THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy world

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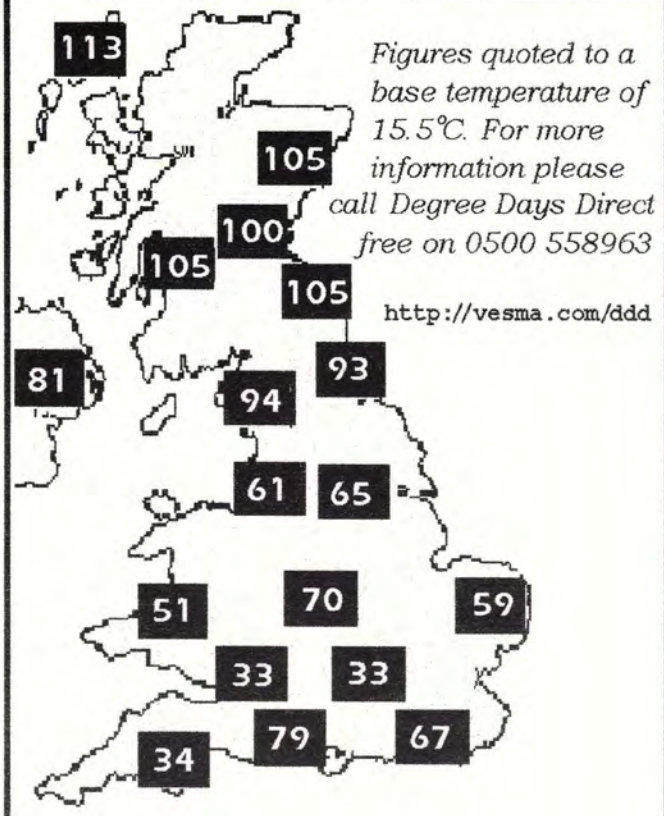
Road transport energy

SOUTHERN AFRICA

An energy manager's day

Degree days: September 1997



Figures quoted to a base temperature of 15.5°C. For more information please call Degree Days Direct free on 0500 558963

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Beilby Medal and Prize

This year the Institute of Materials is administering this prize and would welcome nominations from the energy efficiency or related fields.

The Beilby Medal and Prize of £1000 are awarded annually to a scientist or engineer to recognise substantial work of exceptional practical significance in chemical engineering, applied materials science and energy efficiency.

Preference is given to candidates under 40 years of age.

The award is sustained by a Trust Fund commemorating Sir George Beilby FRS (1850-1924).

If you would like further information concerning this prize then please contact Carolyn Shaw, Institute of Materials, 1 Carlton House Terrace, London, SW1Y 5DB. Tel: 0171 839 4071, fax: 0171 839 1702

Sustaining Business Growth

Are you operating or developing cleaner methods of production, if you are the Environmental Best Practice Programme would like to hear from you.

They would like to recruit as Case Study Hosts, companies who make significant cost-savings through the use of cleaner production. In return for detailed information about the economic and environmental benefits that a company derives through adopting cleaner production methods, they will consider an access payment of up to £50k. Cleaner production methods reduce waste at source. The successful case study host companies will therefore be in the process of implementing significant changes to their products and processes. These changes will involve fundamental improvements in the environmental performance of the company and reduced operating costs through measures such as more efficient raw material usage and reduced waste production. They will involve changes above and beyond waste minimisation practices.

Case study nominations must show that they meet or agree with the criteria below:

- the cleaner production method should be novel in approach
- the cleaner production method must be able to provide substantial cost savings for users
- quantifiable environmental benefits must also be demonstrable
- the cleaner production method must be widely applicable to other UK manufacturing companies
- the first wave of projects will be ready to start in Autumn 1997, so that results can be published by the year 2000
- ETBPP will be free to publish agreed, non-confidential results
- proposals from smaller companies are particularly welcome.

If you are interested please contact the Institute for further information, alternatively contact Steve Conchie at the ETBPP directly, on 01235 463771, fax: 01235 463804

THE MAGAZINE OF THE INSTITUTE OF ENERGY

Contents

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COVER

We are starting to realise the urgency of cutting emissions from road transport. This month's issue includes an article looking at ways of cutting fuel use and emissions from current vehicles (see page 10). Next month we will feature perhaps the most exciting development for the near future - fuel cells. This month's cover shows one of Daimler-Benz's new zero emission vehicles; a multi-purpose vehicle incorporating a hydrogen powered fuel cell with Johnson Matthey electrodes. Daimler-Benz has also put fuel cell-powered cars and buses on the road.

Kyoto will bring a "radical change in the way we regard energy"

The forthcoming summit meeting on climate change will have serious ramifications for energy. But what are the Labour Government's plans, both for Kyoto, but also post-Kyoto as it writes the strategy for achieving the cuts agreed there. Hard information is scarce, but here, in an extract from his foreword to the 1997 Energy Report*, Energy Minister John Battle MP gives some clues.

We will have to take very seriously indeed the need to protect the environment. Once, this problem was largely local - the despoilation of localities from the mining of coal or chopping down trees. Then it became regional, as large-scale production of energy (and of goods requiring energy inputs) produced great tracts of pollution which spread far and wide. The problem is now also seen as a global one. Industrialised countries like the UK will have to set a lead in addressing this problem - and we will do so. We have said that concerns for the environment and sustainable development will be at the heart of our decision making. What that means in practice is still to be determined in many areas - for example, in the reduction of emissions of carbon dioxide and other greenhouse gases.

The Government wants the UK to take the lead in pressing for developed countries to agree significant reductions in greenhouse gas emissions at the next Conference of the Parties to the Framework Convention on Climate Change in Kyoto in December. Our Manifesto set out a clear target of reducing CO_2 emissions to 20% below 1990 levels by 2010. The Prime Minister restated his support for positive action to reduce CO_2 emissions in his speech to the United Nations Special session in June. He made it clear that the UK fully supports the European Union's proposal that developed countries reduce their greenhouse gas emissions to at least 7.5% below 1990 levels by 2005, and to 15% below 1990 levels by 2010. The position is not a unilateral offer but conditional on others making similar efforts - we will be legally bound by the target agreed at Kyoto.

Achieving the 20% domestic target will be difficult, and we are looking at a range of policies and measures which could contribute to the emissions cuts needed. The UK's programme will inevitably have significant implications for energy use and the energy supply industries. The Energy Advisory Panel has produced a Paper** which examines the implications of cutting the basket of greenhouse gases by 20% (not carbon dioxide alone, which would be harder to achieve): that paper reinforces the view that a range of policies and measures will be needed. Achieving this kind of target, then, is probably going to take some radical change in the way we regard energy and its use.

To take one current example: the switch from coal to gas for electricity generation has resulted in lower carbon emissions: this is because gas is a less carbon intensive fuel than coal, and it can also be converted to electricity more efficiently - existing Combined Cycle Gas Turbines generation sets can convert the potential energy in the fuel with an efficiency of close to 50% on average, while existing coal-fired power stations have a conversion efficiency of less than 40%. And CCGTs with efficiencies of up to 60% are being developed.

The combination of these factors - higher conversion efficiency for gas, and lower carbon intensity of the fuel - means that generation of a unit of electricity from a CCGT produces less than half as much CO_2 as the same unit generated from a conventional steam-raising coal-fired station. Other emissions, such as sulphur and particulates, also need to be taken into account.

As the Energy Advisory Panel's other paper points out, all these factors present serious challenges to the UK coal industry. We are considering the role that clean coal technology can play to offset the disadvantages that UK coals face from the lower sulphur and lower chlorine coals now available on world markets in growing quantities and at increasingly competitive prices; and also the strategic trade-offs between the environmental advantages of CCGT stations - particularly in terms of carbon and sulphur - and the security and diversity arguments for coal and other black fuels.

Much of this is for the longer term. However, it is also important to remember that the UK remains on course to do better than its target of returning carbon emissions to the 1990 level by 2000, with emissions falling sharply in the first half of the decade. On provisional estimates, emissions rose by around 1% last year (on a temperature-corrected basis) but appear to have fallen in the first half of this year. Trends in emissions reflect a number of different factors, in addition to fuel switching. For example, economic growth is pushing up energy demand and thereby emissions. Also, emissions are significantly affected year to year by fluctuations in average temperatures.

* The Energy Report, Volume 1 1997: *Shaping Change* is available from The Stationery Office.

** See page 5.

Electric scooters

Two French scooter manufacturers have joined forces with the French national electricity company EdF to promote the use of electric scooters. The two companies, Barigo, based in La Rochelle, and Peugeot Motorcycles, have taken the action in response to increasingly stringent environmental regulations in all industrialised countries.

The companies claim that the electric scooter compares particularly favourably with its petrol-engined counterpart in terms of speed (45 km/h in accordance with the speed limit in urban areas), acceleration, mobility in traffic and range. An electric scooter's range, of between 40 and 60 km depending on driving conditions, corresponds to the distance driven by 94% of petrol-driven scooters, they claim.

Disadvantages such as oil and petrol odours and noise pollution are eliminated and there are no problems with maintenance: the batteries must be topped up with water three times a year and they are powered by a simple socket. It takes two hours for the batteries to be recharged to 95% of their capacity and between four and five hours for a complete recharge.

EU to investigate German anthracite subsidies

Wales' leading producer of anthracite coal, Celtic Energy, has welcomed the announcement by the European Commission that it is to further investigate the payment of state subsidies to German anthracite producers. The announcement follows Celtic Energy's request to the Commission to investigate alleged pricing irregularities in the European anthracite market.

The complaint centred on the abuse of state subsidy payments which were distorting the market for anthracite in Europe and allowing German producers to compete unfairly in overseas markets, including the UK.

Keith McNair, Chief Executive of Celtic Energy, said that the decision was good news for the whole Welsh coal industry, which generates over £200 million of output in Wales. "State subsidies have been allowing German producers to sell their coal at well below cost price" he added.

PowerGen looks to Asia for new power projects

World demand for energy could double by 2020, with far-reaching consequences, not just for the structure of the power industry, but for industrial and economic development, the financial markets, government policies and the environment on a global scale, according to 'Energy 2020', a new report on future world energy demand from PowerGen.

Demand for energy is set to grow across all regions of the world but it will be most concentrated in the high growth economies of Asia. The energy gap between the developed and developing countries - the difference between energy consumption per head of population - looks set to close in the first two decades of the 21st century, according to the company.

This could lead to the emergence of a new order of energy super users, with the traditionally heavy energy consumers of Europe being overtaken by Asian countries. Although the US will still lead energy demand, six of the top ten energy users could be in Asia.

PowerGen will operate and maintain the first private sector power project to be built by an international consortium in India. The 655 MW gas-fired plant in Gujarat will produce its first electricity before the end of this year.

PowerGen sees an opportunity for $3 billion of investment in expanded power production capacity in the projected growth, and is keen to promote its own capabilities as in international developer and operator of power projects.

World energy demand has risen by more than a fifth in the past decade. This increase is equal to more than the entire annual consumption of all of Latin America, the Middle East and Africa combined. And the growth in demand is accelerating. A continuation of the present pattern would see energy demand double within 25 years. says the company.

The overall increase in energy consumption has been outstripped by the demand for electricity which has grown at double the average rates for all energy consumption and could treble by 2020 according to PowerGen. The main drivers of energy demand growth are the pressures of population increase and population shift from rural to urban areas, together with industrial and economic development.

China's Three Gorges hydro project powers ahead

A consortium including General Electric Canada Inc and two German companies, Siemens AG and Voith Hydro GmbH, has signed a contract valued at $320 million to supply electrical equipment for the Three Gorges hydropower project on the Yangtze River in China.

The consortium will provide six hydro turbines and generators for a hydroelectric plant at the end of the Three Gorges Region, which has been under construction since 1993. Designed to produce 18,200 MW of power when it is completed in 2009, Three Gorges is the world's largest hydroelectric project.

