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REGULARS

Engineering Council

DIARY

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COVER

Offshore wind power - pictured is part of the ten-500 kW turbine Tuno Knob wind farm off the east coast of Denmark's Jutland. Denmark plans to generate 40% of its total electricity needs form offshore wind by 2030.

In the UK, Energy Minister John Battle has called offshore wind the UK's greatest natural, sustainable and pollution-free resource and has launched a consultation document on how best the technology can be supported by Government. Meanwhile, ahead of the long-awaited results of his review into how renewables can be supported to meet 10% of the UK's electricity needs by 2010, he has also announced the biggest-yet NFFO Order (see page 5) (*Picture courtesy of Vestas Wind Systems A/S*)

Viewpoint

Educating the energy technician

Dick Evans, Principal, Stockport College of Further & Higher Education

Over the past five to ten years, the further education sector has seen a serious and steep decline in enrolments in vocational science, engineering and construction. The reasons for this decline are multidimensional and reflect the major transformations that have occurred, not only in the world of work but also within the workings of the global economy. The long and deep recession in construction and engineering has seriously impacted on the number of students studying these subjects in further education. As companies have downsized and outsourced their services, fewer staff are released

to colleges to continue their studies. Certainly, the growing perception that engineering, science and construction do not offer secure careers have deterred people from thinking about entering to study these disciplines.

Colleges, and increasingly universities, are finding it difficult to resource these programmes of study. Fewer students, coupled with insufficient funding from the Funding Councils, have brought about a number of closures or reductions in the importance and visibility of departments of science, engineering and construction.

So, what are colleges and universities to do when they are confronted with these challenges? We do live in a scientific and technological world and this will become of increasing importance to all members of society. Institutions which have resources and expertise in these areas are looking, obviously, for new areas of development in terms of curriculum and provision which is more appropriate to the future demands of employers.

One very exciting opportunity is in the area of environmental sciences and technologies. Analysis of a number of employment forecasting reports would indicate a major growth in the technical and managerial aspects of the environment. One such report from the Institute of Employment Research indicates that the growth expected between 1994/2001 is around 20% and an order of magnitude greater than the average growth of employment expected during this period across all areas. When one further analyses the figures, it is found that the associated elements include pollution control, land reclamation and energy conservation.

The whole area of new build or the improvement of existing building stock requires a detailed knowledge of energy and its management, particularly elements around conservation and utilisation. Managerial and technological expertise are required to tackle some of the major challenges that the world is confronted with in terms of energy and its conservation. Environmental management is very much about the fusion of key disciplines such as science, engineering and built environment technologies. It is multidisciplinary and can no



Traditionally universities and colleges, and indeed a great deal of the school curriculum, is located in boxes with boundaries. Boundaries not only in terms of subject content but also the way the institutions are managed e.g. departments/faculties of mechanical engineering, electrical engineering, construction etc. If we are to begin to accept the challenges, these structures must change fundamentally. Traditional specialist departments need to work together and understand holistically the kind of issues that need to be taught.

There is already evidence across the FE and HE

sectors that science and engineering programmes are being offered with other subjects, for example management, modern languages, information technology etc, but this is but one aspect of the transformation that is required within the world of education and training. There needs to be a true fusion between subjects so that they are not taught in any way perceived as separate.

The energy technician is a good example of this. These individuals need to acquire the skills, knowledge, understanding and competence to appreciate the scientific and technological aspects of their work. In addition awareness of the legal aspects of pollution control and management as well as energy management and conservation are essential. For energy technicians, institutions need to configure programmes of study which utilise their expertise and resources across the institution. New methods of teaching and learning need to be introduced to produce highly qualified craftspeople, technicians; both graduates and post-graduates.

The real challenge lies at the earlier stages, in laying the foundations for people who will become facilities managers in companies and tackle some of the new management challenges. Hopefully many of these individuals, through their programmes of continuous professional development, will be able to progress onto higher studies but it is this initial stage that is so important: that of developing the concept of the energy technician. Stockport College is beginning to discuss these developments with a number of local Universities.

The development and creation of programmes of study for the energy technician could offer real opportunities for institutions to regenerate their vocational science, engineering and built environment technology activities to provide an adequate stock and flow of highly qualified individuals into these essential new areas of employment.

The challenges are immense. There is a need for radical and fundamental changes in the way institutions are managed and organised and the way in which these subjects are taught and learnt. It promises to be an exciting set of challenges.

Islands networks to be linked to France

engineering group ABB has won

contract to build the new grid.

It will involve laying 65 km of

submarine cables between the

underground cables across the

islands. Also included are new

and upgraded substations, and

control equipment. Fibre optic

associated protection and

requirements are also being

The 50 MW subsea cable

between Jersey and Guernsey

will be the first electricity link

85 MW cable between Jersey

and France will supplement an

existing 50 MW cable.

between the two islands. A new

cable links for data and

telecommunications

installed.

two islands and the French

coast, and 70 km of

the £50 million turnkey

The electricity supply

networks of the Channel Islands of Guernsey and Jersey are to be linked for the first time by a new link which will also connect to the European grid via France. The 'Channel Islands Grid' is due for completion by the end of July 2000.

The new Channel Islands Electricity Grid Company Ltd (a 50/50 joint venture between Jersey Electricity Company and Guernsey Electricity) aims to provide electricity users on the two islands with the strategic and economic benefits of connection to the huge European electricity network whilst sharing each other's power system capacity.

International electrical

Solar South Africa

Fifty thousand homes in South Africa - many with very little chance of ever being connected to the national grid could soon have solar-powered systems, following the launch of a joint venture between Shell International Renewables Ltd and Eskom, South Africa's national electricity supplier.

The joint venture is to target these homes with a unique solar home system which should cost around US\$8 a month, roughly what householders spend now on paraffin and candles, says Shell.

The uniqueness of the system comes from a combination of the financing and security features. Magnetic cards are used to store the prepaid power credit, which is drawn down as it is used, providing people with the opportunity to install solar power without having to make a large up-front investment in equipment. The pre-payment charge also covers the installation and maintenance of the unit. Magnetic cards will be available from local network of franchised outlets.

As solar panels must be positioned outside buildings and are easily transported, the system also tackles security issues. The Shell system overcomes these by incorporating a patented 'SmartSwitch' into the battery and the solar panel. These components will not function without the associated control system. Copenhagen's Amager Power Station in Denmark is using Salter Weigh-Tronix weighing equipment, supplied by Scaletronic, to help provide the people of Copenhagen with a reliable electricity supply.

nternational

The power station uses 500,000 tons of coal a year, supplied in a variety of grades from a number of sources. Five conveyer belts combine and distribute the coal to ensure the desired blends and quantities reach the three power units. The Scaletronic solution required installation of four weighbars onto each of the belts which are, in turn, linked to a control centre containing five intelligent weight indicators.



Electricity liberalisation spreads across Europe

Liberalisation and deregulation of electricity industries, pioneered in the UK, is spreading to parts of Europe, with the Finnish IVO Group intending to move into the German electricity market. The company's German subsidiary has signed provisional agreements to build a new, gas-fired power plant of 750-1,250 MW in Lubmin, for the state-owned Energiewerke Nord GmbH. IVO was one of the first foreign companies to receive a German supply licence.

Meanwhile, the new Amsterdam Power Exchange will from next year provide an international facility for trading in electric power. The exchange will be the trading location for the supply and demand of electricity for both power producers and regional distribution companies, initially as a spot market for one day ahead, but later as a forward market.

German and Belgian as well as Dutch market parties have announced their wish to trade actively on the APX.

In a separate move, the UK's Eastern Group is opening new offices in six major European centres to complement its UK business: Frankfurt, Stockholm, Madrid, The Hague, Prague and Warsaw to handle risk management, joint ventures, equity investments and infrastructure development projects.

Sustainable construction initiatives

Construction Minister Nick Raynsford has launched two new sustainable construction initiatives, BREEAM '98 for Offices and The Green Guide to Specification.

