mail: caspian@spearhead.co.uk

How to realise the potential

COGEN Europe annual conference, 14-15 October, Brussels, 400 euros + VAT Details from COGEN Europe, tel: +32 2 772 8290, fax: +32 2 772 5044, e-mail: cogen_europe@compuserve.com

Fuel cell technology

Conference, 18-19 October, London, £995 + VAT. Details from IQPC, tel: 0171 430 7300, fax: 0171 430 7301, e-mail: f-cells@igpc.co.uk

Coatrans 99

Conference and exhibition, 18-20 October, Hamburg Details from Coaltrans Conferences, tel: 0171 779 8945, fax: 0171 779 8946, e-mail: coaltrans@euromoneyplc.com

Introduction to petroleum refinery processing Course, 18-20 October, The Netherlands Details from the Center for Professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

Standards for

managing energy Workshop, 19 October, Peterborough, free Details from Jone Ayres, ETSU, tel: 01235 433753, fax: 01235 433737

Severe weather – impact on customer service Seminar, 19 October, Capenhurst, Cheshire, Details from Barbara Prince at EA Technology, tel: 0151 347 2323, e-mail: events@eatl.co.uk

UK energy tax and emissions trading Conference, 19-20 October, London, £995 Details from IIR Ltd, Tel: 0171 915 5055, fax: 0171 915 5056, e-mail: registration@ iir-conferences.com

Investment opportunities in liberalised Spanish power

Conference, 19-20 October, Madrid. Details from DMG Business Media Ltd, tel: 01737 855 5380, e-mail: saguiar@dmg.co.uk European Electricity Summit Conference, 19-20 October, Brussels Details from the Institute of Economic Affairs, tel: 0171 608 3491, fax: 0171 490 2296

Coal - powering into the 21st century Conference, 20-21 October, Wellington, New Zealand Details from the New Zealand Coal Research Ltd, tel: +64 4 570 3700,

Energy for the next century – the engineering dilemma

fax: +64 4 570 3701

Conference, 25 October, London. Details from the Institution of Civil Engineers, tel: 0171 665 2314, fax: 0171 233 1743, e-mail: coninx_r@ice.org.uk

Environmental protection 99

Conference, 25-28 October, Brighton Details from National Society for Clean Air, tel: 01273 326313, fax: 01273 735802, e-mail: admin@nsca.org.uk

Electrical Shanghai 99

Exhibition, 27-30 October, Shanghai, China Details from Asdale Exhibition Services, tel: +852 2811 8897, fax: +852 2516 5024, e-mail: aes@adsaleehx.com

UK Gas market

Conference, 29 October, London, £999 + VAT Details from IIR Conferences, tel: 0171 915 5055, e-mail: registration@iir-conferences.co,

November 99

Implementing Europe's new gas business Conference, 3-4 November, Koln, Germany Details from EconoMatters Ltd, fax: 020 7650 1431, e-mail: confs@economatters.com

How to do an energy survey, monitoring & targeting Course, 3-4 November, Manchester, £396 Details from Mid Career College, tel: 01223 880016, e-mail: courses@midcareer-college.ac.uk

Clean coal technology

Symposium, 8-10 November, Beijing. Details from China Coal Research Institute, tel: +86 10 64212752, e-mail: cct@public.netchina.com.cn

The commercial potential of fuel cell technology for stationary power Conference, 9-10 November, Hamburg, Germany Details from DMG Business Media Ltd, tel: 01737 855 5380, e-mail: saguiar@dmg.co.uk

Power finance

Course, 9-11 November, Surrey, £1950 + VAT Details from the Petroleum Economist, tel: 0171 831 5588, fax: 0171 831 4567

NEMEX

Energy efficiency exhibition and conference, 17-18 November, Birmingham. Details from tel: 01203 252246

Energy efficiency accreditation scheme is launched in Northern Ireland



Dr Archer, NEF Chairman and Mr Guiney, NI Scheme promoter NIE

On 24 June 1999, the Energy Efficiency Accreditation Scheme, for which the Institute of Energy is the accrediting body, was officially launched in Northern Ireland. The launch event was hosted by Northern Ireland Electricity, who are the scheme promoters in Ireland, and was attended by Martin Fry, Director of the Scheme, Richard Tinson, Director of the National Energy Foundation, the Scheme's managers, and Tracey Fisher, Membership and Education Manager, Institute of Energy.