GE Canada will build three generators and three turbines, Siemens will supply three generators and Voith will provide three turbines. Startup is scheduled for mid-2003.

The Three Gorges project includes the construction of the world's largest dam across the Xiling Gorge on the upper reaches of the Yangtze River in Hubei province, creating a 375-mile long reservoir. The project will supply 85 billion kWh of electricity annually for China's central and eastern provinces.

The German Mannesmann AG is to supply some 917,000 tonnes of longitudinally welded large-diameter pipe for a new, 4,400 km natural gas pipeline to connect Siberia's Jamal peninsula with central Europe. The first of the three parallel running pipe trains of the Jamal pipeline system will start supplying natural gas to the German pipeline network by the year 2000. Annual capacity of the pipeline, which is scheduled for completion in 2005, will be around 51 billion cubic metres.

The pipeline supply contract is a 'gas-for-pipes' deal of the sort which has been going on between Russia and Mannesmann since 1970. A banking consortium is organising the project's funding and loan repayments will be in the form of gas deliveries.

Sydney's solar village includes 660 PV systems

Pacific Power has announced that BP Solar Australia is to supply solar photovoltaic energy systems for a new Athletes Village in Sydney. Solar electricity generation will begin in April 1998.

The contract is for the supply and installation of an initial 500 systems out of a total of 665 systems to be installed in the village. Each system, which will produce a peak output of 1 kW, will be integrated with the roofs of the permanent houses at the Village.

The photovoltaic cells will be primarily manufactured at BP Solar's Sydney factory. The project is expected to provide a significant boost to the photovoltaic industry in Australia and underlines the strength of it's solar R&D.

The Solar Village is the first project in Australia involving large scale grid connection of solar energy systems.

Australian power users have the option of going green

Australia's New South Wales state has launched the world's largest scheme for the sale of renewably-generated electricity. Under the state-wide Green Power scheme, developed by the state's Sustainable Energy Development Authority (SEDA), eight electricity retailers are offering customers the chance to direct funds to renewable energy projects.

Among the eight separate approaches, energyAustralia is offering 'Pure Energy' to its domestic customers and 'Millennium Energy' to commercial and industrial customers. Both schemes involve payment of a premium for energy purchased under the scheme from sources certified by SEDA as renewable. Advance Energy is offering its customers options to take between 10 and 100% of their electricity from a 19 MW hydro-electric scheme.

Australian Inland Energy is calling for public subscriptions to assist in the redevelopment of the White Cliffs solar thermal station as a tracking photovoltaics station, and with the promise that it will later develop a 5 MW station. Great Southern Energy's scheme invites customers to participate by paying a 25% premium on either half or all of their electricity purchases; the money to be directed to investment in renewable energy developments.

Integral Energy is offering its customers an option to negotiate for the supply of their facilities from renewable generation projects that Integral already owns. Customers of NorthPower are able to choose two levels of participation under which a 3.5 cents/kWh premium will be directed towards developing and promoting more renewable energy generation projects.

The Green Power scheme offers customers the opportunity to contribute to development of renewable electricity generation, without having to erect their own facilities.

Taxes alone cannot deliver CO_2 cuts; coal to decline still further

Meeting the UK's carbon reduction targets purely by the use of some sort of carbon tax would cause quite unacceptable fuel price rises, according to the Government's Energy Advisory Panel. Price increases of up to 87% for gas and up to 37% for electricity would be needed to achieve a 10% reduction in carbon emissions by 2010, with even bigger rises (125% for gas and 41% for electricity) to meet the Government's current target of a 20% cut by 2010, says the Panel.

This year's Energy Report - the DTI's annual summary of news and statistics on the energy industry - takes the unprecedented step of including two papers by the Government's Advisory Panel, which was established following the pit closures row of 1992/93.

The calculated price rises would be unpopular, but also unacceptable in terms of industrial competitiveness, says the Panel, which bases its calculations on the DTI's own energy model. The same model suggests that, to meet a 10 or 20% reduction carbon emissions, coal use in power stations would all but disappear - in favour of gas in the 10% case and in favour of gas and nuclear generating capacity for a 20% reduction.

The UK coal industry faces further - and very serious - problems according to the Panel: "There is a strong probability that after 1998, the UK deep mined coal industry will face steep decline under competition from imports (cheaper and lower in sulphur) and from gas-fired generation. Viewed from the strict environmental or economic standpoints, this is not necessarily a problem - coal is readily and cheaply available on world markets, and gas-fired power stations are both cheaper to build and cleaner in operation than coal-fired ones - but these are not the only considerations a Government might wish to take into account".

The Panel then cautions that any planned intervention to help coal could "subvert the efficient working of the market" and fall foul of international rules on state aid.

The Panel goes on to say that energy taxation is only one way of reducing carbon emissions; other measures which could be considered include:

- regulation - on efficiency standards for housing and equipment and emissions limits for plant and vehicles
- subsidies - for energy efficiency
- levies - on energy use for redirection to on cleaner technologies such as CHP and energy saving.

All eyes are now on the Kyoto international climate change negotiations to be held in December. Once carbon reduction targets are agreed, national governments will be able to draw up detailed strategies to achieve the cuts.

The Energy Report, Volume 1 1997: Shaping Change, £35 from Stationery Offices

Powerline bridges the energy gap

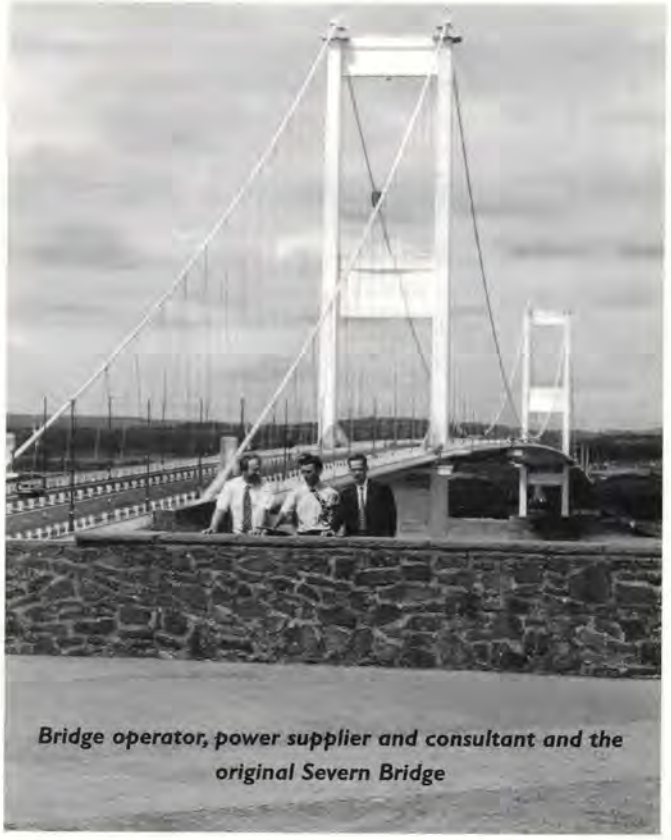
Powerline, Midlands Electricity's energy service for business customers, has signed a contract to supply electricity to two of Britain's most famous river structures - the Severn Bridge and the Second Severn Crossing.

The company responsible for managing both the old and new bridges, Severn River Crossing Plc, represents the interests of construction companies Laing and GTM Entrepose, plus two major banks. Because of the increase in electrical load brought about by the new bridge, SRC brought in a team of energy consultants to establish the best criteria for a new all-inclusive contract which would service the bridges' four main energy usage sites, situated on the east and west banks of the Severn - including the toll plaza areas.

Previously, the sites were serviced by three regional electricity companies: SWALEC served the two sites on the Welsh bank, MEB served the English side of the original bridge and the east bank site for the second crossing was served by SWEB.

The electricity bill for both crossings is estimated at around £200,000 per year. During the day, consumption is almost 2.2 million units. At night this figure drops to less than 1.2 million units.

Electricity is used for lighting and to power mobile equipment used for maintenance.



Bridge operator, power supplier and consultant and the original Severn Bridge

Trains switch to Ni-Cd batteries

Chiltern Railways' new Class 168 Turbostar units will use Ni-Cd batteries

Derby-based train maker Adtranz is breaking with UK railway tradition by fitting nickel-cadmium batteries rather than the lead-acid type to the Turbostar diesel multiple units (DMUs) it is building for Chiltern Railways. Alcad of Hampton will supply 24 Saft SRX/SRM batteries for diesel engine starting and auxiliary power on four Class 168 Turbostar units which will run between Birmingham Snow Hill and London Marylebone.

Adtranz, along with other UK manufacturers of DMUs, has previously used lead-acid batteries. The case for the inherently more reliable Ni-Cd type has, up until recently, been marginal because of Ni-Cd's limited charge/discharge cycle life. However, the Alcad batteries use sintered positive and plastic-bonded negative electrodes that result in a life in this type of application of over 5000 cycles, twice as many as conventional Ni-Cd batteries, says the company. The SRX/SRM batteries are also around 45% smaller and lighter than competing battery types with a similar capacity, helping to make the Class 168 Turbostar units more energy efficient.

Batteries are used for starting and to power auxiliary services in emergencies.

New CHP plant for Yorkshire

Yorkshire Electricity and Hickson & Welch have agreed a major new investment in a 56 MW CHP plant at the chemical company's Castleford site in West Yorkshire. The £30 million plant will be funded, built and operated by Yorkshire Electricity.

According to Yorkshire Electricity, the new plant will reduce Hickson's energy bill by meeting all the site's steam and electricity needs, provide local businesses with the possibility of buying cheaper power, help to secure the site's long term future and help to protect employment prospects.

The new plant is designed to produce up to 58 MW of electricity of which Hickson will take 6 MW for its own electricity requirements. The remaining 50 MW will be exported into Yorkshire Electricity's local distribution network.

HECAction-year 2 awards

The Energy Saving Trust has awarded over £2.5 million to local authorities around Britain to help customers reduce their fuel bills on a long term basis, and reduce CO_2 emissions. With additional support leveraged from the private sector the funding available will exceed £20 million this year, says the Trust.

The awards are made by Energy Saving Trust as part of HECAction, a competition amongst local authorities throughout Britain to kick start self-sustaining energy efficiency initiatives. This year the HECAction Awards have gone to 31 schemes involving over 60 local authorities around the country.

Simon Green, Programme Manager at the Energy Saving Trust, said, "Since its launch in 1996, HECAction has facilitated the investment of over £40 million from the private sector, with a further £20 million expected this year, to encourage energy efficiency in the home. As well as reducing consumers' bills, we estimate that these schemes will save over 2 million tonnes of CO_2 from being emitted."

Shock for electricity market

One of the biggest customer defections of all time looks set to rock the £7 billion electricity supply industry when the market is open to full competition next year, according to consultants Coopers & Lybrand. Survey results from the company indicate that over half of UK households could be powering their homes with electricity bought from new suppliers, including supermarkets and banks.

The survey on potential consumer behaviour in the deregulated energy market paints a picture of a once static market poised to become one of the most volatile in the country. A combination of competitive pricing and new products on offer from strong high street brands could tempt more than 12 million customers away from regional electricity companies.

Deregulation in the gas market has already seen 20% of eligible customers leave British Gas for cheaper alternatives.

EMF case collapses

Lawyers acting on behalf of two families who had brought claims against Norweb and the National Grid Company in connection with electric and magnetic fields (EMF) and their alleged links to childhood leukaemia, are applying to the court for the cases to be withdrawn, according to the National Grid Company.

Scientists consulted by the families bringing the action have assessed the recent study into the subject by the US National Cancer Institute (NCI). These experts have apparently reached the view that the findings of the NCI study were sufficiently negative to make them believe that is unlikely that electric and magnetic fields are a cause of childhood leukaemia.