BREEAM is a method of reviewing and improving the environmental performance of buildings. Since it was first launched in 1990, some 400 major office buildings have been BREEAM assessed. BREEAM 98 for Offices is an improved and expanded version for assessing both new and existing office buildings. New elements of the scheme include:

- assessing the environmental impacts of building materials and components using information from The Green Guide to Specification
- predicting likely transport related carbon dioxide

emissions for buildings

 recognising and rewarding a full range of water

conservation initiatives. The Green Guide to Specification was initiated and sponsored by the Post Office. It scores construction materials and components according to the amount of energy consumed, water expended, and pollution and waste generated during their production and distribution. Life expectancy, toxicity and recyclability are also covered. They are then rated A, B or C - category A having the least environmental impact - to give easy-to-use guidance for architects, specifiers and other building professionals, owners and users

Both publications are available from CRC Ltd, tel: 0171 505 662



STULZ 'low-energy' ultrasonic humidifiers have been installed as part of a recent fit-out for a leading European Investment Bank based in the Broadgate Development in the City of London. Consulting engineers for the project selected STULZ ultrasonics for six air handling units and ultrasonic humidifiers have now been supplied for a further thirteen units as replacements for electric steam humidifiers.

Gas power station moratorium to continue, Pool to be overhauled

The Government's new White Paper on fuels for power generation, published last month, eventually did confirm the expectations raised by its consultation paper released back in June. The Government is nothing if not ambitious: it proposes a "radical reform agenda" to "remove distortions in the electricity market and safeguard the security and diversity of our long term energy supplies, at lower prices".

Specifically, this means overhauling the way the electricity Pool works, forcing the major generators to sell-off some of their coal-fired generating plant, and forcing the regional electricity companies to separate their distribution and generation activities. Until these are achieved, the Government will strictly control the growth of new gas-fired generation capacity. The development of new, gas-fired, electricity only (ie non-CHP) plants would, as the Government said previously, "normally be inconsistent with the Government's energy policy concerns relating to diversity and security of supply".

So the moratorium remains, until Offer advises the Government that the reform agenda is "substantially" completed.

As before, the Government will make exceptions to the moratorium for projects which "promote our energy policy and sustainable development objectives", ie "good quality" CHP schemes, defined as those with a thermal efficiency of at least 70%; and for renewables projects. The CHP Association has welcomed the White Paper, saying that it "has set out a clear agenda for boosting the use of high efficiency CHP plant".

The White Paper follows a ten-month review of the electricity generating market prompted last autumn by fears that more coal mining pits could close if more gas-fired capacity came on stream. Over 30 proposed gas-fired CCGT power plants are said to have been halted by the moratorium on new plant.

"Conclusions of The Review of Energy Sources for Power Generation" is available from The Stationery Office for £17.85, and on the Internet at www.dti.gov.uk

Ultrasonic systems are ideal for the development as their cool, steam-like mist readily evaporates, and is generated with minimal energy consumption and thus operating costs, says STULZ. Operational efficiency was also an important criterion. The STULZ systems feature proportional control and were easily interfaced with the existing BMS system.

NFFO-5 - dominated by waste and large wind projects

An extra 1.4 million homes around the UK might eventually be powered by electricity from renewable sources as a result of the Fifth Non Fossil Fuel Obligation (NFFO) Order - the largest yet - announced by Energy Minister, John Battle in September.

Including 261 projects totalling 1,177 MW generating capacity, NFFO-5 is the largest Order since the scheme began in 1990. It contains projects throughout England and Wales involving landfill gas, waste, hydro and both large and small wind farms for the electricity market, developed by a wide range of large and small companies.

NFFO-5 is also the cheapest. The average price of power expected to be generated is only 2.71p/kWh, compared with the electricity pool price of 2.67p/kWh. This is down from 4.35p/kWh under NFFO-3.

The Order is dominated by energy-from-waste and landfill gas projects, together with large-scale wind farms (see *table*). These projects also show the lowest prices, while small-scale hydro and smaller wind developments are more expensive. Unlike NFFO-4, no biomass projects are included.

The size of the price reduction, which shows some renewable sources very close to competing with conventional sources, surprised everyone, including Mr Battle: "When I launched the competition for NFFO-5, I expected some further price reductions from those seen under earlier Orders. However, the price reductions have exceeded my expectations and reflect well on an industry determined to make renewables competitive with other sources of energy."

The NFFO requires public electricity suppliers in England and Wales to purchase from generators using renewable sources of energy. Following the announcement of NFFO-5, suppliers are now expected to sign contracts with renewables developers, through their agent the Non-Fossil Purchasing Agency Ltd. Some of these contracts will start as early as I December 1998, although experience of previous Orders suggests that a minority will never get off the ground.

Mr Battle added: "There can be no doubt that this obligation on the public electricity suppliers signals this Government's long term commitment to encouragement for renewables. Many of the projects which I have required to be contracted today will be generating well into the next century. We are now building renewable energies solidly into our future.

"Meanwhile, we are continuing to encourage renewable technologies not yet included in the NFFO scheme. I have already launched a consultative document on opening up NFFO in future to offshore wind energy. When I opened the British Wind Energy Association's conference in Cardiff I said that we hoped to see five or six projects initially. I also recently announced the first 16 out of 100 British schools and colleges to receive Government support under the SCOLAR scheme to install solar panels in their buildings."

The table summarises the cost and composition of NFFO-5.

Technology	Number of Projects	Capacity of Projects	Average Contract
	Contracted	Contracted	Price
		MW	p/kWh
Landfill Gas	141	314	2.73
Energy from Waste	22	416	2.43
Energy from Waste using CHP	7	70	2.63
Small Scale Hydro	22	9	4.08
Wind Energy exceeding 0.995 MW	33	340	2.88
Wind Energy not exceeding 0.995 M	1W 36	28	4.18
Total:	261	1177	2.71

Buyers' guide to clean fuel vehicles and suppliers

The Energy Savings Trust's Powershift has launched the UK's first buyers' guide to clean fuel vehicles (CFVs), engine suppliers and converters, called the Powershift Register. The Register should, says Powershift, create a recognised industry standard for clean fuel vehicle and suppliers, useful for managers thinking of buying or converting to CFVs.

Companies who apply for

inclusion in the Register will be graded on three selection criteria. The first is to ensure that the financial security of the company is sound. The second is to determine the level of experience of the company in supplying CFVs.

The third stage is to test specific information on safety and emissions for each CFV model. If these criteria are satisfied then the manufacturer's CFV will be awarded the Powershift Clean Seal of Approval and will be graded as either Band 0, 1, 2 or 3. Powershift funding levels will be set according to vehicle emissions banding.

Vauxhall is the first vehicle manufacturer to receive the Powershift Clean Seal of Approval for two models of their dual fuel cars. The manufacturer has received a grading of Band 3, in the Register, which provides for 75% of funding towards their extra purchase cost.

Powershift has also announced that it is to support its biggest ever single application for clean fuel vehicles, from Securicor Vehicle Management for funding for 170 transit vans to run on liquefied petroleum gas (LPG). The York-based Portasilo Ltd has won a contract with Merlin Gerin to supply and install eight custom-built PORTASTOR equipment housings for the London Electricity's (LE) supply to power the Millennium Dome in Greenwich. This is part of a larger agreement between LE and English Partnerships.

For the Dome, the steel housings are manufactured to fit Merlin Gerin's Genie switchgear. The housings are mounted on external steel support structures (five can be seen in the picture) and will eventually be contained within elevated services cylinders which will surround the Dome.



First 'carbon offset' gas tariff from Amerada

Gas supplier Amerada has launched an innovative environmental tariff to its domestic customers in the UK - the Climate Care Saver, thought to be the UK's first 'green' tariff for domestic gas customers.

The tariff has been launched in conjunction with the Oxfordbased Carbon Storage Trust (CST), a waste management organisation whose work involves replanting deforested and degraded sites around the world, to 'soak up' carbon dioxide produced by burning fossil fuels. In the longer term the Trust also plans to invest in renewable energy and energy efficiency projects as part of its carbon offset work. The tariff is offered to customers at the same competitive rates as Amerada's standard tariff but with a 0.119p per kWh supplement which goes to the CST to fund carbon dioxide offset projects. Amerada also makes a £10 contribution to the CST for every customer who signs up the tariff - providing additional upfront funding.

An early CST project is one in West Uganda - where a forest, prime habitat for chimpanzees and other important primates, is being replanted. The work of the CST is scrutinised by a steering committee of reputable environmental groups and eminent individuals.

New methane-fuelled power plant for colliery

Multi-utility Hyder and south Wales Tower Colliery are to work together on a £3 million project to build a on-site generating plant to enable the pit, the last deep mine in Wales, to produce all its electricity from naturally occurring methane gas at the pit.