During the launch event, Dr. Mary Archer, NEF Chairman, presented the Mayor of Larne Borough Council, the first Northern Irish organisation to achieve accreditation, with its award. Larne Council's Chief Executive, Colm McGarry said, 'Our Council is totally committed to improving the environment, as demonstrated by the installation of the CHP plant at Larne Leisure Centre and the commitment to NIE's Eco Tariff. In addition to these measures, the Accreditation Scheme will help us measure our performance and indicate where further improvements and savings can be made.'

Andy McCrea, Northern Ireland Electricity's Environment Services Manager said, 'Larne Borough Council have shown a tremendous commitment to the environment. They have taken very positive steps which will show real cost savings, a significantly lower energy consumption and environmental benefits.'

The Energy Efficiency Accreditation Scheme was first launched in 1992, by the Energy Systems Trade Association, in conjunction with the Institute of Energy. Its aim was to provide independent standards of assessment and public recognition for the effective management and efficient use of energy by organisations in business, industry and the public sector.

In January 1998, the National Energy Foundation became the managers of the Scheme and, with the sponsorship of PowerGen and the endorsement of the Confederation of British Industries, have actively promoted the scheme. This has resulted in over 60 organisations having already achieved the required standards, including Marks and Spencer, British Telecommunications, Heathrow Airport, Rover and MFI Homeworks. A further 40 organisations are currently working towards achieving the standards.

Accreditation through the Scheme is a tangible way for companies to demonstrate their achievements in energy efficiency and for many organisations is an important step towards improved environmental performance, reduced costs and greater competitiveness.

For more information about the Energy Efficiency Accreditation Scheme contact Richard Tinson at NEF on 01908 665555 or email:

nef@natenerg.demon.co.uk.



Dr Archer presenting Larne Borough Council with their award: Mr Blair, Mayor Drummond and Mr McGarry

Sustainability breakfasts

In May this year, the Governement published, "A better quality of life, a strategy for sustainable development for the UK". The strategy calls for high level sustainable development frameworks to be put in place in each region by the end of 2000. To assist the process, DETR is organising a series of regional Ministerial breakfasts in October and November this year. For more information, please contact White Rose Conferences on tel: 01709 828181, fax: 01709 828732 or e-mail: whiterose.conferences@virgin.net

Private health care for members

The Institute of Energy has made special arrangements with the Hospital and Medical Care Association for private medical treatment benefits exclusive to members and their families, with discounts of up to 40%. Ian Cooke of HMCA elaborates.

Health problems are always with us, an inescapable part of life. Who amongst us has not had the experience of visiting a hospital either as a patient or to see relatives or friends? At the Hospital & Medical Care Association, we believe that we should concentrate on the provision of benefits for inhospital treatment for overnight or longer stays, where the heaviest burden of expense falls. Additional sums for consultancy and specialist services, including certain well-known alternative medical services such as homeopathy and acupuncture, are available. Members are not restricted to treatment in local hospitals and cover for preexisting conditions may be available, if they are first declared and accepted by HMCA. Moreover, claims for treatment of acute illness in respect of conditions that first arose during the period of a previous underwritten plan, from which you have transferred, are automatically accepted without quibble.

For further information about HMCA benefits, please complete the information request form enclosed as the label carrier with this issue of Energy World.



In May 1999, Dalkia, Europe's leading energy services provider, announced that Dalkia Energy Management Limited, the UK market leader in total energy management and Dalkia Technical Services Limited one of the UK's leading facilities maintenance providers were to be integrated.

Dalkia Energy & Technical Services are currently providing a total energy management service for all types of building, ranging from large commercial office buildings to shopping centres, from leisure centres to schools and universities and from a Premiership football stadium to Scotland's largest prison. The specialist skills and technical know-how of the company's engineers and technicians enables them to operate and maintain HVAC plant and associated equipment to achieve maximum operating efficiencies.

However, Dalkia Energy & Technical Services' Vision is to be recognised as the leader in the delivery of total energy management and the highest quality technical services and the company realises that the only way this can be achieved is by continuously developing its employees, as Training Manager, Mike Perry explains:"Our mission statement not only states our commitment to continuous improvement and growth by providing a quality service which is constantly improving to ensure continuing customer satisfaction, but inextricably links it to the encouragement of innovation,

learning, communication and teamwork."

"Organisations of all sizes train their employees to integrate them, focus them on the business and help them to perform better. Employees have to understand what their company does and quite rightly expect to be trained so that they can make their contribution and perform better".