The recent NCI study adds strong weight to the existing body of scientific knowledge which has led British and international experts to conclude that the current body of evidence does not show that exposure to these fields presents a human health hazard, says the Company.

Croydon Energy Network

Croydon MP Malcolm Wicks has opened a new partnership project, offering free advice and information to local people and businesses on how to save money by introducing energy efficiency measures.

Based in Thornton Heath, the Croydon Energy Network is a joint venture between Croydon Council, environment charity Project in Partnership (PIP) and other local organisations and businesses. It aims to promote energy efficiency in small businesses and homes in Croydon, help decrease emissions from burning fossil fuels, and contribute towards the sustainability of energy use in the borough.

The company was set up in March this year with funding from the European Union, the Council, PIP, the Energy Saving Trust and the Wandle Valley Single Regeneration Bid with a view to becoming self-financing within three years.

Contact Croydon Energy Network on tel: 0181 683 0333

BNFL Engineering Ltd, the engineering arm of parent company BNFL, and INBIS have secured a multi-million pound, four-year supply contract from BNFL to design and supply a series of 'Commander' robotic arms for the remote retrieval of intermediate level waste (ILW) from a suite of five ILW plants, either under construction or planned, at Sellafield.

BNFL Engineering Ltd has jointly developed a system to meet the demanding requirements of all five ILW plants, incorporating an approach focused on achieving ease of operability, minimum lifetime costs, robust performance and payload demands of up to 100 kg.

In the Sellafield configuration, the Commander has a reach of 2.4 m and the capacity to fully manipulate a 120 kg load throughout its operating envelope. A design based on hydraulic vane actuators, the Commander has a six degree of freedom manipulator with interchangeable powered gripper. It can be reconfigured at any time in its working life for an infinite range of tasks making it truly versatile with proven performance.

Scottish Ecological Design Association

The Scottish Ecological Design Association (SEDA) has launched a free technical information service aimed at supporting design professionals, companies and individuals who are seeking advice on benign materials, products and processes, energy conservation and alternative energy systems, building systems and designed outdoor spaces.

SEDA is establishing a technical information database and related bibliographical database. If you would be willing to contribute information appropriate to developing these databases please contact the SEDA office.

SEDA is a non-profit making membership organisation and part of a global network providing information for an ecological design approach. It acts as a networking group for designers and provides information, training and education and promotes research. SEDA's activities include seminars, lectures and workshops, visits to demonstration projects, a directory of services provided by SEDA members, involvement in green events, festivals and green design initiatives, and a regular newsletter.

The new information service is sponsored by SEDA and The Scottish Office, and by Gaia Research, Gaia Architects and Inveresk Architects Builders.

Contact SEDA on tel: 0131 661 2500.

Strengthening energy between the EU and

by Dean Cooper, Regional Energy Co-ordinator on behalf of DGXVII, European Commission

Since June last year, the European Union has been engaged in carefully targeted activity to investigate the potential for closer co-operation with Southern Africa in the energy sector. Here, Dean Cooper reports on early findings of the work.

The ongoing action directed towards the Southern African region and supported by DGXVII, the Directorate General for Energy of the European Commission, can be divided into five elements.

First, the intention is to identify what should be the nature of future energy sector co-operation between the European Union and Southern Africa. This is really the first time that DGXVII has attempted to investigate the potential for concerted action in the region. Therefore, it was necessary to establish whether Southern Africa should be a priority target when compared to other regions of the world.

In fact, it became apparent very soon after this work commenced that the region has considerable potential for future collaboration which could offer mutual benefits. Due to this early positive conclusion, a small number of more specific actions aimed at certain Southern Africa Development Community (SADC) member states actions (such as the investigation of non-solar renewable resources in South Africa and the identification of sites for mini hydro in Mozambique) have already been introduced.

Second, having determined the potential for effective EU intervention, one of the key goals is to specify a range of actions that could be supported in the future. This covers all non-nuclear sectors. However, it is the renewable energy sector that has been selected as the focus for initial investigation primarily due to the clear access of the entire region to appropriate resources.

Therefore, the renewable energy sector is being considered in three ways. The first is to assess the current policy related issues throughout the region. This aims to determine what exactly is the existing status of renewable energy policy and how such policy is now implemented or is likely to be implemented in the future. Then, in order to show how more targeted co-operation from the EU can lead to effective results for all concerned, rural electrification has been selected for specific attention. An assessment of how relevant technology can be implemented to extend access to electricity across the region is now near completion.

Finally, at the outset of this investigation, the need to demonstrate a concrete result from collaboration was recognised, even though there was no guarantee of any follow up to the action selected. For this reason, it was decided to establish an energy information network as a foundation for all future activity, whatever was finally identified. Again the initial focus was on the renewable energy sector and the pilot network has been set up ready for full-scale operation and expansion as required, providing that future EU energy co-operation in the region will be pursued.

The following themes govern the approach of DGXVII to Southern Africa:

- to foster the development of electricity generation, transmission and distribution in the region;
- to supply rural areas and townships with electricity by an increased use of renewable energies;
- the introduction of clean coal technologies;
- the enhancement of regional industrial competitiveness through the promotion of EU collaboration with the main energy producing and consuming industries in Southern Africa;
- the promotion of technology transfer and sustainable institution building;
- to improve the rational use of energy, reducing distribution losses, managing efficient use in energy intensive industries, introducing cost-effective saving schemes in the residential sector;
- to protect and preserve the global environment.

SADC

Until September this year the Southern Africa Development Community comprised Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The twelve were supplemented by the addition of the Democratic Republic of the Congo and the Seychelles in September.

Early conclusions

After an investigative period now extending over more than 12 months, some important conclusions have been drawn. In fact, some of these impressions - again primarily in the renewable energy sector - were presented at a recent conference for the region, supported by DGXVII, entitled "Sustainable Energy Development for Southern Africa". This conference provided a significant focal point for the ongoing EU initiatives since it offered the opportunity for local reaction to the ideas generated.

For all non-nuclear sectors, the following fundamental conclusions were reached.

In the renewable energy sector, there is experience in the utilisation of the solar

co-operation Southern Africa

resource which is, of course, widespread. Outside of this, the data in existence and the potential for other renewables sub-sectors is generally not clear and requires further attention. This applies to the mini-hydro, biomass and wind resources which, other than solar, are the priority areas of interest. The dissemination of information regarding renewables, both within the region and outside, is an activity which requires greater priority. Much useful experience can be gained from neighbouring countries and the European Union. The Renewable Energy Information Network supported by the EU could provide an effective foundation for such efforts, though clear integration with SADC plans is required.

Rational use of energy, or energy efficiency, is at a very early stage throughout the region. The relatively low cost of energy - particularly electricity - supplies means that there has historically been little attention to efficient use. This is now beginning to be addressed, though the requirements at present are the foundations for future development of this theme including institution building, improving awareness and encouragement for no or low cost actions. The one main SADC initiative for energy efficiency involves capacity-building through training and has been very successful. Support should be considered to develop a clear strategy for improved energy efficiency which could be put into practice through the capacity developed.

In the coal sector, the resource distribution is limited, being heavily dominated by that in South Africa. Other countries such as Zimbabwe, Botswana, Swaziland and Zambia also have significant supplies which are utilised. However, the truly regional concerns are based rather on the electricity generated and the potential environmental degradation. An investigation into the utility of the regional resources, and the potential for effective use of discard coal from South Africa, is required before detailed future plans can be developed.

Consideration of hydrocarbons is again limited by the specific location of resources. Despite the reserves very recently exploited off the coast of South Africa, Angola is the only regional oil supplier. For gas, again exploitation of significant fields has not yet been effectively achieved though generation from the Kudu and Pande fields in Namibia and Mozambique could play an important role in the future.

Future co-operation

The DGXVII activity to date has helped to understand those issues which will need to be carefully addressed when any future EU/Southern Africa co-operation is planned. This dramatically improved appreciation of the energy sector needs in Southern Africa could provide a foundation for follow-up action with clear benefits on both sides. The similarity between the structure of the European Union with its 15 Member States and SADC with its 14 Member States provides a common awareness of the needs and processes required for effective regional co-operation.

The historical links established through many EU Member States and Southern Africa also provide a firm basis for future action since there is extensive knowledge of current issues and the background to their development. The range and extent of bi-lateral support, which in many cases has clear impact on the energy sector, is a further indication of the positive relationships established which offer a basis for further effective energy sector co-operation.

A clear message that has been regularly encountered during the current investigation is the need to consider the practical energy requirements at the user level. It seems that an approach to simply offer increased supply options is unlikely to address the real problems faced by potential users with no access to the supply. A demand driven approach should therefore form the focus of future co-operation. Also related to this theme is the clear link between energy and development throughout the region. The effect of improved access and utilisation of energy can certainly facilitate the development goals targeted by many organisations such as improvement in healthcare, education, transport and agriculture.

The final message to deliver with respect to potential collaboration between the European Union and Southern Africa in the future is that this should not be a one-way transfer of experience, technology or services. The mutual benefit of any co-operation is recognised since co-ordinated activity can bring positive outcomes for both sides. In general terms, the only restriction on the benefits likely to be achieved is the duration for which clear commitment to co-operation is engaged. It is quite evident that a quick attempt to address the energy sector issues prioritised in Southern Africa is unlikely to result in sustainable results. An effective contribution from the EU to the sustainable energy development in Southern Africa is clearly dependent on the engagement of long-term co-operation. This need has been recognised and can hopefully form the foundation for any future action agreed.

The author

A Member of The Institute of Energy on the staff of ETSU in Harwell, Dean Cooper has carried out some 40 overseas energy assignments on behalf of the EU in the last five years. Prior to representing the European Commission in Southern Africa, he was based in Brussels, working with both the OPET Network and the THERMIE Programme. He has also been an EC observer for Energy Centres established in 15 central and eastern European countries.

Energy savings in

by Marcus Jones and Guy Hitchcock of ETSU

Although most of us are familiar with the idea that greenhouse gases are damaging to the environment, few know precisely where they come from and how they can be reduced. In this article, Marcus Jones and Guy Hitchcock of ETSU look at the way road transport contributes to the 'greenhouse effect' and consider future patterns for fuel usage.

Carbon dioxide is the most significant greenhouse gas. Although its concentration in the atmosphere has been steadily increasing since the eighteenth century, the period from the nineteen fifties has seen a startling rise, partly stimulated by the rapid growth of transport.

It only needs a few statistics to illustrate the place of the transport sector in energy usage. For example, the annual fuel consumption of road vehicles in the UK amounts to nearly 2,000 PJ, worth around £23 billion, with 21% of all UK carbon dioxide emissions originating from surface transport (24% if electricity generation for transport, and transport fuel production are included). Road transport alone accounts for 87% of all transport-related emissions, which are estimated to have nearly doubled between 1970 and 1990 - from 16 million tonnes of carbon (mtC) to over 30 mtC - and forecast to rise to 43.5 mtC by 2010, unless further action is taken.

However, increasing fuel usage is not the only problem, as ever-increasing road traffic impacts on people in many other ways. Road transport is the major cause of poor air quality in urban areas and is linked to a number of health problems. Transport is responsible for nearly two-fifths of the accidental deaths in Britain and, for most people in the UK, transport is the most pervasive source of noise in the environment. Road transport is responsible for the consumption of large quantities of finite resources, not only fuel, but aggregates for road construction, and non-renewable resources used in vehicle construction.

Over the last 25 years, the average distance travelled per person each day has risen by almost 75%. This growth has taken the form of an enormous increase in the distance travelled by car - a tenfold increase since the mid-nineteen fifties. Seven out of ten journeys of a mile or more are now by car, accounting for over 86% of total distance travelled. As congestion on the UK's road network increases, the damage it causes to the economy is becoming a pressing concern for industry and commerce. The annual cost of wasted time, fuel and resources is already estimated by the CBI to exceed £10 billion.