"Reducing costs is very important for us to remain competitive, so this is an excellent scheme as it will slash our energy costs and add to the viability of the colliery," said Tyrone O'Sullivan, Tower's chairman. "At present, the methane gas is not being used, so in effect by harnessing it we will be producing electricity from free fuel - and it will be much cheaper than buying in power."

The generating plant will begin production early next year and produce 6.5 MW of power. Hyder will finance its construction by selling electricity to the pit for at least eight years, after which time Tower will have the option to extend the contract.

Methane gas is released by the process of mining coal and, because it is combustible, it is vented from the pit. It is similar in composition to the gas released naturally from domestic waste deposited in landfill sites, so landfill gas-to-power technology could easily be transferred to the Tower project.

Any surplus electricity will be fed into the local network.



New energy regulator Callum



Callum McCarthy will become Britain's first electricity and gas regulator from January next year, subject to legislation to amalgamate the regulatory regimes for gas and electricity. He has just taken up his post as Director General of Gas Supply and will also become Director General of Electricity Supply from January 1st. Both appointments will run until 31 October 2003.

The move reflects the gradual convergence of both the electricity and gas industries and their regulatory bodies, Offer and Ofgas.

Appointing Mr McCarthy, Secretary of State for Trade and Industry, Peter Mandelson, described Mr McCarthy as:"an

exceptional individual with strong track records both in business and government environments. He has the skills and the management experience to lead the merging of Offer and Ofgas, as well as to drive forward the process of establishing fully competitive energy markets - an important objective for the Government".

McCarthy, 54, is a graduate of the University of Oxford. He also has a PhD in economics from Stirling University and a MS from the Graduate School of Business at Stanford University (USA). He has 13 years' experience of working at the DTI, from 1972 to 1985, and was latterly with Kleinwort Benson, BZW and Barclays Bank.

Eastern targets 2,000 MW power station for FGD

Eastern Group, Britain's fourth biggest electricity generator, has signalled its intention to invest more than £100 million in flue gas desulphurisation (FGD) plant at the 2,000 MW West Burton power station in Nottinghamshire. The proposal is subject to a series of consents, and subsidiary Eastern Generation is to begin a consultation process with local planning authorities, the Environment Agency and other interested parties before submitting formal plans to the Department of Trade and Industry.

If plans are approved the plant will take around two-anda-half years to construct. The FGD process will remove at least 90% of the sulphur dioxide gas - the main cause of acid rain - emitted from the station' twin stacks, contributing to better air quality locally, nationally and internationally.

Eastern's largest power plant, West Burton power station was designed to burn British coal which has a relatively high sulphur content compared with imports. Fitting FGD will assist Eastern in meeting revised emission targets set by the Environment Agency and maintain the company's option to continue burning Britishmined coal.

Destined for FGD - West Burton power station



Hydro-Electric to merge with Southern

Restructuring of the electricity industry continues apace. Following PowerGen's acquisition of regional electricity company East Midlands Electricity this summer (see Energy World, September), the Boards of

Scottish Hydro-Electric and Southern Electric have announced a merger of their two companies to form 'Scottish and Southern Energy'.

The combination will, say the companies, create:

· one of the largest energy

supply businesses in the UK

an electricity supplier with net generation output of approximately 13.2 TWh in Scotland and 23.2 TWh in England and Wales by 1999/2000, and

electricity distribution

networks which together serve some 3.3 million customers.

The headquarters of the merged group will be in Perth. The new company will be one of the largest in Scotland and will enter the FTSE 100 index.

Metering aids

by Stephen England, Datum Solutions Ltd



Electricity liberalisation means more access to data and therefore better monitoring and targeting of energy use

One of the changes to the electricity market in 1998 is the ability of customers on half hourly contracts to nominate their own meter operators and data collectors. But meter operators can offer far more than that, argues Stephen England.

The primary objective of the electricity privatisation process was to increase competition and bring down prices. The ten years since the process began have seen prices drop steadily, but it remains to be seen how much further they will come down. There may still be yearon-year reductions to be won by going out to tender every 12 months, but increasingly the savings will be made through managing demand and consumption.

Customers using half hourly metering have been able to nominate their own meter operator since 1994. They can now also choose their data collector as well.

The meter operator is responsible for:

 supplying and installing the relevant meters, maintenance of the system, including repair,

 record keeping (these have to be kept by the meter operator for eight years).

Data collection includes meter reading and the various data processing tasks of validating readings and processing meter reading data for settlement, as well as communicating that data to relevant parties.

The settlements process in the 1998 market is more complex than before. It consists of two stages; the first is the setting of pool prices for each half hour. The second, subsequent, stage is the apportioning of all demand between suppliers and distributors following the receipt of actual metered data from the appointed data collectors.

TWO SYSTEMS

Until recently, the billing meter constituted the boundary between two quite distinct systems: the billing and settlements procedure on the one hand, controlled by the suppliers and generators; and the customer's premises on the other with its own monitoring and targeting (M&T) and energy management systems. On one side was the supplier and on the other the customer - and there was no overlap. However, the 1998 changes have now allowed these two regimes to overlap, with consequent benefits to the customer.

The data collected for settlements

purposes remains the property of the electricity supplier but, increasingly, customers want access to that data for energy management purposes. The customer will need to obtain the supplier's permission before he can use that data, but there is no technical reason why the data cannot be copied and supplied to the customer.

It should also be noted that customers will want access to the raw and unedited data. This may be different from the processed data supplied to the Pool for settlements. The form in which the material is used for settlements includes a number of adjustments which may not be useful in energy management. In addition, the raw data will give the customer a means of checking the bills and will provide the basis for any challenges over billing.

ENERGY MANAGEMENT

The most important use for the data, though, is as a management tool. It provides an accurate measure of total energy consumption which can be integrated into the overall energy management functions of the organisation. In particular, it can be used in conjunction with existing sub-metering and M&T systems to provide an accurate, overall picture of energy use on one - or many - sites.

The new liberalisation of the energy market means that a customer can now employ one metering specialist to undertake all metering and data related tasks. In the past, it was always possible to put an extra meter next to the supplier's meter to measure overall consumption. However, this was an expensive duplication of equipment and, if there were any discrepancies between the two meters, a long and often fruitless dispute could arise.

Under the new dispensation, only one meter is necessary and the data this

management

provides can be integrated into the energy management system to provide a single, total solution to metering requirements.

By having access to the raw half-hourly data, consumption figures become much more meaningful as well. Billing data has traditionally been supplied in arrears sometimes six weeks after the event. For energy management purposes, the data loses its value in direct proportion to the delay in receiving it.

Yet there is no reason why the half hourly consumption data from the main meter should not be available within 24 hours, especially if the meter operator and data collector are providing other linked metering services. All the data can be analysed and reports produced to a very short timescale, allowing much finer control over energy use. In addition, any problems arising in a plant or building will become apparent very quickly and effective, prompt remedial action can be taken - reducing the risk of heavy penalties through exceeding maximum demand for long periods.

CONTINUITY

There is a further benefit of integrating 'internal' and 'external' systems - that of continuity. Many businesses today go to the market every year in search of better prices for electricity and gas. If the supplier changes every year, what will happen about meter operation and data collection? Is this going to change every 12 months as well?

Meter operation contracts have historically been for five years duration, so the situation could arise where one supplier still has this contract while another supplier is providing the energy. If, on the other hand, the meter operator and data collector changes every year according to whoever is supplying power, there will be little continuity over the years: a new contract will have to be drawn up with both supplier and operators, and the flow of data may be interrupted - anathema for effective energy management.

The 1998 rules allow the customer to have a say in the metering services affecting their utility supply and consumption. By integrating all these services, an organisation can improve its energy management, cutting out waste and reducing energy bills still further. The accumulated data will also allow the customer to negotiate the best - and most cost-effective - supply agreement. Datum Solutions is the metering arm of the National Grid Group, which has over 50 years experience of developing and delivering metering technology and services. Stephen England can be contacted at Datum Solutions Ltd, Littlebrook Business Centre, Littlebrook Manor Way, Dartford, Kent DA1 5PS. Tel: 01322 295000.

Electrical energy storage systems - a bigger role in operational efficiency

The use of batteries, flywheels, fuel cell/electrolyser systems, SMES and capacitors for electrical energy storage is a rapidly maturing technology with the potential to help electricity users and suppliers meet both local and global targets for operational and energy efficiency. So said speakers at an international conference held in Chester this summer titled ESAT 98: Electrical Energy Storage Systems Applications & Technologies.