Considerable research by Dalkia's Training and Energy Management departments identified that although there was existing externally accredited energy management training available at NVQ level 4, there was nothing pitched at levels 2 and 3. Recognising an internal training need that couldn't be suitably met through external course providers and after detailed research and development, Dalkia launched an ambitious modular, in-house energy management training programme for its engineers and technicians. Module One of the programme was designed to introduce or refresh knowledge and understanding of energy saving principles and to establish a benchmark for all Dalkia engineers and technicians.

As Mike Perry continues: "In formalising the training on energy management, we are taking a step to improve perceptions and performance, whilst at the same time reinforcing the unique and innovative way we operate compared to the more traditional HVAC maintenance activities which forms the background of many of our engineers and technicians. All programme participants are required to complete a practical energy reduction project identified by their line manager. An experienced company mentor is appointed to offer support and guidance throughout this process. Course and project work already completed by the 68 engineers and technicians that have so far participated has been very encouraging, with many practical and innovative energy saving solutions being identified and demonstrated on-site."

Following evaluation by the Institute of Energy's Accreditation & Approval Panel the Dalkia course has been formally approved with successful course participants being awarded Associate Membership of the Institute.

Mike Perry acknowledges the valuable support the Institute continues to provide: "It has been crucial for us to be able to work in partnership with the leading body for the energy profession to develop a programme that has earned us recognition for what the company and its people are doing in the marketplace in terms of energy conservation".

"It would be fair to say that engineers being introduced to the programme for the first time initially treated it with some scepticism. However having now completed Module One, they are seeing tangible benefits coming from their participation not only in terms of their own



personal development and the company's business performance, but also in terms of the improved service they can provide for our customers."

After further consultation with the Institute, Dalkia have recently launched Module Two of their in-house Energy Management training programme which goes into greater depth on all aspects of the business. This includes commercial training, energy surveying, procurement and supply and advanced BEMS training; including programming and interfacing. Added to this further development in Dalkia's training programme is the continuing involvement of many of the company's energy managers in TEMOL.

For further information contact Mike Perry at Dalkia Energy & Technical Services on tel: 0121 585 0568, or the Institute of Energy's Membership & Education department on: 0171 580 0077.





New

MEMBERS

LONDON & HOME COUNTIES

Ms KM Harris, Graduate AEA Technology Miss V Kemenc, Graduate National Energy Services Ltd National Energy Services Ltd, Group Affiliate Mr D Wines, Graduate Jaros, Baum & Bolles (UK) Ltd

NORTHERN IRELAND

Mr DP Henry, Associate L.M. Fabrications

SCOTTISH

Mr AJ Currie, MInstE Cadogan Consultants Dr GF Weir, MInstE Blyth & Blyth Consulting Engineers

YORKSHIRE

Dr PW Wright, FlnstE University of Sheffield

DECEASED MEMBERS

Frank Claude BERGE, Associate, London & Home Counties Carl FOX, Graduate, Yorkshire Branch

ANGLIA PEI

Hertfordshire & Bedfordshire Group Prestige Evening Lecture 'Engineering in the New Millennium'. 2 November 1999 at Lindop Building, University of Hertfordshire, Hatfield Campus Refreshments at 6.00pm Event at 6.45 pm, by ticket only. Contact Ron Elston tel: 01438 798011

BRANCH EVENTS

OCTOBER 1999

HONG KONG

Date and venue to be confirmed Technical talk on energy management by building automation system. Jointly organised with Cerberus Division of Siemens. Contact Danny Lai, tel: 852 2966 8837, email: mtlai@netvigator.com

SCOTTISH BRANCH

Date to be confirmed Visit to Lighthouse Building in Glasgow. Contact C Boyd, tel 0141 270 7060, e-mail: CadoganCon@compuserve.com

LONDON & HOME COUNTIES BRANCH

Wednesday 6 October Caleb Brett Award meeting Contact D Barber, tel: 01494 783142 Email: Rufusred@aol.com

YORKSHIRE

Wednesday 6 October, 6.00pm Visit to Yorkshire Wind Power Generating Site at Penistone. Contact A Mallalieu, tel: 0113 276 8888

MIDLAND BRANCH

Thursday 7 October, 7.00pm 'Energy from the Oceans' -Dr L Ducker, Coventry University. Contact Mr H Freeman, tel: 0121 353 2397 Email: hfreeman@talk21.com

LONDON & HOME COUNTIES BRANCH

Tuesday 19 October, 6.00pm 'Energy Savings by Control & Design Strategy' by Malcolm Barlow at Imperial College, London. Contact D Barber, tel: 01494 783142 Email: Rufusred@aol.com

YORKSHIRE

Thursday 21 October, 7.30pm 'Fire Prevention Arrangements in the Millennium Dome' by Andy Nicholson at Cedar Court Hotel, Wakefield. Contact A Mallalieu, tel: 0113 276 8888