Traffic volumes continue to grow in the UK (picture courtesy Freight magazine)

The challenge

Although an effective transport system is vital for economic well-being and the quality of life, there is no doubt that continuing high levels of fuel consumption and emissions will damage the environment, and the health of both people and the economy. The Government is committed to an overall reduction of 20% based on 1990 carbon emissions levels by the year 2010. If applied to transport, this would mean reducing emission levels to 26.6 mtC, a cut of 16.9 mtC or 39% on the current forecasts - an extremely tough but not impossible target.

The measures that can be applied to the transport sector to reduce energy use and carbon emissions can be roughly divided into three categories:

- operational measures: optimising the use of fuel in the vehicle, affecting the energy use per vehicle km driven;
- strategic measures: optimising the use of the vehicle itself, affecting the number of vehicle km driven for a given transport demand; and
- demand reduction: reducing the actual demand for travel.

Efficient operation

The Department of the Environment, Transport and the Regions' Energy Efficiency Best Practice Programme (EEBPP) has published a number of guides to promote fuel efficiency in road transport. So far, the measures promoted are mostly aimed at improving operational fuel efficiency in lorry and car fleets. Half of all transport fuel is used by commercial vehicles (company cars and lorries) and, unlike those of the private motorist, these vehicles are under the control of a few thousand organisations.

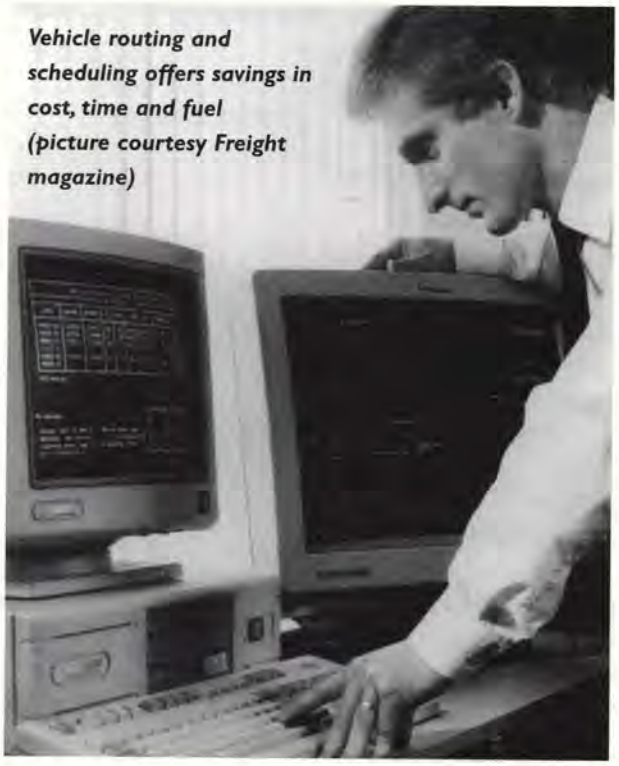
An indication of the scope for energy savings is provided by two recent Energy Efficiency Best Practice Programme publications which provide a good starting

road transport

point for all vehicle operators - large or small. Energy Consumption Guide 59: *Fuel Consumption in Freight Haulage Fleets* shows that the best fleet operators are as much as 20% more fuel efficient than their competitors, and reveals that about 50% of companies do not have effective fuel management or monitoring programmes. Benchmark data for six different vehicle types, ranging from small box vans to 38-tonne articulated lorries, is provided to enable operators to compare their performance with the best and worst in the industry. Finally, an action plan to enable effective fuel management is provided - the message: a carefully thought-out and efficiently implemented fuel management programme can improve your competitiveness.

Energy Consumption Guide 64: *Fuel consumption in UK car and van fleets* is a must for any organisation. As fuel represents up to 25% of vehicle operating costs, no matter what size or style of fleet is involved, it makes sense to take fuel costs seriously. Attention to a few simple key points can make a substantial difference to overall costs. An extensive survey carried out in 1996 provided data to enable operators to 'benchmark' their cars and vans with those of other companies. The survey revealed that, for a fleet of 100 lower medium, petrol-engined cars or vans, averaging 12,000 miles/year, improving consumption by only 2 mpg will save as much as £5,000/year - a worthwhile saving, indeed.

The Energy Efficiency Best Practice Programme has supported a number of projects aimed at optimising energy use per vehicle kilometre. A driver training scheme, detailed in the Good Practice Case Study *Energy savings through improved driver training* (GPCS 311), proved to be highly cost-effective with fuel savings of 6% achieved in the first year, showing that the driver's right foot is a significant factor. Maintenance costs were also significantly reduced while the cost of accidents was almost halved. Annual CO_2 emissions were cut by an estimated 740 tonnes. An additional bonus came in customer relations, as the high standards of driving and safety exercised by drivers encouraged customers to trust in an effective and reliable service. Although this case study concentrated on training for goods vehicle drivers, there is no doubt that similar savings can be achieved through improved training for company car drivers.



Vehicle routing and scheduling offers savings in cost, time and fuel (picture courtesy Freight magazine)

A project, supported by the DETR, to optimise the aerodynamic streamlining of a 32 tonne articulated truck, has led to 16% fuel savings, with the equipment for one tractor and two trailers paying for itself within ten months. In another project, a long-distance operator has developed a computer model to specify vehicle requirements, and introduced a policy to equip all vehicles with aerodynamic aids. There is also a wide range of computer-based systems to aid route planning, and allow vehicles to take the most fuel efficient routes, enabling fuel savings in the order of 6%. Operational fuel efficiency could also be improved through the adoption of new technologies, such as low energy tyres, and a range of new, more efficient types of engine.

However, although national savings of up to 30% could be achieved from operational measures alone, realistically, a figure of 20% is more likely, which would reduce CO_2 emissions by around 8.7 million tonnes, on year 2010 levels.

A STRATEGIC APPROACH

In order to make further savings, companies will have to take a wider look at their transport requirements, and consider some strategic measures. These are likely to include optimising travel routes, improving vehicle load patterns, and even switching from road transport to more efficient transport modes for transport of both goods and people. To date, the EEBPP has concentrated mostly on strategic improvements in goods transport, but alternatives to car travel have been promoted in joint activities with organisations involved in car fleet management and business travel. Improving load factors in road haulage will undoubtedly save money; at present, it is estimated that 30% of lorry vehicle kilometres are made up of empty running.

Freight transport is increasingly organised within a logistics management framework, and the DETR is now exploring how opportunities for fuel conservation might be created by rationalising logistical operations. These issues are discussed in a new Energy Efficiency Best Practice

Programme publication, General Information Leaflet 40 *Freight distribution and logistics*. Within the framework of rationalised logistical operations, the suggestion is for greater co-operation between retailer, haulier and supplier to optimise distribution efficiency through promoting return loading and by permitting shared use of resources. These processes can be further assisted by the use of multi-compartment vehicles which enhance the capability for consolidated mixed loads and return loading. Two case studies conducted with Tesco and Nissan are due to be published shortly which will look at ways in which empty running has been reduced by encouraging co-operation between supply chain partners.

Transport demand

However, even with great improvements in fuel efficiency, increased use of public transport and more efficient freight distribution, $C0_2$ reduction targets are unlikely to be met unless the total demand for transport is reduced. Only by reducing the demand for transport can the current trend towards ever-increasing traffic levels be reversed. At the national level, it is clear that changes in land-use planning and travel substitution can have profound effects on transport demand. In terms of land-use planning, the relationship between travel demand and population has been observed in many countries, and shows that, as population density increases, demand for travel decreases.

In the case of transport infrastructure, it is now well documented that new roads are often accompanied by new, traffic generating, retail and office developments. People now travel further to carry out activities, like shopping, which were once done locally. One example of travel substitution is the much discussed concept of 'teleworking', which certainly holds promise for reducing transport demand. The practice is likely to increase, particularly if communication technology continues to improve and costs continue to fall at the present rapid rates. However, the precise effect on transport demand of both land-use planning and travel substitution is extremely difficult to predict and quantify.

The Government is currently consulting on its Integrated Transport Policy, the results of which will form a White Paper. Commentators on transport have proposed various measures to assist in the process, including:

- using planning legislation to optimise land-use patterns to reduce travel;
- increasing the use of target setting to help focus on major problem areas (presently, air quality and traffic levels are targeted);
- implementing controls on road space - such as, pedestrianisation, parking restrictions, and lorry bans;
- using vehicle technology regulation to force down energy use;
- initiating variable rates of vehicle taxes, favouring fuel efficient vehicles;
- introducing road-based charges, such as road pricing and parking fees to reflect the true cost of vehicle use;
- increasing fuel taxes (studies indicate that a 10% increase in fuel price achieves about a 3% reduction in usage); and
- using infrastructural investment as a way of influencing transport mode choices.

Measure	Potential savings (%)	
Operational		
fuel management	6-8	6-8
procurement	3-5	1-2
new technology	15-20	5-15
Strategic		
optimised routes	0	7-8
better load factors	5-10	10-15
mode switching	5-10	2-3
Demand		
land-use	?	?
travel substitution	?	?

Conclusion

Fuel consumption in the transport sector depends on a complex mixture of technological, economic, and social forces. With the expected continued growth in road transport, the target of a 20% reduction in 1990 carbon emission levels by 2010 will be extremely tough to meet. Inevitably, the solution will have to be found within a policy framework aimed at reducing the overall demand for the movement of goods and people.

However, significant savings can be made by improving the energy efficiency of the vehicle fleet, through better operational practice and new technology. There are also important opportunities for better utilisation of the transport system, through a more strategic approach to managing the demand for travel. Industry can and should take a leading role in these areas, not only to help meet national CO_2 targets, but to reduce their costs and improve competitiveness. It is clear that much of industry is already taking major steps, as evidenced through the examples supported by the Energy Efficiency Best Practice Programme, indicating that the will exists to meet the challenge and provide a more sustainable transport system.

The Energy Efficiency Best Practice Programme can help all organisations - for further information and free copies of Energy Efficiency Best Practice Programme publications, contact the Energy Efficiency Enquiries Bureau on 01235 436747, or fax: 01235 433066. Faxback: 0891 616323. E-mail: etsu.enq@aeat.co.uk. Internet: http://www.etsu.com/eebpp. There is also an Energy Helpline (0541 542541) which offers free advice on energy efficiency to UK companies.

Note: The views expressed in this article are those of the authors, and not of the Department of the Environment, Transport and the Regions.

Selected Energy Efficiency Best Practice Programme publications

Energy efficiency in road transport (Fuel Efficiency Booklet 20)
Freight distribution and logistics (General Information Leaflet 40)
Fuel consumption in freight haulage fleets (Energy Consumption Guide 59)
Fuel consumption in UK car and van fleets (Energy Consumption Guide 64)
Energy savings through improved driver training (Good Practice Case Study 311)
Fuel management for transport operators Good Practice Case Study 342)

Coming in from the cold

In terms of marketing, the environment, economics and technology, district energy is in a completely different world to that which it inhabited 20 or 30 years ago - according to a new report from EconoMatters. It is, in fact a fuel of the future. Steve Hodgson reports.

District heating works well in a few cold Scandinavian cities but is a non-starter in the UK where fewer people live in flats and most have access to cheap gas-fired central heating - and systems installed during the council house building boom of the 1960s and 1970s are being ripped out, rather than expanded, as they corrode and leak. This is a view commonly held in the UK until a decade ago, and probably still around in some quarters.