Keynote speaker Hans Jorgen Koch, executive director of the International Energy Agency (IEA) Office of Energy Efficiency, told 140 delegates from 15 countries that storage systems have an increasingly important part to play in achieving the Agency's aims of energy security and economic growth, together with environmental sustainability. "The role of energy storage is an example of new technologies which can be applied to increasing electricity supply system efficiency," he said, whilst urging greater international collaboration to develop and share technical progress.

Andrew Cross, Systems Division director with EA Technology, which hosted the event, added: "The main applications for electrical energy storage include power quality enhancement, integration with renewables, load levelling, spinning reserve and deferral of capacity.

"Storage technologies are rapidly coming out of the laboratory phase of development and proving their worth in real-world installations: but potential users and systems integrators still need clearer guidance through the minefield of matching the available storage technologies to utility network applications. Users need to understand the specific advantages and disadvantages of storage systems which include batteries, flywheels, fuel cell/electrolyser systems, SMES and capacitors."

Mr Cross said that among the key issues raised by the three day conference were the need to provide customers with more demonstrations of the benefits of storage systems through large-scale working installations and preparation for major research programmes coming up in the future.

Contact EA Technology for further details or a copy of the proceedings of the conference, tel: 0151 347 2323, fax: 0151 347 2178.

Advances in domestic metering 'delayed by uncertainty'

The meter under the stairs and the meter-reader with a torch date back to the turn of the century. Yet, in spite of massive advances in technology, the majority of domestic consumers in this country still have their electricity and gas meters read in this antiquated way. It is costly, unreliable, anti-social and - in rural areas in particular - ecologically undesirable, according to automatic meter reading company RMS Communications.

Reliable methods of remote, automatic meter reading have existed for several years, but only a tiny percentage of UK domestic consumers benefit from this technology.

Recent research reveals that uncertainty, cost and technology are seen as barriers to automatic meter reading (AMR) implementation, says RMS, and only half of Britain's electricity companies are currently considering AMR.

RMS has designed and developed an advanced power line communications system, PowerNet. The system provides reliable highspeed data communications on the electricity supply network, enabling utility companies to run their own applications and potentially to sell services to other companies. PowerNet successfully completed its benchmark commercial installation in Scotland in early 1997 and is now being introduced into the marketplace, says the company.

Originally developed in 1992, the system is either installed, or has been on trial, with twelve electricity companies in six countries around the world. RMS Managing Director, Mike Hosie, considers that the UK regional electricity companies are uncertain about almost all the key areas that would enable them to conduct a meaningful AMR investment appraisal. He says that the issues concerning cost and technology are only symptoms resulting from this prime concern of uncertainty.

He says: "The RECs are still unclear about many facets of the de-regulated marketplace. They are unsure about the future structure of their businesses; who will control which assets; which costs or benefits will be acquired by which company; even the areas of their businesses for which they will have future responsibility. They do not know whether or not they need solutions that are applicable to more than one element of their operations - distribution and supply business needs, for example.

"RECs are reticent to reveal their plans and make investment decision, and will remain so until they have a clearer picture of how the competitive market will settle over the next few years," he continues.

"In a joint study that we conducted with Jersey Electricity Company, it was found that they would achieve a payback within 8.8 years and an internal rate of return (IRR) after tax of 10% using our PowerNet power line communication system's basic features of AMR and load management. By implementing other valueadded services, such as data communications, monitoring services and e-mail, the payback period reduces to less than five years and IRR increases to 38%. And what could be simpler than using the existing electricity cable network to communicate directly between meter and supplier?" Mr Hosie concludes.

Optimising coal-fired power station start-up

National Power is using the US-based Gensym Corporation's intelligent G2 software in a new operator advisory system that assists in planning and carrying out startups at its coal-fired power stations. The 'Start-up Management System' (SMS), is designed to help achieve on-demand electricity supply at a minimum overall cost.

"The profitability of National Power's coal-based power stations is significantly affected by the cost and reliability with which their units can start up, shut down, and change load," says Alan Fricker, automation consultant at National Power. "The start-up period for a generation unit can vary from under an hour to several hours. However, the operator must always synchronise the unit to within plus or minus five minutes of the time specified by the National Grid company."

To meet this synchronisation requirement and ensure safe operations, SMS produces a schedule based upon the plant conditions predicted for the beginning of the start-up, which may be a few hours later. During the



actual start-up, SMS monitors the plant state and advises when operations should be carried out. It also continually reschedules using current plant data to meet the require synchronisation schedule.

The G2-based SMS has been in regular use at one power station for six months and is in the process of being installed at three other power stations in the UK.

East Midlands Electricity has replaced old oil-fired heaters at McKechnie Plastic Components' factory in Wragby, Lincolnshire, with electric short-wave infra-red units. Exposed to cold easterly winds, the factory was unsuitable for warm air heating due to its extensive glazing and low insulation levels, together with its high bay construction.

East Midlands installed a system of Quartzray short-wave infra-red heaters to heat specific locations within the factory. Ten 6 kW heaters, suspended from the roof apex, were installed, together with 30 smaller, wall-mounted units to warm operators at individual workstations. East Midlands says the new system has cut energy consumption by 70%.



Custom-build, dual-purpose resistor units from Cressall are helping to combat fluctuations in voltage demand on the National Grid Company's network at Iron Acton substation near Bristol. Based on the company's stainless steel expanded mesh elements, the resistor units have been incorporated into static VAR compensators (SVCs) where they serve the twin purposes of damping in the harmonic filters and discharging excess energy stored in the SVCs.

With a contract value of £155,000, the 27 Cressall units form part of three 60 MVAR SVCs supplied by Alstom T&D Power Electronic Systems. Each SVC incorporates nine convection-cooled stainless steel resistor boxes containing a filter resistor and a separate discharge resistor. The filter resistor dissipates the harmonic currents which may occur in the thyristor-switched capacitors of the SVC, while the discharge resistor dissipates any energy stored in the capacitor banks whenever the thyristor valves are blocked.

Microwave breakthrough for ceramics industry

A UK-led breakthrough in microwave technology is set to reduce energy consumption in the world ceramics industry by more than 70%, speed up production and cut waste, according to the developer EA Technology.

EA Technology - inventor of the halogen cooking hob - has developed a new type of kiln which uses microwave in combination with gas firing to produce tiles, sanitaryware, pottery and other types of ceramic products more efficiently. The system uses less than 30% of the energy of conventional processes, which rely on radiant heat from gas burners or electric elements alone.

Called MAGF (microwave-assisted gas firing), the technique has been developed into a fully-working commercial system during a four year programme headed by EA Technology and supported by a consortium of ceramics manufacturers from the UK, Germany, Japan and the USA. The programme is also being backed by the UK Department of the Environment, Transport and the Regions and a number of UK electricity companies.

"This is far more than a theoretical advance. We have thoroughly tested MAGF technology at full scale in a vast range of production conditions and it is now being built into a new generation of commercial kilns," said EA Technology marketing director John Walker.

The MAGF technique has solved the basic problem that has plagued ceramics producers for thousands of years - how to heat a pot, tile or component to a high uniform temperature without it cracking or deforming. Until now, the only firing technology available has been to apply heat to the surface of ceramics and rely on thermal conduction to reach their core, producing high temperature gradients and stresses.

By introducing microwave energy into gas-fired kilns to heat the centre of products directly, EA Technology has demonstrated that thermal stresses are dramatically reduced, together with the need for energy input.

"Our results show that the speed at which ceramics can be fired using MAGF, starting from cold and ending with a product cool enough to handle, can be accelerated by a factor of four. The finished products are of higher quality and have fewer failures than with conventional kilns," said Mr Walker. "We have consistently achieved savings in total energy input by more than 70% compared with conventional gas-fired kilns. Even allowing for the average price differentials between gas and electricity, that represents a cost saving of more than 40%".

EA Technology's claims are based on detailed figures derived from three prototype MAGF kilns built at its Capenhurst headquarters since 1994 and subject to intensive testing by the ceramics companies which make up the consortium. The latest in the series is a 15 m tunnel design, accurately reproducing large-scale commercial production conditions, using a combination of 900 kW from gas burners and 120 kW from microwave energy.

Commercial production of kilns using EA Technology's MAGF system has now started in the UK and is expected to accelerate rapidly worldwide.

Caterpillar dealer Finning (UK) Ltd has leased a Caterpillar 400kVA diesel standby generator set to Essex brewery, TD Ridley and Sons under an arrangement which has helped the brewer to safeguard its power supplies while keeping capital outlay to a minimum.