NORTH EAST BRANCH

Wednesday 27 October, 5.30pm In conjunction with the Newcastle Environment Forum at Newcastle Civic Centre. 'The Development of Renewable Energy in the

North East of England' chaired by Prof Bob Hill, University of Northumbria. Speakers: Mr A Hoare & Mr A Smith. Contact Dr CR Howarth, tel: 0191 222 7303, email: c.r.howarth@ncl.ac.uk

NOVEMBER 1999

MIDLAND BRANCH

Thursday 4 November, 7.00pm Austin Court 'Low NOx Regenerative Burners' - Mr AVV Kelly & Mr PG Ramsell. Contact Mr H Freeman, tel: 0121 353 2397 Email: hfreeman@talk21.com

YORKSHIRE BRANCH

Wednesday 17 November, 2.30pm

'Latest Improvements in Coal Firing Technology' by Dr Alan Jones of Power Technology at Dept of Chemical Engineering & Fuel Technology, University of Sheffield. Contact A Mallalieu, tel: 0113 276 8888

MIDLAND BRANCH

Friday 26 November Belfry Woodland Suite Annual Dinner Dance. Contact Mr H Freeman, tel: 0121 353 2397 Email: hfreeman@talk21.com

ISWA CONFERENCE - HONG KONG BRANCH

ISWA International Symposium on Waste Management in Asian Cities. Held at The Hong Kong Convention & Exhibition Centre, 23-26 October 2000 First Announcement: Call for papers and registration. For further details contact: The ISWA Conference Secretariat, c/o Environmental Protection Department, Waste Policy & Services Group, 28th Floor, Southorn Centre, Hennessy Road. Wan Chai. HONG KONG Tel: (852) 2835 123, Fax: (852) 2318 1877, Email: epdwsg@hkstar.com Web:http://www.hongkongwma.org.hk/iswa.htm



Details on application, but... time is running out so reserve your places NOW for this most prestigious of tournaments for the "President's Cup"

Don't delay!

Contact: John Ingham Tel/Fax: 0115 937 2567 E-mail: john@augeng.freeserve.co.uk

Attention all Universities & Colleges

The Council of The Institute of Energy has recently approved the launch of a new grade of membership specifically for Universities & Colleges -**"The Academic Affiliate".**

For a fee of just £150, your department's staff and students will be able to gain access to the Institute's membership services and activities, including: consultancy on academic course design to meet Institute & SARTOR educational requirements, accreditation approval of academic courses, Energy World, the Journal and the Yearbook, situations vacant/wanted,

Regualar updates on Engineering Council Regulations (including SARTOR)

For further information e-mail:education@ioe.org.uk or telephone: 0171 580 0077

For easy payments, be direct

As part of the Institute's continuing improvement of its services to members, we would like to invite members to pay their annual Membership Subscription Fee by Direct Debit.

This facility will provide a convenient & secure service without risk of payment going astray.

Simply fill in the form inserted into this magazine & return it to: The Finance Department. The Institute of Energy, 18 Devonshire Street, London WIN 2AU.

> For members who would like to spread payments over a six month period, please contact Sam Cobbina, Finance Department on Tel: 0171 580 7124, Fax: 0171 580 4420 or e-mail: scobina@ioe.org.uk

Please note, there will be a 5% administration charge on all installment payments. Please ignore the above if you are already paying by Direct Debit or have already submitted your Direct Debit form.

NEMEX'99

nemex

17th & 18th November 1999

The Institute will be hosting a drinks reception on the evening of 17th November at the Metropole Hotel in Birmingham following the first day of the NEMEX exhibition. If you would like to represent your company

and find out more about the services the Institute provides its company members, please join us to hear testimonies from organisations who are working closely with us on energy management inititatives. Tickets are available from Katie Howe at the Institute.

Maria Adams, Projects & Marketing Manager, will also be hosting a workshop at **NEMEX** on the morning of the 18th November covering The National Standards for Managing Energy and new information on staff energy awareness training. We will also be available on **stand number 53**.

We look forward to meeting our current and new members at NEMEX. We hope to see you there!









AVAILABLE

Chris Le Fevre – Theme address

IGasE President John Hinchliffe

For Executives, Managers, Gas Industry Professionals the SBGI and IGasE present:

Profitable Gas Business in the Millennium EARLY BIRD DISCOUNTS

Two-day Conference and Support Exhibition Wednesday 17th & Thursday 18th November 1999 at the Royal Court Hotel, Coventry



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