But it is seriously outdated. While many district heating - the UK industry prefers the term *community heating* now - systems of the 1960s and 70s did perform poorly, and many were subsequently disconnected, the tide has turned and new systems are now being installed again. One of the main reasons is a new generation of heat distribution pipe technology which does work, doesn't leak readily and, if were to do so, warns the system operator and pinpoints the location of the leak through an automatic leak detection system installed with the pipe.

Sheffield's centre scheme - which serves nearly 100 city-centre buildings and 4,000 homes - is the UK's largest example of a modern district heating scheme. However, Britain's largest system, in Nottingham, dates back to the 1970s and, while it has had its share of problems over the years, has had more than £10 million invested in modernising, extending and revitalising the system.

The EconoMatters report: *District Energy Schemes - coming in from the cold*, concludes that district heating and cooling is on the brink of a breakthrough in many parts of the world: "the continuing changes in district energy technology are sufficient to justify district heating and cooling as 'fuels of the future'".

According to EconoMatters, the main reason that district heating technology fell into disuse was the trend throughout the developed world away from local power stations as generators realised they could reduce costs by building bigger and bigger stations out of town. Previously, waste steam from local power stations was piped to nearby energy users. The argument goes that, with power station design now turning full circle - away from large, remote coal-fired plant back to smaller, cleaner gas-fuelled generators - it is becoming possible to site power stations near energy users again, so that 'waste' heat can be used.

Liberalisation of energy infrastructure taking place around the developed world is also important. In this country, electricity privatisation has made it legally possible for developers to build CHP stations to serve industrial sites with heat and electricity. With liberalisation of energy markets due to be completed next year, there is no barrier to building CHP systems within towns, offering their and power output to local homes, commerce and industry, and, with the necessary underground heating mains the heat too.

Another factor important in continental Europe but yet to take off in the US is the use of incinerators fuelled by municipal refuse to supply the heat for district heating systems and/or to generate electricity. Such systems are already operational in the UK (Sheffield and Nottingham), Germany, France and the Nordic countries.

The US, historically a major user of district heating and with a District Heating Association founded some 80 years ago, is also seeing a resurgence in district energy schemes; some new systems operate as 'trigeneration' systems producing heat, power and chilled water.

But perhaps the major growth in the future will come from Asia. China already has some district heating schemes and the cold north of the country, with its appalling air pollution levels caused by individual coal fires, would be ideal for its expansion. In contrast, there is an enormous potential for district cooling systems in Japan, which has difficulty building enough power stations to run the many air conditioning systems being installed in commercial buildings and urban homes.

District heating schemes are all different, and reflect the available fuels and energy needs of their surroundings. The EconoMatters report describes a 28 MW system in Denmark which is burns locally-produced municipal waste, straw and woodchips, as well as natural gas to superheat the steam. An old steam district heating system serving the Minnesotan city of St Paul has been overhauled to a modern hot water system. It now burns low sulphur coal and some gas to produce enough heat to serve 75% of the buildings in the City's downtown area, and is rapidly expanding its sales of chilled water too. A Swedish system uses a wood gasification plant to produce gas to be burned in a gas turbine and Finnish engineers have exported CHP technology to at least one coal-fired plant in China.

District energy still faces some major barriers, says the report; it requires "organisation and investment on a large scale". But the technology " deserves its increasing market share and improved reputation".

District energy schemes - coming in from the cold, is available for £185 from EconoMatters Ltd on tel: 0171 613 0087, fax: 0171 613 0094, e-mail: gas@economatters.com

Energy in electrical

by Vin Callcut, Technical Director, Copper Development Association

Electrical equipment and infrastructure are relatively efficient but, because consumption is high, the amount wasted is also high and is usually greatly underestimated. Typically, up to 8% of electricity is wasted due to poor selection of equipment such as motors and transformers, and poor installation practice. This wastage is unnecessary, because electrical efficiency can be improved easily at low cost, and, because of the quantity of electrical energy used, this will yield substantial savings.

The use of good installation practice is just as important as selecting the correct plant; many managers will be surprised to learn that most fixed electrical plant is installed in such a way that the efficiency of the cabling alone can be as low as 96%.

Power losses in electrical equipment are due to resistance in conductors and losses in magnetic materials. Conductor losses occur in motors, transformers and in all cabling and are proportional to the square of the current and the conductor resistance - known as I^2R losses. They can be minimised by using the optimum size of conductor for the application. Magnetic losses occur in motors and transformers and are a function of the design of the magnetic circuit, the quality of steel used and the care exercised during manufacture and assembly.

The use of high efficiency equipment and low-loss installation practice is often no more expensive than traditional methods and yet yields substantial savings in running costs which accrue over the whole of the life of the installation. In addition, the heat released is less, reducing the load on air conditioning and forced ventilation.

Once high-efficiency equipment has been selected, it is equally important to ensure that it is correctly rated. For example, motor efficiency is highest above 75% of full load, so over generous rating will increase both capital and running costs. On the other hand, cables are least efficient when fully loaded, so generous rating of cables can substantially reduce running costs.

High efficiency motors

An electric motor will consume electricity to the equivalent of its capital cost within the first 500 hours of operation - a mere three weeks of continuous use, or three months of single shift working. Every year, the running cost of the motor will be from four to sixteen times its capital cost. Over its working life, an average of thirteen years, it may consume over 200 times its capital cost in energy. Clearly, in achieving the lowest overall cost running costs are of prime importance.

High efficiency motors are now available at no cost premium. Cheaper motors are also available, but these will rarely be built to the same quality standards as those from high quality manufacturers and will be of somewhat lower efficiency.

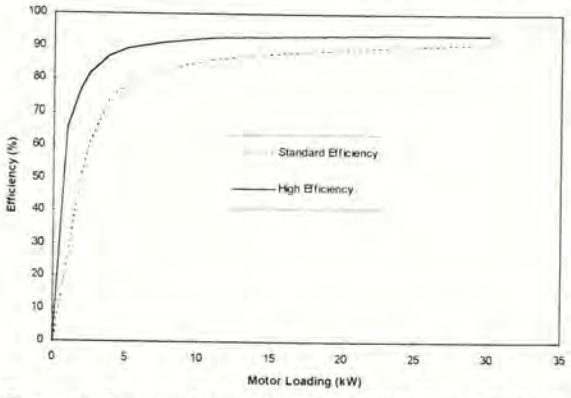


Figure 1 Comparison of high efficiency and standard motors

Figure 1 shows a comparison between a high efficiency motor and a standard motor of just a few years ago. The full load efficiency has been improved by reducing the resistance of the stator windings to reduce I^2R losses, while the improvement at idling and low-loading is due to the use of low loss steels in the magnetic circuit, coupled with improved manufacturing techniques. This makes high efficiency motors particularly attractive for driving cyclic loads, such as presses, where the motor spends a significant proportion of time idling. Although the high quality, high-efficiency motor may cost a little more than the cheapest available motor, any difference will be recovered in reduced running costs within a very short period of operation. Since the high quality motor will continue to give reliable service for an average of thirteen years, savings in running costs will continue to accrue.

The efficiency of a three-phase motor can be seriously reduced if the phase voltages are poorly balanced. An unbalance of only 5% requires a derating of 25%; separate circuits should be provided to avoid this problem.

Transformers

On-site transformers are installed only for installations with very heavy power requirements. Transformer efficiency is very high - about 99.5% - but since they are energised virtually all the time and handle large amounts of power, even this level of loss can be significant. The loss mechanisms are similar to those for motors, i.e. conductor losses that increase with load, and magnetic iron losses which are effectively constant, and similar steps can be taken to reduce them. Energy efficient transformers are dealt with in detail in reference 1.

efficiency infrastructure

Most energy efficiency initiatives are aimed at improving thermal efficiency and reducing electricity consumption by good housekeeping measures. It is not generally realised that more than 8% of the electricity you buy is probably wasted due to the design of your equipment and the way it has been installed. In this article, Vin Callcut suggests that major contributions can be made from careful attention to cable sizing and the choice of electrical motors.

Installation practice

Cable installation practice in the UK is governed by the IEE *Requirements for Electrical Installations*, known colloquially as the Wiring Regulations, but now more properly as British Standard BS 7671:1992. This standard is concerned primarily with the safety of personnel and property. Consequently, it recommends cable sizes that are the minimum possible consistent with thermal safety i.e. the minimum size that will maintain a sufficiently low working temperature so that the insulation does not degrade and there is no risk of fire in surrounding materials. For many installations this means conductor running temperatures of up to 90°C can be expected and the energy to maintain this temperature is being paid for.

This practice is perfectly safe ñ given that suitable materials are selected ñ but it is a very expensive waste of energy. Note that the standards also recommend a maximum voltage drop in cabling of 4%, so wasting 4% of the supplied energy - an efficiency of only 96%.

It was once common for electricians to install cable two sizes larger than the minimum as a matter of course. This practice brought the benefits of longer cable life, much reduced fire risk and high efficiency. Now, increased economic pressures have led to a 'lowest first cost' approach by specifiers that has obliged installers to use minimum sizes, often against their better judgement.

When the true lifetime costs are considered, taking into account cable, installation, and the total energy wasted, it is clear that the minimum cable size does not equate to minimum cost. The cost of cable has little connection with that of the copper content; it includes the cost of insulation and sheathing materials, processing, labour, distribution, and profit and these are not all proportional to conductor size.

Installation costs remain similar over a wide range of cable sizes; once the duct has been installed drawing the cables is a simple operation not critically dependent on size. The calculations required to determine the economically optimum size, which take account of electricity tariff, circuit duty factor, load growth, and interest rate, are not difficult, but the detail is outside the scope of this article. They are discussed in reference 1 and a program[2] for PC compatibles is also available. Typically, savings in the order of 50% can be achieved.

The validity of these calculations is widely accepted; British Standard 7450:1991 equivalent to IEC 1059:1991, *Economic Optimisation of Power Cable Size*, is based on the same principles. Although this standard was developed for distribution circuits rather than building installations it is equally valid for high duty cycle circuits in buildings.

As an example, a cable of 16 mm^2 section can be rated at 109 amps and run at 90°C but over a 50 m run would drop over 15 volts and waste nearly 1.6 kW. This would cost over £600 per year if electricity is bought at £0.043 per unit. The use of 35 mm^2 section more than halves this wastage, saving £300 per year, every year.

Computer aided design (CAD) programmes are available for cable installation. Most calculate cable sizes based on strict application of the Standard and will therefore select minimum sizes throughout. The recommended size can often be overridden, somewhat defeating the object of CAD, but will be necessary until an enlightened CAD supplier provides users with a choice of size selection criteria.

Conclusion

The best time to consider the efficiency of the electrical infrastructure of a building is early in the design process when any incremental cost of high-efficiency equipment will be easy to determine, the lifetime will be longest and there will be no, or little, additional installation costs. However, there will also be many instances where the building electrical services are refurbished - on average every nine years with about 40% of the installation being replaced - and the installation of new high-efficiency equipment will be seen to be fully justified by savings on running costs.

The financial return on electrical energy efficiency initiatives is at least as good as commercial organisations normally achieve in their mainstream activities. Management should revise their policies to take energy efficiency into account in all electrical projects and to oblige their contractors to demonstrate that their designs meet their requirements.

References:

1 *Electrical Energy Efficiency*, Publication 116, 1997, Copper Development Association

2 *Economic Sizing of Power Cables*, Datadisk No 6, Copper Development Association

Contact the Copper Development Association on tel: 01707 650711

What environmental price power?

By David Lyth, principal consultant with environmental and engineering consultancy, Entec UK

Power stations impact both the local and global environment and the 'greenest' of renewables schemes are by no means always welcomed locally. David Lyth advises developers on the engineering and environment aspects of new power stations - here he discusses options around non-conventional plant.

The prospect of a new power station will always incite strong reactions to its potential impact on the environment. The developer has to be sensitive to the feelings of the local communities affected as well as to the concerns of the statutory and green organisations over the effect to the environment on a global level.