Greg Jephcott, managing director of TD Ridley and Sons, of Hartford End, Essex, commented: "Beer cannot be kept waiting. If we suffer a loss of power during the brewing process, the beer will get out of condition and will be wasted. Likewise, any delay in the bottling plant means that it becomes necessary to work overtime in order to fulfil orders. Both cost us money - or would without the standby generator. We also have effluent and waste disposal systems which could become a problem for us should we be forced to suspend them. In addition, like most modern businesses, we do not relish a power loss to our computers."



New compressors help Magnox purge costs



One of the two new compressors installed at Sizewell A

BNFL Magnox Generation has invested in two CompAir Demag Marathon rotary screw air compressors as part of an efficiency improvement programme at Sizewell A power station in Suffolk. The compressors will be used to purge reactor pressure vessels during outage periods.

The Demag compressor package offers Magnox the opportunity of repaying its capital investment in the first year of operation, says CompAir, as outage time, which costs Magnox £120,000 per day, could be cut by two to three days. In normal

operation of the reactor pressure vessel, carbon dioxide gas is used to transfer heat between the reactor core and boilers. When the reactors are closed down for maintenance work, the reactor circuit is purged with clean dry air

in order to allow inspection work within the pressure circuit to be carried out. Dry air is then continuously supplied during the shut down period to control moisture levels within the graphite moderated reactor core.

The two air-cooled, single stage compressors supply air for this task through a pair of absorption dryers and particle removal filters. A large air receiver from a proposed hydrogen plant that was never commissioned has been incorporated into the system. Reactor purging requires an air volume of 2,500 cfm at 7.5 bar pressure. The Marathons are rated at 1,540 cfm each and are fitted with the a micro processor control system for optimum performance.

Reactor maintenance work cannot start until the pressure vessel is sufficiently cool and purged of carbon dioxide gas. In previous outages this process has taken up to ten days. The new compressors will reduce outage time by enabling an improved reactor cooling rate to be achieved. The system will initially be run at full capacity to slightly pressurise the reactor core with dry air. This increase in pressure will improve the heat transfer rates between the reactor core and the pressurised air. In the remainder of the outage period the compressors will be used at reduced capacity, supplying dry air to maintain the required reactor moisture levels. Surplus air will be used for other needs such as breathing air.

Built 31 years ago, Sizewell A was originally projected to have a twenty year lifespan. However, it recently passed its thirty year inspection with flying colours. Electricity generation capacity is 420 MW.

Landmark project completed at Chernobyl

AEA Technology Nuclear Engineering and the Inter-disciplinary Science and Technology Centre 'Shelter' have completed a study aimed at finding ways of handling contaminated water at the Chernobyl Nuclear Power Station.

Rain water, snow melt and water used to keep down radioactive dust at the building which houses the damaged reactor become contaminated with actinides from nuclear fuel and cannot be treated in an ordinary liquid radioactive waste plant.

The study looked at ways the Ukrainians could pre-treat the water before it was sent to a plant and evaluated methods of treatment. It was supported by the British Government's Know How Fund (via the British Embassy in Kiev) which aims to transfer the best of British technology and expertise to Central and Eastern Europe.

AEA Technology Nuclear Engineering has been involved in operations to clean up the Chernobyl site since the accident in April 1986. The company is also a member of the European Commission's On-Site Assistance Team (OSAT) at Chernobyl and is helping with the specification and procurement of a plant for managing solid radioactive waste.

An integrated plan to deal with the problems of the Chernobyl site, including the one reactor still in operation, is underway. A new liquid waste plant must be built, a dry fuel store is needed and a solid radioactive waste treatment plant must also be constructed. The shelter over the damaged reactor is potentially unstable and must be made safe and measures taken to ensure the consequences would be limited if the shelter was to partially collapse. There is also a programme underway to bring the shelter into an environmentally safe condition in the long term.

Meanwhile, BNFL Engineering Ltd, as part of the International Chernobyl Consortium (ICC) which includes Morrison Knudsen and Ukrainian partners, has been awarded a multimillion dollar contract with the owner/operator of Chernobyl Nuclear Power Plant, EnergoAtom, to provide civil engineering consulting services on the Chernobyl Shelter Implementation Project (SIP). The SIP is a continuation of significant efforts, primarily by Ukraine, with international community involvement over the past 12 years.

Sellafield's Drypac waste plant under construction

The Sellafield Drypac plant (SDP) is being designed by BNFL Engineering Ltd, the engineering arm of parent company BNFL, from its offices at Salford Quays in Manchester. The plant will condition intermediate level wastes (ILW), stored on the site, and prepare it for ecapsulation in a form suitable for eventual disposal in a Nirex repository.

As a world leader in the development of high force compaction for both ILW and low level waste (LLW), BNFL has adopted drying and high force compaction in the SDP as the means of reducing the volumes of ILW requiring disposal. The burden of future disposal costs mean that the advance technology in SDP, an integral link in the overall strategy for disposal of ILW, will result in significant lifetime cost savings, says the company.

The Drypac plant, the biggest project undertaken on the Sellafield site since the flagship Thorp reprocessing plant, is currently under construction and scheduled to begin operations in 2002.

The flexibility designed into SDP means that it can co-process wastes from multiple sources. This results in high efficiencies by optimising plant throughput from increased feed availability. SDP is not reliant on other plant to deliver pre-determined quantities of waste. If one source is temporarily interrupted, the process feed can switch to optimise SDP's throughput. Similarly, any production fluctuations encountered at an encapsulation plant can be accommodated at SDP by a change in the plant's feed source.

The high force compactors used in BNFL Engineering Ltd's design will size reduce cans filled with ILW. The compactors are housed in shielded steel cells, connected directly with the drying cave. The use of steel enables the shielding thickness to be only 25% of the equivalent concrete thickness.

The need to shield operators requires maintenance to be carried out remotely from outside of the cell. Careful design has minimised the size of the cell, and compactor equipment within the cell. BNFL Engineering has located the hydraulic cylinders and pipework outside of the compaction cell allowing hands-on maintenance.

The main hydraulic cylinder provides the high compaction force. The ram compacts the cans while the compactor mould controls the diameter of the resulting puck.

A major contribution to the waste minimisation concept of SDP is the ability to mix compacted wastes from a variety of sources into the product drums. In order to comply with any potential Nirex specifications on the fissile content of the waste, it is necessary to ensure the contents of each drum is accurately recorded. A variety of control systems, including intelligent neural networks, track all wastes through SDP and ensure the most efficient, safe utilisation of product drums.

The core principle in the preparation of wastes for disposal is that they should be immobilised within a container. This is achieved in SDP by high force compacting cans loaded with dried waste into a physically robust package (a puck). Pucks are then permanently grouted into an outer product drum at a downstream facility. This multi-barrier concept provides the package with an integrity suitable for disposal in a Nirex repository. Nirex has accepted that the SDP product meets their requirements for drop tests and fire resistance and are compatible with transport arrangements.

C&I equipment for nuclear power plant in China

Siemens is to be involved for the first time in the construction of a nuclear power plant in China. The Siemens Power Generation Group (KWU) received the order to plan and supply almost the entire control and instrumentation (C&I) equipment valued at about DM 300 million for the Lianyungang nuclear power plant. Purchaser are Jiangsu Nuclear Power Corporation, Lianyungang, as the plant operator and China Nuclear Energy Industry Corporation, Beijing, as the importer.

The plant is being built by Russian companies and will comprise two units each equipped with a Russian-design VVER 1000 pressurised water reactor with an electrical capacity of 1000 MW.

At the end of 1997, China had an installed power plant capacity of 250,000

MW, of which around 75% are coal-fired, 24% hydro and 1% nuclear power plants. There are currently three nuclear power plant units with a combined capacity of 2100 MW in operation, a further eight units totalling 6600 MW are under construction.

Anti-corrosion specialists Corrocoat, based in Leeds, has completed a major refurbishment project on two ten foot diameter cast iron strainer wheels in use at BNFL Magnox Generation's Bradwell Power Station in Essex. The strainers are



used to filter incoming cooling water from the seawater estuary of the River Blackwater. Each has a rotor weight of eight tonnes and a shaft length of nine feet. The contract called for removal of the filter plates and all associated fixings. The exposed cast iron wheel framework was then gritblasted, pressure washed and inspected to ascertain the extent of the corrosion damage.

The prepared areas were then coated using Corroglass 200 series materials, Corrocoat's own flake glass filled polyester coating.

Energy recovery by drying and

by Abdullah Malik and Nigel Crowe, Entec UK Limited

Increasing environmental pressures mean that UK water companies need to find new ways to treat and dispose of sewage sludge. Here, Dr Abdullah Malik and Nigel Crowe describe a solution to be adopted by Northumbrian Water Ltd. The proposed sludge drying and gasification plant will, say the authors, have significant efficiency, cost, flexibility and environmental benefits.



Figure 1 - Drying plant with CHP integration

The European Union's Urban Waste Water Treatment Directive requires significant improvements in the treatment of sewage particularly from coastal and estuarial conurbations. Higher levels of treatment will inevitably result in increased volumes of sludge for disposal. Sludge production in the EU is expected to increase at least by 50% to the year 2005.

Within the EU, marine disposal of sludge must cease by the end of 1998. Forthcoming landfill directives are likely to further restrict sludge disposal options. Within the UK landfill gate fees have been rising well above the rate of inflation over the last decade. Additionally, a landfill tax has recently been introduced and a carbon tax may shortly be levied. Beneficial reuse of sewage sludge on agricultural land is seriously under threat while the National Farmers Union and the food retail industry debate what level of support consumers are prepared to give them for the continuation of this practice. The water industry is also showing a reluctance to pursue incineration strategies because of the difficulties with public perception and objections related to

atmospheric emissions.

This increasing weight of environmental, legislative and economic pressure is forcing UK water companies to provide new and innovative solutions for beneficial reuse of sewage sludge. What is needed is a change in the perception of sludge from that of an unwanted waste to a beneficial resource.

NORTHUMBRIAN STRATEGY

Entec, on behalf of Northumbrian Water Ltd (NWL), has carried out an economic appraisal of the technical options which resulted in a regional sludge disposal strategy. The conclusion of the study was that drying of raw sludge offered the greatest benefits in terms of security, environmental benefits and flexibility for material re-use.

Dried sludge can be used in a variety of ways, offering the flexibility to respond to changes in legislation, public perception and market opportunities. After further consideration, NWL and Entec opted to pursue an energy recovery strategy to utilise its dried product and minimise its reliance on external markets.

The preferred method of energy recovery selected was gasification using the Lurgi Ruhrgas (LR) process. As this was to be a novel application of a proven technology the project was eligible for financial support through the European Union Thermie programme and a Thermie grant of 1.4 million ECUs was awarded to support the conceptual and detailed design of the process in September last year.

SLUDGE DRYING AT BRAN SANDS

A simplified process flow diagram of the selected drying plant is shown in Figure 1.

The majority of the region's liquid sludge will be transferred to Bran Sands by ship. Ship-board pumps will deliver liquid sludge into a reception tank located adjacent to the jetty. Liquid sludge is then pumped via a 2 km pipeline to the storage tanks. Liquid sludge from the adjacent effluent treatment works will be pumped directly to the storage tanks. Road tankers can discharge into the storage tanks via a small reception facility.

From the storage tanks, the liquid sludge will be pumped to one of four strain presses. Any screenings discharged from the strain presses will be compacted and collected into an enclosed skip. The strained sludge passes forward into an intermediate buffer storage tank.

From the strained sludge storage tank, sludge is pumped to the belt presses. On average this can produce cake at a nominal 31% dry solids (ds). A single polyelectrolyte preparation and dosing system is provided to allow for the controlled injection of polyelectrolyte into the sludge upstream of each belt press.

The dewatered cake is fed into the drying circuit via the mixer/granulator where it is back-mixed with recycled dried product (comprising; fines, on-size product and/or crushed oversize material).

The material leaving the mixer/granulator is then fed into the rotary drying drum, with a co-current flow of hot dry gas. The drying drum comprises three

gasification of sewage sludge

concentric tubes, with lifting blades fitted on the inside walls of each tube. As the drum rotates, these blades, together with the flow of hot gas, gently move the solids along the drum in the same direction as the flow of gas - the blades repeatedly lifting the solids up the wall before it then cascades down again through the stream of hot gas.

This movement ensures intimate contact between the solids and the hot gas stream, which promotes the drying of the sludge. At the end of the third path, the dried granulates are carried out of the drier in the flow of warm gas. This gas stream is then drawn through a bag filter which separates the gas from the dust. The de-dusted gas then passes to a directcontact spray condenser.

The spray condenser controls the water balance of the drying loop, reducing the water content of the gas. This cooled gas is then reheated by feeding it into a direct-fired combustion chamber. Here it mixes with the flue gas that is generated by the burning of a conventional liquid or gaseous fuels. The gas mixture leaves the combustion chamber at about 450°C, and is then directed back into the feed end of the drying drum.

Dried solids leaving the water-cooled screw conveyor are screened to remove large lumps and fibrous material. A desired product size of between 1 and 3 mm diameter can then be passed forward to storage. If the quality of any product is deemed poor with respect to granulate, the product is then pelletised with a pellet size range of 4-12 mm.

This dried product is suitable for use as a fuel, a soil conditioner in agriculture, forestry and land reclamation and as a source of carbon in the manufacture of bricks.

ENERGY RECOVERY

One of NWL's key aims was to develop the potential for energy recovery from the dry sludge. After an initial economic assessment it was decided to develop a thermal gasification process. Entec initially looked at a number of gasification technologies and Lurgi Ruhrgas technology was judged to offer the following advantages:

- · high CV gas,
- · high net cold gas efficiency, and

• low carbon content in final residue. The long term aim is to gasify the full output of the drying plant and to fire a CHP plant with the product gas to produce electricity for the whole site and heat for the drying plant.

The plant currently on the drawing board is a demonstration plant which will take slightly less than half of the total dried product.

The fuel gas produced will be cleaned and compressed before being used to fire a nominal 5.6 MWe gas turbine. At the end of a successful demonstration phase, the plant will be fully integrated with the drying plant, supplementing the heat supplied to the drying plant by the existing gas turbines. This landmark project will be one of the first commercial applications of sewage sludge gasification in the UK.

THE GASIFICATION PROCESS

A schematic of the process is shown in Figure 2. This gasification plant will convert





dried undigested sewage sludge from the drying plant into electrical power and heat. The gas turbine generates electrical power either for on-site use or for export to the grid, with the exhaust heat being recovered for use in the sludge drying process

The electrical generation capacity of the gasification plant is based on a Solar Taurus 60 gas turbine generating a nominal 5.6 MWe. A wet NOx suppression system is envisaged utilising demineralised water injection. The overall generation efficiency is 28%.

The key process operations are described as follows:

Gasification

Dried, undigested sewage sludge is fed to the top of the gasifier using conveyors. The sludge is then fed in to the reactor where it intimately mixes with hot recirculated heat carrier (sand).

The sludge undergoes high temperature treatment at the optimum gasification temperature (nominally 850°C) to produce a medium calorific value process gas. This raw process gas leaves the reactor, is cooled and then cleaned prior to compression.

A mixture of the sand heat carrier and

residual char from the pyrolysis process flows from the bottom of the reactor into a char combustion system. This consist of a vertical pipe in which preheated combustion air is introduced. This pneumatically transports the sand and char up to a high level collection bin. Carbon in the residual char is rapidly combusted in this pipe, re-heating the sand heat carrier to around 950°C. The hot sand is collected in a high level bin. This allows sand to flow by gravity back into the reactor at a controlled rate.

Flue gas treatment

Flue gas and ash from the char combustion pipe goes through a cyclone, where ash is separated and removed. The flue gas may also contain traces of carbon monoxide, and so immediately downstream of the cyclone is a flue gas afterburner to burn out any residual combustion gases. The gas is then cooled and fly ash removed in a bag filter.

To meet the environmental emission limits on SO_2 , lime will be added in the bag filter to achieve the desired reduction prior to discharge to atmosphere.

Product gas cooling and cleaning

Raw process gas leaves the gasification vessel at approximately 850°C to pass through a primary cooling and treatment system. A direct water quench cooler is used which brings the gas temperature down to about 200°C. In this first cooling stage, volatile metals such as mercury are removed by addition of sodium tetrasulphide and adsorption of the resultant metal sulphide onto the dust particles in the gas stream. Heavy metals, alkali metals and tars in the gas stream will also condense and be removed with the dust and other particulates in a bag filter.