Onus on the developer

A typical wind farm will produce enough electricity for 15,000 homes and saves 45,000 tonnes of carbon dioxide and 6600 tonnes of acid rain gas emissions each year. It produces no pollutants, gaseous emissions, radioactive contaminants or waste products. Wind turbines can be decommissioned and dismantled in a matter of days and all components can be recycled. It is one of the cleanest methods of producing electricity.

Why is it then that wind farms meet such strong opposition in the planning process? The Council for the Protection of Rural England has publicly condemned the Government's support for wind power, saying it "flies in the face of strong public concern about their impact on some of our most beautiful landscapes."

Wind turbines can be anything from 40 to 55 m high. The wind arm operates simply by wind turning the large rotors. This mechanism is responsible for the two main environmental effects - visual impact and noise.

The construction of a wind farm will also mean the provision of new access tracks, underground cabling and buildings. These will affect the existing land cover and drainage patterns. Typical ecological impacts may include: removal of sensitive vegetation, or the destruction of habitats and their inhabitants. The landscape impacts are likely to include physical changes to the pattern and fabric of the countryside.

Any physical effects on the ecology and landscape features can be avoided through a detailed ecological survey and assessment, which is usually a Phase 1 Habitat, undertaken in accordance with guidelines devised by statutory organisations. This information will influence the siting of turbines, road and cables to a large extent. A sensible developer is able to design the wind farm with a minimum of physical change to the existing ecology and landscape patterns, simply by avoiding sensitive areas and ensuring that landscape protection and restoration measures are incorporated into the scheme.

Wind turbines create both mechanical and aerodynamic noise. The noise assessment of a proposed wind farm will require several components: an understanding of the behaviour of noise produced by wind turbines, accurate data regarding the noise signature of the wind turbine design, data on the predominant wind directions, and an appraisal of the existing land form and vegetation between the wind turbine and the noise receptor (usually a private residence).

Arguably, the impact of a wind farm on a site is relatively small - it occupies only a small proportion of land, and the existing land use and management can continue right up to the base of each turbine. However, it is difficult to quantify the extent of the visual impact on the scenery, as it is influenced by land form, number and size of machines; design and colour; layout of machines and the existing skyline of the area. To determine the quality of a local landscape, landscape architects must rely heavily on a landscape assessment.

This is a study which leads to a detailed understanding of the factors contributing to landscape character and value. Once this is defined, the wind farm is assessed according to a range of criteria and an acceptable design is achieved - that is a siting with sympathy to landscape features and with contours.

Energy sources of the future

The government's policy of encouraging the use of non-fossil fuels, combined with the impact of the recently-introduced landfill tax, has meant that the reuse of waste materials as an energy source has become a focus of attention.

Using waste as a replacement for fossil fuels can actually have a positive environmental impact, by reducing net CO_2 emissions, since most of the carbon in waste is renewable. Utilisation, both through incineration and anaerobic digestion, will also reduce landfill requirements and the

Shotton Paper Mill, where Entec helped Eastern Generation in the development of a 240 MW CHP scheme to supply heat and power to the mill

production of methane when organic wastes are landfilled.

Methane is a potent greenhouse gas and when emitted from landfills can be a significant local nuisance. The Government estimates that 2 million tonnes of methane are emitted from British landfill sites per year.

Waste incinerators tend to face strong local opposition and are likely to have strict environmental and planning controls applied to them. Extensive precautions are needed to ensure that emissions are minimised and that performance meets stringent EC and national limits.

In addition to meeting statutory requirements, the physical design of buildings, traffic movements, noise and nuisance mitigation also require careful consideration. Sympathetic siting is required to minimise the perceived impact of the development.

Most European countries make much more use of incineration with energy recovery than the UK does, with plants located in city centres, so that the heat produced is used for both power generation and district heating.

The impact of a landfill gas scheme is likely to be small. The land needed for landfill gas power generation schemes is mainly that required for buildings to house the engines and pumps. Any visual impact will be minimal because of the small structures involved. The noise generated from the compressors, engine and exhaust systems can be kept to acceptable limits with adequate insulation, siting and design.

CHP SCHEMES

Combined heat and power (CHP) plants also offer a way of minimising further impacts on the environment. They are receiving increasing support from the new government. When in opposition, the Labour Party promised a revised target of 10,000 MW of schemes by the year 2010.

CHP is a highly efficient energy process, with a significant reduction in combustion products per unit of energy used, compared with traditional heat and power generation systems. Since CHP is almost always replacing electrical power from the older coal-fired power stations, significant reductions of SO_2 and NO_x emissions are also achieved because of the lower sulphur content fuel and more modern combustion equipment.

The CHP Association estimates that for every MW of CHP installed, 1250 tonnes of carbon are saved. The increased fuel efficiency of CHP could potentially play a useful role in helping to combat global warming, through curbing the emission of carbon dioxide.

The size and type of installation will affect whether consent is required for any expansion under the Electricity Act 1989 or the Town and Country Planning Act 1990. A planning application to construct and operate a CHP plant will, of course, need to be supported by a study of the effects of the development on the local environment.

The consent recently granted to the Saltend Cogeneration Company for the construction and operation of a CHP generating station with a capacity of 1200 MW is an indication of the growing level of support given to the schemes by the government. This case also demonstrates the extent of the planning process involved with these schemes.

Planning permission for the station was given, subject to the inclusion of 58 planning conditions. These conditions include: the construction of a new access facility; the suppression of dirt during construction; layout and design; access for fire appliances and fire fighting equipment; limits in noise and vibration during construction and operation; the stripping and storing of soil; landscaping provisions; measures to prevent contamination of watercourses; requirements as to air pollution monitoring; fuel delivery and storage; the disposal of contaminated waste; and the restoration of the site after the cessation of electricity generation.

The issues surrounding all the energy sources explored here demonstrate the importance of mitigating and minimising the impact of the various schemes on the local environment. Energy sources with little detrimental impact on the global environment can very often cause the greatest concern among local communities, so finding a compromise can be extremely difficult.

Further exploitation of options such as CHP - already well-established in industry sectors such as chemicals, pharmaceutical, paper and pulp and brewing - where the plants are located on existing industrial sites, certainly offers a solution in terms of damage limitation. The commitment of the government for CHP seems to indicate that this is the way power generation in heading.

The uptake of renewable energy sources in the UK to date is disappointing. Although many of these are proven as practical options, it appears that we need to work harder to obtain wider public support. In the meantime it is likely that we will see an increasing number of CHP schemes and gas-fired power plants because they offer the most viable options in terms of both economic returns and limited impact on their surroundings.

Contact Entec UK on tel: 01606 49077, fax: 01606 49194.

Energy

by Alan Dodson and Steve Hodgson

This article is the first in a new series aimed at readers of Energy World who are still choosing a direction for their careers. The articles are designed to explain the daily routines carried out by a range of energy professionals, and discuss the necessary qualifications. We start this month with an energy manager.

Energy Manager Alan Dodson - the car doesn't come with the job

Alan Dodson is the Energy Management Officer for the South Yorkshire Police Force, which enforces the law in around 600 square miles of territory including Sheffield, Rotherham, Barnsley and Doncaster. The Force has 142 buildings, the largest being the Force's headquarters at 6000m^2, the smallest a wooden Victorian 'Tardis' telephone box in Sheffield.

The Force spends just less than £1 million a year on energy; some £600,000 of this being electricity. Water accounts for around £114,000 of the total budget. The Force also buys gas, coal, oil, propane, and, for two buildings in Doncaster and Sheffield, district heating. South Yorkshire Police operates one of around 100 commercial buildings in Sheffield city centre which are heated by hot water generated by the incineration of the City's municipal refuse and piped into the building by Sheffield Heat & Power Ltd.

Alan Dodson's main responsibilities are to monitor the Force's energy use and recommend ways of increasing the efficiency with which it is used. But, in common with many energy managers, he also advises on energy purchasing. South Yorkshire Police actually buys its energy supplies through Yorkshire Purchasing - an ex-public purchasing department that now buys energy on behalf of several public bodies in the area, taking commission to fund its operations.

Alan describes a typical day like this. "I start with checking the incoming mail and prioritising any responses. Then set up a quality check on the data held in our energy monitoring and targeting (M&T) software. While this is running I contact the project engineer at Barnsley Council to discuss progress on a feasibility study into refurbishing the lighting in our 1960s district headquarters to high frequency lamps. Apparently the costings are ready but potential savings have yet to be quantified. The complete report is promised for next week."

"Meanwhile the quality check has revealed several missing entries on the M&T database; calls to the districts concerned result in two faxed bills, but three more buildings have yet to be invoiced. Competition in the gas market has reduced unit prices but the time spent chasing missing or incorrect invoices has gone through the roof."

"With district representatives to the new Energy Forum now nominated, I decide to invite the Deputy Chief Constable to chair the first meeting. So its onto his secretary looking for a free date in his diary, and then a letter with the proposed agenda."

Alan has established the Energy Forum in the brief year and a half he has been with the Force; it is one of several areas where he is starting to make an impact.

"Next - make a start on the six monthly analysis of 'J' District's energy consumption. I try to take a detailed look at one district's figures each week. Then, go through the boiler services reports with the Force Building Officer and arrange a meeting to look at flue reports in more details next Friday."

"I take a phone call from the computer section - they have some printers and monitors which are beyond economical repair; do I know if they can be recycled or disposed of in an environmentally friendly way? No I don't - but I know someone who does and the DTI's Environmental Helpline* promise to fax some information later today."

"Meanwhile the M&T analysis for 'J' District is complete so I start to go through the information using 'S' curves, graphs and 'cusum' to show trends for the whole district, for each fuel and each building. The District results are encouraging but one building's gas consumption is well up. Ring the District Engineer to request a check on control settings as soon as possible."

In the afternoon, Alan gives an energy awareness talk at an induction course for new employees at the Force's Training

manager

South Yorkshire Police's energy mascot

Centre. This inclusion of this talk within the induction of all new employees is another one of Alan's initiatives.

"Leaving the training centre, I call in to one of the small section stations to fit an automatic power monitor to the electricity supply. I will leave this for two weeks - the data gathered and downloaded to PC should allow me to estimate the proportion of night-time usage and thus decide whether change of purchase tariff might save money."

"Back to the office to check mail and messages again* - nothing urgent for a change. I manage to contact all the parties concerned to resolve a problem with dual billing for gas to one of our buildings. Changeover dates area agreed, amended bills promised. I notify district finance of the situation. Then see a company representative - another electronic energy management system, worth a further look so I arrange a site visit in ten day's time."

"Nearly time to go home - but what has happened to that information from the Environment Helpline? Ah, here, pass it on. Now, check - computers off? Printers off? And, what about the lights?"

Alan is pleased that his work, including a poster campaign and a competition in the Force's newsletter *Billboard* seems to be paying off with a greater awareness of energy issues among staff. "Certainly the normalised performance indicators for 96/97 show a reduction in consumption which cannot be accounted for by milder weather."

So this is a typical day in Alan Dodson's life at work - but how did he become an energy manger?

Alan started his career as an electrician in the mining industry before moving into building services maintenance, first at a local college and then at contract energy management company Associated Heat Services. His focus on energy management took off when he returned to the education sector as Senior Administrative Assistant (Energy) at the then Sheffield Polytechnic, leaving some years later as Energy Services Manager. It was here that he developed a particular expertise in M&T, giving a paper on the subject to a conference of energy managers in higher education. From there, with a short period exploring the consultancy market, Alan joined South Yorkshire Police.

Like many energy managers, Alan Dodson's qualifications for the job come from many years doing it, together with a series of short courses taken as and when needed to build new skills. Recently he has decided that it's time to formalise matters and he is now doing The Institute of Energy's Training in Energy Management through Open Learning (TEMOL) course. The course, taken in the candidate's own time usually over 12-18 months, covers both the technical and managerial aspects of energy management. Taking it allows the candidate to join the Institute as an Associate free of charge.

Alan is enjoying the course: "I've been doing this job a long time but I've always approached it from a practical, day-to-day point of view. It has been very useful to study the fundamentals of heat transfer, for example, and I'm sure this will do me good." He is also pleased to see energy management raising its profile: "At long last the work of energy managers is being recognised as a profession - the move by The Institute of Energy to allow associate membership as recognition for professionals in this field is very positive".

And his advice to younger people considering a career in energy management? "Achieve technical qualifications by all means but never forget the importance of experience and common sense, which allow energy managers to make valid judgements, including when to obtain the necessary technical information."

* 0800 585794

Why your intelligent systems could be well and truly hung over in the year 2000

by Graham Nicholls, managing director of E-Squared Limited

While the Millennium Commission spends the last few years of this century preparing a celebration at Greenwich, on the meridian that synchronises global time, the controls industry is preparing to avert a catastrophe brought about by the way computers handle date and time functions.

As many as 90% of PCs in use today are estimated to be susceptible to a time problem which will cause them to crash or behave erratically on 1st January 2000 or up to several years later. This flaw has been detected even in leading make PCs delivered as recently as January 1997. The US firm Productivity Research has described this as 'the most expensive single problem in human history', estimating it could cost $1,000,000 million worldwide to solve.

The 'Year 2000 Problem' or 'Century Date Change Problem' stems from the way computers handle time functions. Time is maintained on a PC by an internal real time clock (RTC) which operates even when the computer is turned off. Most RTCs use a US programming convention of storing dates in MMDDYY form, with only two digits representing the year.

After 123199 (31st December 1999) RTCs will roll over to 010100. This is fine until a program performs calculations using these dates. It may generate a negative or imaginary number, possibly crashing the program.

The bridge between a computer's hardware and software is the Basic Input and Output System (BIOS). Various BIOS versions exist and there is no real 'standard' as such. Some BIOS versions do not allow dates after (19)99 and will revert to 1 January 1980 on the first day of the new millennium. Such machines are at the heart of numerous building control and data acquisition (Scada) systems.

Even where RTCs and BIOS versions are year 2000 ready, problems will still occur if the computer Operating System (OS) or the software applications running within them are not. For example, MS-DOS version 6.2 onwards and MS-Windows are year 2000 compliant, but to work reliably, the RTC, BIOS, and all applications software should also be compliant.

The impact of the year 2000 on personal computers has been widely discussed, but there is another potentially more challenging problem for the building services arena. Microprocessors are to be found everywhere throughout buildings - not only in office equipment, but embedded in the intelligent systems that regulate the built environment itself - in lighting and lift controls, building management systems, security and access systems, CCTV, car parking and metering, power generation controls and so on.

It must be acknowledged that most system manufacturers are taking the year 2000 issue seriously, designing year 2000 compliance into their most recent products. However expect to find some firmware or supervisory problems with many existing systems. Moving from 1999 to 2000 won't alter the way a BMS modulates a valve, but logging, reporting, tuning, optimum start/stop and alarm routines could all be affected.

So what can be done? Firstly building managers would be well advised to establish that applications on PCs/servers are based on four digit year codes and that these, the processors and operating systems are fully year 2000 compliant.

In addition, Systems Integrators like E-Squared are now offering audit services to check existing installations and identify potential problems, while manufacturers of intelligent systems are developing firmware and software fixes. The latter should be available well in advance for downloading and testing.

It is imperative not to delay investigating whether or not the Year 2000 Problem will affect your building systems. Given the absolute nature of the timescale (we have until 31/12/1999), and the variable nature of humankind ('why do today what you can put off until tomorrow?') a last minute rush is inevitable.

Contact E-Squared Ltd, tel: 0171 378 0101, fax: 0171 378 0012

Don't let the bugs bite!

Some 19% of smaller companies are not concerned by the Year 2000 problem, compared to just 2% of larger firms, according to a survey by the British Standards Institution.

BSI's DISC department, which is responsible for standards in information and communications technology, conducted the survey. Results showed that 97% of larger companies are both aware and concerned about Y2000 and 98% are taking action. Of the smaller companies surveyed, 30% were not even aware of the problem.

One large power company said that it was testing embedded systems but are finding it hard to believe manufacturers' and suppliers' statements.

DISC has produced two documents to help UK businesses. The first: PD 2000-1 *A Definition of Year 2000 Conformity* is free, the second: PD 2000-2 *A Code of Practice for Small and Medium Enterprises* informs business and project managers about the nature of the problem and what they must do to resolve it.

For a copy of PD 2000-1, contact BSI DISC on tel: 0181 996 7420, or download it to your PC from website www.bsi.org.uk/disc/year2000.html

The greening of the workplace

by David Nicholson

There is general agreement among property managers that not only does BREEAM help them to keep costs down, but it adds to the resale or letting value of a building.

The buildings we live and work in may seem to be fixed, environmentally neutral objects. But the materials they are made from, the resources they use - such as water, gas and electricity - and the effect they have on their surroundings have a huge environmental impact. Buildings account for 50% of all energy use, and therefore 50% of polluting carbon dioxide. Cutting down the energy which they consume can make a vast difference to pollution levels overall; to contribute to the preservation of the environment it is crucial to build and maintain energy efficient and generally greener offices and houses.

The Building Research Establishment (BRE) leads the way in setting high standards of environmental performance in buildings. In 1990 BREEAM (the BRE Environmental Assessment Method) was launched, allowing office managers, architects and developers to get the best advice and information on materials, design and operations, all aiming to reduce costs and minimise the impact of a building on the environment.

As part of a report on the effectiveness of BREEAM, BRE commissioned Deloitte and Touche Consulting Group to compile a Market Survey. BRE used the survey, combined with further research, to improve the scheme and will announce additional revisions to it as part of its on-going development (without reducing the value of already completed assessments). The aim is to encourage improvements in buildings by demonstrating real and tangible benefits to scheme users.

Seven years from the foundation of BREEAM, the lasting effects of the scheme have become clear, as the Deloitte and Touche survey demonstrated. Major high street firms, government departments and utility companies have introduced BREEAM assessment as standard for new and existing buildings around the UK; similar schemes based on BREEAM have been taken up in Canada, Hong Kong and Norway and others are in development elsewhere.

There is general agreement among property managers that not only does the scheme help them to keep costs down, but it adds to the resale or letting value of a building.

"I'm sure it is an extra selling point to have a high BREEAM rating" says Mike Dixon of NatWest Group Property in the North. "NatWest Group is committed to achieving the highest possible standards. As part of this, our policy is to only acquire new buildings with a BREEAM rating of 'good'. We influenced the design, and project managed the construction of our South East Lancashire Business Centre in Wigan with the result that it was awarded the highest possible BREEAM rating of 'excellent' in 1995, this was a first for NatWest in new build terms nationally.

"We believe that this approach makes good business sense - not only will the building have a better working environment for the bank's staff, but it will also operate more cost effectively with a very necessary regard for important environmental issues."

When an organisation gives advice to others on building issues, the importance of the assessment is greater still. PACE is an Executive Agency of the Cabinet Office which, amongst other functions, provides professional building service advice to various government departments. It is the successor body to Property Holdings. "We were a part of the Department of the Environment, so it was particularly important for us to be seen to be environmentally aware; we achieved a double 'excellent' on our own building in Bristol. This proved that we were on the right track," says Mike Levy. "It reinforced our internal controls and gave us a degree of recognition and authority. We can present ourselves as an example to clients."

Mike Levy also sees the high BREEAM rating as a marketing tool when seeking to attract tenants for vacant space. Many companies are still keen to increase their environmental profile and could see the occupation of a building with a high BREEAM rating as one means of achieving this. PACE gave instructions to use the BREEAM rating in their recent marketing exercise in Bristol.

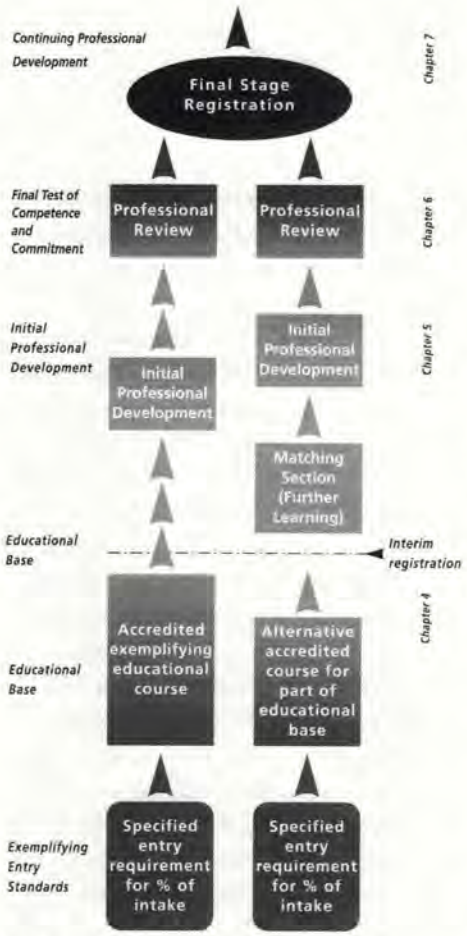
As with other companies, the BREEAM certificate is hung prominently in the PACE office foyer. There are distinct advantages to corporate prestige in demonstrating a commitment to sound practices, especially when energy is part of a group's business.

Besides new offices, BREEAM operates assessments of existing offices, industrial units, superstores and new homes, weighing up the elements of ventilation, the impact of the building on neighbouring areas, the use of materials, the encouragement of public transport, insulation measures, recycling initiatives and lighting systems.

In combination, they form a highly persuasive package for designers, developers, landlords, occupants and potential buyers alike, making Britain's workplaces greener as a result. As Mike Levy of PACE puts it: "Our staff benefit and the organisation benefits, it raises awareness and shows that we are environmentally responsible."

Contact the BREEAM office, tel: 01923 664462

New standards include four year courses for CEng



Main pathways to registration

The Engineering Council has announced radically revised standards for the education an training of professional engineers.

The raised standards are contained in the new edition of the Council's policy document, *Standards and Routes to Registration* (SARTOR), which aims to ensure that UK engineering qualifications remain equal to the best internationally.

Mike Heath, Director General of the engineering Council, said: "The new levels of education and professional development of engineers are intended to ensure that we continue to possess a world-class engineering workforce, at least as well educated and trained as the very best of international competition."

The new standards, which qualify engineers and technicians for admittance to the Council's National register as Chartered and Incorporated Engineers and Engineering Technicians, will be applied in phases from 1999.

The main changes compared to the current, 1990 edition are:

- Chartered Engineer (CEng) - four years' academic study instead of three, to be met by a four-year accredited MEng degree or equally by a three-year accredited BEng(Hons) degree plus a further year of additional learning.
- Incorporated Engineer (IEng) - three years' academic study instead of two, by either a three-year accredited IEng degree or a two -year HND plus a further year of additional learning.

Key educational requirements for registration are in three stages, all of which are being boosted: an accredited engineering course; initial professional development by an accredited programme to build competence and professional breadth; and a professional review to assess competence and commitment. Membership of an engineering institution remains obligatory.

Mr Heath said that the new policy is driven by recognition of changed national and international circumstances - the most important being the need for internationally recognised qualifications.

But other factors include:

- change from a selective to a mass system of higher education and a consequent need for universities to provide courses for different types and levels,
- doubt about the equivalence of output standards from different universities
- increasing use of occupational standards by employers.