Following the first stage cooling and cleaning, the process gas is passed to a gas scrubber unit for further cooling and cleaning. A re-circulating aqueous liquor is used in the scrubber unit to cool the process gas to about 35°C. Light oils and naphthalene are condensed and the majority of water-soluble contaminants in the gas dissolve in the aqueous scrubber liquor. Some additional light oil may be added to the scrubber liquor to dissolve any naphthalene deposits and prevent fouling. Liquid effluent which leaves the scrubber unit is sent to a collection tank, where the light oils and naphthalene are separated from the aqueous fraction. The light oil and naphthalene are recovered and can be re-cycled back into the process.

The partially cleaned product gas is now suitable for compression, but not yet for fuelling the gas turbine due to the presence of residual trace contaminants in the gas. The partially cleaned gas is compressed through the first two stages of the compression island to raise the pressure to 7 bar. The compressed process gas is then passed through a contact scrubber, where a onepass, high pressure, water wash is used to remove residual chemically bound nitrogen compounds and halides.

Electrical power generation

The selected gas turbine requires fuel gas to be delivered at a pressure between 13.5 and 15.5 barg. It is proposed that a three stage reciprocating compressor rated at approximately 650 kWe will raise the fuel gas pressure from nominal atmospheric to that required.

The compressed process gas is delivered to the fuel gas regulator valve on the gas turbine. This will control the gas flow to allow the turbine to operate at the optimum power generation efficiency.

The gas turbine is a standard packaged unit with a nominal 5.6 MWe output at the alternator terminals. The combustor design will be modified to suit the anticipated fuel gas quality.

Exhaust temperature from the turbine will be about 500°C. It is envisaged that when the demonstration plant is integrated into the sludge drying plant, the majority of this heat will be recovered for use in the drying plant.

The turbine combustion system will be capable of running on process gas, natural gas or a blend of both.

Environmental impact

An environmental impact assessment has been done comparing the proposed scheme to a conventional landfill option. When all consequential elements are taken into account total emissions of greenhouse gases are significantly reduced by this drying or gasification approach. In addition a study has been undertaken comparing drying or gasification of sewage sludge to incineration, with the following conclusions.

A pragmatic approach was adopted, focusing on the key issue of pollutant partitioning. Following consultation with the Environment Agency the following potential pollutants were investigated: heavy metals (in particular mercury); sulphur; chlorine; dioxins; oxides of nitrogen.

Overall there is a distinct environmental advantage available through drying and gasification when compared with incineration. Indeed, gasification offers better environmental benefits in terms of lower oxides of nitrogen (NOx) releases.

It is also likely that dioxin emissions will be lower from a gasifier than an incinerator, as operating conditions in a gasifier facilitate the decomposition of dioxins.

The volumetric flow rates of emission streams associated with incineration are significantly larger than those associated with gasification. The cost of retrofitting pollution control devices to incineration processes will therefore be significantly higher than for drying/gasification processes.

Hence there is sufficient evidence to support the argument that drying and gasification is a more attractive option for processing sewage sludge than is incineration in terms of efficiency, cost, flexibility and environmental impact.

CONCLUSION

This project will produce electricity from a renewable resource and hence displace carbon dioxide emissions from fossil fuel power generation elsewhere. At 5.6 MWe, 13 million m³/year of natural gas will be saved. The project will also secure a long term outlet for using the dried product with a significant saving on landfill costs.

Indeed, sludge gasification offers a way forward with significant benefits for the water and others industries. Contact the authors at Entec UK Limited, Northumbria House, Manor Walks, Cramlington Northumberland NE23 6UP, tel: 01670 733777, fax: 01670 712806.

Ice cold heat: the fuel of the future?

By Dr Ben Clennell, School of Earth Sciences, University of Leeds

One paper presented at this year's British Association annual festival of science provoked much interest among energy people - it talked of a huge new undersea energy source. An edited version appears below.

Properly called gas clathrate hydrates, gas hydrates are naturally occurring compounds in which cages of hydrogenbonded water molecules trap small gas molecules in an ice-like structure. Gas hydrates form at high pressure (greater than 50 atmospheres) and low temperatures (0 to 25°C) in the presence of enough gas and water molecules to stabilise the clathrate lattice.

In nature, methane is by far the most common gas, along with carbon dioxide and some other hydrocarbon molecules like ethane and hydrogen sulphide. Other gases such as nitrogen, chlorine and xenon will also form water clathrates.

Hydrates pack a lot of gas. One cubic metre of ice-like hydrate will release 160 m³ (a large room full) of gas when it melts.

There are various ways to calculate the amounts of hydrates present globally, although at present the results can vary wildly. Even with a conservative estimate, there is enough methane locked into hydrates worldwide to exceed all known conventional fossil fuel reserves.

Gas hydrates can form in gas transmission pipelines, where they present a safety problem, and beneath the seabed where natural gas has migrated from depth, or methane is generated in the sediments by bacteria.

The cold, deep-water conditions require for this extend over much of the ocean floor, but submarine hydrates are generally restricted in occurrence to parts of the continental margins between 500 and 3,500 m water depth associated with sediments having an appreciable amount of buried organic matter. Even these conditions are met over millions of square kilometres of seabed in both high and low latitudes, including much of the continental slope of the North Atlantic. Gas hydrates can also form in permafrost regions above conventional gas fields.

WHAT USE ARE GAS HYDRATES?

Obviously, as a source of fuel: methane burns with a clean flame to produce only water vapour and carbon dioxide. New catalysts have been developed in the past few years that make the conversion of methane into other useful and more transportable fuels, particularly methanol, much more efficient.

Clathrates have also been suggested as a safer and more economical means of transporting natural gas from conventional gas fields to the marketplace.

When gas hydrates form, any salt in the water is excluded, just like ice. Unlike ice, the freezing can take place well above zero degrees, given the correct mix of gas and a reasonable pressure. Experimental plants have been built to exploit this property for desalination in Middle Eastern countries where gas is often cheaper than water.

Gas hydrates are a major geological part of the carbon cycle that previously we had limited to the atmosphere, oceans and biosphere.

ARE HYDRATES A GOOD THING?

Not entirely. There is a downside as well. Methane is a powerful greenhouse gas (ten times more potent than carbon dioxide, molecule for molecule). Widespread melting of submarine and arctic gas hydrate has been suggested as a contributor to major episodes of climate warming in the geological past. Perhaps global warming will be accelerated if our present subsea, and especially, subarctic hydrates melt and release their trapped gas to the atmosphere.

Also, gas hydrates beneath the seabed may melt during drilling for oil and other submarine engineering operations. The gas produced can cause the structures built on the sea floor to become unstable. While circumstances could occur where hydrates pose a hazard to seabed installation, it should not be over-exaggerated because a large amount of heat is required to melt the hydrates and release the gas. However, there could be a risk from the gas itself if it reaches the sea surface and ignites.

WHAT HAPPENS NOW?

The history of hydrates research is a series of false dawns. The massive amount of hydrate present has to be set against the impossibility, at present of doing anything useful with it. The US Department of Energy has periodically pumped large sums of research money into the question, and most oil companies have looked at the promise and risks of gas hydrates at one time or other.

In the past couple of years, interest in hydrates worldwide has really taken off again.

Major oil companies do not yet view hydrates as a target because they tend to be dispersed in fine-grained impermeable sediments and, so far, there are no practical techniques developed to exploit them. That is, they are a bit like gold - not much use unless it is in a rich vein. To get them out we need to melt them with heat, dissolve them with chemicals, and drop the pressure down the hole and wait for them to melt. Conventional gas is still plentiful and cheap so commercial exploitation of gas hydrates is not going to happen tomorrow. First we will see hydrates used to top up gas resources when they occur close by.

Research in Europe has focused more on concerns over the role that gas hydrates may play in causing major submarine slope failures and, when the gas is released to the atmosphere, in triggering very rapid periods of global warming. Hydrates may also be of benefit in this regard and offer a way to lock away atmospheric carbon dioxide in the deep ocean. Other scientists from a range of disciplines are investigating all aspects of the system because clathrates play a vital role in the biological and geological carbon cycle.

So far, evidence suggests that we are fairly safe for the time being, the record of climate change in the ice cores does not point to gas hydrates as being a major element in global warming, but we cannot rule out a role for them either.

A year in industry - invaluable for building a career

Last October's issue of Energy World included a report on the Year in Industry scheme, in which students defer their first year at university for a placement in industry. In this issue, we revisit the scheme and describe the work carried out last year by three students.