Investigations by a number of organisations into the future needs of engineering formation identified a need for more students of high potential in engineering courses, that more co-operation is needed between schools, universities and employers, and that the team-working skills of young engineers should be developed. Higher priority to training and professional development throughout careers was also one of the identified needs.

Standards and Routes to Registration, third edition 1997, is available for £20 from the Engineering Council, 10 Maltravers Street, London WC2R 3ER

Council welcomes Dearing Report

The Engineering Council has welcomed the Dearing Report and broadly endorsed its recommendations, saying that it clearly reflects the engineering profession's own commitment to raising educational standards (see above).

In particular, the Council applauds the recommendation that that university courses should not all be the same level and of the same duration. The Council is greatly encouraged that Dearing's model for a national qualifications framework fits so well with SARTOR, which the Report quotes as the main example of how Sir Ron sees his framework operating.

In responding to the Report's view that quality should be assessed through output standards, the Council said that this did not represent any fundamental incompatibility. The Council agrees that if robust, verifiable and guaranteed outputs are achieved by the process proposed by Dearing, together with accreditation of courses by the engineering institutions, the need for specified entry standards will diminish.

November 1997

Boiler water treatment
Conference, 17-18 November, London. Details from FT Conferences, tel: 0171 896 2120, fax: 0171 896 2696, e-mail: lucindar@pearson-pro.com

Introduction to petroleum refinery processing
Course, 17-18 November, The Netherlands.
Details from The Center for professional Advancement, tel: +31 20 638 2806, fax: +31 20 620 2136

Corporate energy management in just one day
DETR workshop, 18 November, Newport
Details from BRECSU, tel: 01923 664531, fax: 01923 664602, e-mail: brecsuenq@bre.co.uk

The world's your oyster: new opportunities for upstream oil & gas
Institute of Petroleum conference, 18 November, London. Details from IP, tel: 0171 467 7100, fax: 0171 255 1472, e-mail: lis@petroleum.co.uk

Project 2000 in power
Conference, 18-19 November, London, £895 + VAT
Details from IQPC Ltd, tel: 0171 691 9191, fax: 0171 691 9192, e-mail: y2kpower@iqpcmail.co.uk

Corporate energy management in just one day
DETR workshop, 19 November, Plymouth
Details from BRECSU, tel: 01923 664531, fax: 01923 664602, e-mail: brecsuenq@bre.co.uk

Practical ways to save energy
Course, 19 November, London, £194. Details from Mid Career College, tel: 01223 880016, fax: 01223 881604

Sixth annual natural gas conference
Royal Institute of International Affairs conference, 20-21 November, London
Details from RIIA, tel: 0171 957 5711, fax: 0171 957 5710, e-mail: eepriia@gn.apc.org

Spark ignition engine emissions
Short course at the University of Leeds Department of Fuel and Energy, 24-28 November, Leeds.
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

Corporate energy management in just one day
DETR workshop, 25 November, Belfast
Details from BRECSU, tel: 01923 664531, fax: 01923 664602, e-mail: brecsuenq@bre.co.uk

Competence and CPD: the business benefits
DTI conference, 26 November, London. Details from Sarah Barker at CRAC, tel: 01223 460277, fax: 01223 311708, e-mail: enquiries@crac.org.uk

Competitiveness through innovation
Downstream oil logistics conference, 27 November, London, £350 + VAT
Details from the Institute of petroleum, tel: 0171 467 7100, fax: 0171 255 1472, e-mail: lis@petroleum.co.uk

Electricity trading, settlement and reconciliation
Conference, 27-28 November, London, £899 + VAT
Details from IIR Ltd, tel: 0171 915 5055, fax: 0171 915 5056

December 1997

Corporate energy management in just one day
DETR workshop, 2 December, Falkirk
Details from BRECSU, tel: 01923 664531, fax: 01923 664602, e-mail: brecsuenq@bre.co.uk

NEMEX '97
Energy management exhibition and conference, 2-3 December, Birmingham. Details from Inside Communications Media Ltd, tel: 01732 464154, fax: 0172 464454

Switchgear technology for power systems
EA Technology course, 2-3 December, Chester
Details from Ms Del Bennett, tel: 0151 347 2557, fax: 0151 347 2256, e-mail: db@eatl.co.uk

Corporate energy management in just one day
DETR workshop, 4 December, Manchester
Details from BRECSU, tel: 01923 664531, fax: 01923 664602, e-mail: brecsuenq@bre.co.uk

Waste-to-energy
Conference, 4-5 December, Copenhagen
Details from Euromanagement, tel: +31 40 2 974 941, fax: +31 40 2 974 950

How to do an energy survey
Course, 8 December, London, £194
Details from Mid Career College, tel: 01223 880016, fax: 01223 881604

The international energy experience: markets, regulation and environment
Conference, 8-9 December, Warwick, £150
Details from Dr Monica Giulietti, Warwick Business School, fax: 01203 524965, e-mail: m.giulietti@warwick.ac.uk

Power in the Gulf
Conference, 8-9 December, Dubai, £545
Details from Folio Consultants, tel: 01372 466996, fax: 01372 469951

How to do an energy survey
Course, 9 December, Manchester, £194
Details from Mid Career College, tel: 01223 880016, fax: 01223 881604

The future of UK utilities
Conference, 9-10 December, London, £998
Details from Business seminars International Ltd, tel: 0171 490 3774, fax: 01424 773334

From landfill gas to poultry litter power - London & Home Counties Branch visits H Leverton

The current theme of the London & Home Counties Branch is energy efficiency and the environment, and recent speakers have dealt with a range of subjects within the theme, including the last speaker in the 1996/97 programme, the Deputy Director of the Combined Heat & Power Association.

It was, therefore, very appropriate to conclude the year's programme with a technical visit to H Leverton in Windsor. Formed in 1901, this company is one of the largest and longest serving Caterpillar dealers. H Leverton is a Unilever Group company, its main products being industrial engines, power generation and marine propulsion, for which it uses the whole range of Caterpillar engines.

The visit was limited to 35 members and all places were quickly filled.

Andrew Stone, CHP Sales Manager with the company, organised the afternoon programme, beginning with a very useful overview from Andrew of background to the linkage between Leverton and Caterpillar.

With the aid of some slides, Russell Privett then discussed some recent projects from the Power Systems Division. He covered the financial justification, technical considerations, design, installation and product support, then taking questions before we divided into four parties to tour the site. We saw a wide range of power generation systems either being assembled or packaged and made ready for despatch.

The tour ended in the office that operates Leverton's remote monitoring service for all its sites in the UK. The department operates 24 hours a day, seven days a week and 52 weeks a year gathering information which is vitally important to Leverton's product support activities. It also helps reduce the number of breakdowns, ensure that adequate fuel is available on-site and records and controls energy use.

A further and very lively question and answer session took place when we returned to the lecture theatre - but this did not complete our visit. The next presentation was by Martin Eastwood, Senior Project Engineer with Fibrowatt Ltd.

I think it is fair to say that this presentation was unique - not many people have heard a detailed talk on the building of a power station fired by poultry litter mainly from chickens. *(Fibrowatt's activities were also featured in September's Energy World - ed).* The power station is located in the Thetford Forest, Norfolk. It and its access roads are being carefully designed to be as acceptable locally as possible. Once completed, the power station will take around 100 lorry loads of litter per day to produce 38 MW of electricity to be fed into the national grid.

Litter is fed and fired through a burner system not dissimilar to a pulverised coal burner. The residue after combustion is small and is supplied for use as a fertiliser. Feedstock handling equipment ensures that no unwanted solids, eg bricks, cans etc, are passed to the burner.

Siting the station at Thetford Forest was deliberate to take advantage of a county well-endowed with broiler establishments. Well-established broiler farms relatively close to the station should ensure long-term supplies of litter.

Fibrowatt has another similar power station at Eye in Suffolk - not as big at 12.5 MW but working flat out.

Up to now, a lot of poultry litter has been used directly as a fertiliser and reports suggest it is very effective. But poultry litter is very high in nitrates and its use may have contributed to the high levels of nitrates in the water locally. The reduction of the waste matter by burning may therefore be a further environmental advantage.

Needless to say the talk prompted a series of questions which the speaker dealt with adequately.

A complementary visit to White's Pit, Dorset - where an H Leverton Caterpillar-engined landfill gas power plant produces 7 MW of electricity - has been arranged for 11 November as a follow-up to this visit. White's Pit is said to be one of the largest single site landfill power stations in Europe. ***EJ Bell***

Discount for members

Every individual member or group affiliate is entitled to use the Institute's Council and Members rooms for half the normal price. So if you are looking for a place to hold your meetings this winter then why not choose our Georgian building, adding the traditional touch to your small functions. It will also give you the opportunity to visit the Institute and meet the staff that look after your needs. Situated in the heart of London, we are accessible from all geographical areas.

For more information call Derek Smith on 0171 580 7124, email: djsmith@ioe.org.uk

Thank you

May I thank all those many friends, both staff and members, who contributed so generously to my leaving gift. I can assure you all that the money will be spent wisely on helping to reduce my golf handicap!

I would also like to thank all those who so kindly took the time to write to me expressing their good wishes on my retirement. By virtue of retaining my own individual membership I hope that I will meet up with many of you again at some future event of the Institute.

My best wishes to you all.

Jim

Branch Events

NOVEMBER 1997

SOUTH WALES AND WEST OF ENGLAND
Tuesday, 11 November, 5.30pm "Renewable Energy" - G J Swarbrick. South Western Power Ltd (SWEB), Aztec West, Almondsbury, Bristol. Joint meeting the Combustion Enginners Assoc. Buffet available. Contact Mr I Weslake Hill, tel: 01222 757527

NORTH WESTERN
Wednesday, 12 November "Responsible Utilities Management" Joint meeting with the North Western Institute of Chemical Engineers at AEA, Birchwood Centre, Risley. Contact Mr F Owen, tel: 01565 651506

YORKSHIRE BRANCH
Wednesday, 19 November 2.30pm
"Combustion Engineers - they light fires don't they?" Prof. Gordon Andrews, Leeds University.
Contact Mr A Mallalieu, tel: 0113 2768888

NORTH WESTERN
Thursday, 20 November "Fly by Wire" Joint meeting with Blackburn Plant at The County Hotel, Blackburn. Contact Mr C Fielding at British Aerospace.

INSTITUTION OF MECHANICAL ENGINEERS
Wednesday, 26 November Remnant Life Production Seminar. Contact Mr S Burgess, tel: 0171 222 7899

NORTH EASTERN
Wednesday, 19 November "Deregulation of the Energy Industry" Speaker to be announced. Contact The Northern Energy Initiative, tel: 0191 5164400

DECEMBER 1997

SOUTH WALES AND WEST OF ENGLAND
Tuesday, 2 December, 10.30am "Waste Incineration by High Temperature Combustion" Joint meeting with the Combustion Engineering Association, buffet lunch. To be held at Recham Ltd, Gwent. Contact Mr I Weslake Hill, tel: 01222 757527

SOUTH WALES AND WEST OF ENGLAND
Wednesday, 10 December, 6.00pm
Committee Meeting followed by "Inter-Institute Quiz". Social evening organised by The Institute of Gas Engineers. Contact Mr I Weslake Hill, tel: 01222 757527

NORTHERN IRELAND
Wednesday, 10 December, 6.30pm
Visit to SEELB - energy management installation, Dundonald. Contact Dr P Waterfield, tel: 01232 364090, email: p.waterfield@ulst.ac.uk

LONDON AND HOME COUNTIES
Thursday, 11 December, 6.00pm "Energy Efficiency in Buildings" at BRE, Watford. Speaker Mr M Brookes. Contact Mr PM Johnson, tel: 01793 893330

New Members

LONDON & HOME COUNTIES

Member
Christopher Ian McLain MInstE, Bromley, Kent
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