Supon academic success to guarantee employment, says a leading skills provider. Brian Tripp, National Director of The Year in Industry, said: "An academic qualification is no longer sufficient on its own to demonstrate 'employability'. Instead, recruiters are looking for students who can show that their academic knowledge is supported by handson experience - equipping them with the necessary skills and expertise to succeed in the workplace."

This view is supported by the Institute of Employment Studies, whose report What Graduates do Next? revealed that graduate 'ability' was becoming increasingly more important than academic success.

Mr Tripp said: "This is one of many reports which highlights the importance of industrial placements, yet the provision of such opportunities, by universities, is still limited. Undergraduates who are not provided with a placement, or do not have the support to arrange one themselves, are at an instant disadvantage in the graduate recruitment market - no matter how high their academic qualification."

A survey completed by the Association of

Graduate Recruiters in 1997 revealed that employers expect candidates to have a wider range of skills, adding that qualities such as motivation, enthusiasm, interpersonal skills and the ability to work as part of a team are becoming increasingly important.

The report also said that whilst these skills can be discussed in the lecture theatre, they are best practised and developed whilst in the workplace.

The Year in Industry, the single largest supplier of gap-year industrial placements, is providing more than 800 students with the opportunity to work in some of the UK's top companies in 1998/99.

The three case studies printed here illustrate the variety of work carried out by students on the scheme.

Civils work for a power station drainage scheme

When Robert Wilson

decided to take a year out before entering university, he had no idea that it would shape his career to such an extent. "The experience has been

unbelievable," he said. "I was hesitant about taking a break prior to university as I had heard of people wasting their time and then finding it difficult to return to their studies. I wanted an experience that was going to develop my skills, widen my horizons and open my eyes to the real world."

Robert applied for, and was successfully accepted, by the Year in Industry and spent his year with the National Power at the 4,000 MW Drax Power Station, seconded to the Technical Support Group,

enabling him to experience the civil engineering work required to maintain a large power station.

Robert's main project was to modify part of the drainage system as it was felt that he had the ability to handle this task.

He had to familiarise himself with the problems associated with driving work from the design stage; through the



tendering process; to eventually managing the contractors whilst the work was being completed.

"It was a fantastic experience - and something that would have been difficult to learn in a lecture theatre," said Robert. "Reports had already been completed on the effectiveness of the drainage system; however, it was up to me to identify where and why the current problems occurred and ensure that this was addressed as quickly, efficiently and costs-effectively as possible."

This meant that Robert had to complete a personal investigation and field analysis of the coal stock draining system with the assistance of the civil clerk of works. He then went on to work with the civil engineering consultant to develop a series of working drawings.

"I must admit that I was slightly hesitant about working with such highly qualified people. Yet this in itself was a great experience, providing me with an opportunity to meet and work with people of different engineering disciplines. It also meant that my communication skills were

enhanced, as was my confidence."

He was also responsible for writing the technical specification, producing the tender document, managing the contract paper work and controlling the budget. "I can honestly say that compared to my friends who went straight to university, I feel far better equipped to handle a job, manage people and see a project through from start to finish.

Optimising nuclear refuelling with 'radial shuffling'

Graham Creeth spent a large proportion of his twelve months with Nuclear Electric at Barnwood on a project involving an economic appraisal and optimisation study of the fuelling process of Nuclear Electric's Advance Gas Reactor power stations. One particular mode of refuelling, so-called 'radial shuffling', had been introduced at the power stations within the last few years, and its economic value and best way to use it was somewhat uncertain.

The role given to Graham was to take a strategic point of view of radial shuffling, and to bring together data and information from several different sources. Graham obtained data about the actual timings and costs of refuelling from the power stations, and about the generation costs and fuel charges from the company's finance group, and other data from various departments. This involved establishing rapport with a wide variety of people, often remotely, using telephone and fax.

Graham also rationalised the key data to develop an economic model of the radial shuffling process. This was worked and reworked several times as new factors and data were incorporated, so the efficient handling of data and the choice of the right modelling

Promoting the worldwide use of video-conferencing

Year in Industry student Alexis Biller was seconded to Esso. "The company invokes a large corporate image, as expected of a multi-national oil company. Interestingly, working from the inside I saw a smaller image. Sites in other countries seemed far closer, nothwithstanding different time zones, probably because of the ease of travel and telecommunications technology which now facilitate links between people globally. This view was significantly influenced by good company ethos, company spirit and great team skills. The new environment encouraged personal development and was a great learning experience".

Alexis' main assignment was to investigate the way video-conferencing was managed and to recommend operating improvements. Esso launched its first videoconferencing facility in 1995.

However, when he took up the assignment Alex found that the facility was under utilised. By talking extensively to current and potential users, he discovered that many people were not aware of the benefits of the system, some were not even not aware of its existence and many did not know how to operate the equipment.

Alexis takes up the story: "There was a need to dispel fears of using the technology, so I produced a user guide written in simple terms which leads the user through the various steps of organising a video conference and using the controls and facilities available to best effect. I also organised training sessions for staff and made changes to the layout of the video suite to improve ergonomics.

"I proposed new administration procedures which were standardised across all sites, and organised a new technical support function so that most technical problems can be resolved by people with little or no previous knowledge. Finally, to publicise the changes, I put all the video conferencing information on the company intranet site and got a double page spread in the Esso house magazine".

As a result of Alexis' work, interaction between sites began to increase and a few months down the line user satisfaction is greater and reliability improved. Now the once revolutionary method of conducting international meetings has become a firm favourite with a growing number of employees.

Reflecting on his year, Alexis confirms: "The benefits were numerous and became more apparent as the year progressed, particularly interpersonal skills and maturity. The year has given me increased confidence, mostly in communication skills and dealing with other people and it has allowed me to find likes and dislikes of the workplace. I would not hesitate to return or to advise other students to do as I did". tools was also successfully achieved.

The other major obstacle that he had to overcome was to produce a company report that is technically authoritative and persuasive, such that the conclusions of the analysis would be incorporated into the operating strategy of the company's power stations. This involved many re-workings of a report, taking into account comments from technical managers at the stations and headquarters. It is too early to say how effective the work has been in helping to optimise the reactor refuelling strategy, but the potential gains are of the order of millions of pounds per station per year.

THE YEAR IN INDUSTRY

The Year in Industry provides students with a year-long industrial placement before entering university. It is the single largest provider of gap year industrial placements and this year is giving a record 800 students the opportunity to gain paid hands-on experience.

Placements span a wide range of industries from bio-technology to transportation, and include a range of employers within the energy industries. It provides students with an opportunity to try their hand at a career and decide if it is something they wish to pursue.

The Year in Industry offers a structured industrial placement which not only provides experience but pays them for participating. Students receive $\pounds140$ a week for working on a full-time basis between September and July.

A recent survey of the scheme's first 500 students indicated that 67% achieved a first or upper second degree - compared to the national average of 48%. Additionally, 72% were in permanent employment within six months of graduating against a national figure of just 30%.

The scheme has been in operation since 1986 and to date more than 3,000 students have taken part. Contact the Year in Industry, University of Manchester, Simon Building, Oxford Road, Manchester

y2k Utilities Group getting ready for the millennium

The smooth operation of modern life as we know it in this country depends heavily on the four utility sectors: electricity, gas, telecoms and water. Understandably there is great interest in how the year 2000 is being tackled by the companies who provide these services. Who wants to know varies from directors of multi-national businesses trying to ensure that their company will be able to operate in the early part of year 2000 to an individual, who wants to know they will not get up after the celebrations to a cold and dark house.

The y2k Utilities Group was formed in June of last year by a small number of companies and since that time has grown so that today, we represent over 40 of the companies who provide utility services to the UK. We are a sub-group of the UK Year 2000 Interest Group who review, share and develop best practice on the year 2000 and which consists of over 220 member companies including a significant number of the Times Top 100.

Utilities are very experienced in their business of maintaining a 24-hour a day service as a matter of normal activity. The primary objective of each member of the Group is to ensure there is no material disruption of this safe and continuous service to our customers - in other words to make the first days and weeks of the new millennium the same as today and tomorrow in terms of utility supplies. In order to do this we share information to assist in the successful completion of the major individual year 2000 programmes that all our member companies are running.

All these programmes have key milestones and deadlines endeavouring to ensure the readiness of critical systems and the development of additional contingency plans within each ember company. A number of significant milestones have already been achieved e.g. inventory development, business impact assessment etc., with testing

Y2K - the end of the world as we know it?

One thing is for certain, there is no shifting the deadline for dealing with the Y2K problem or the millennium bug. Many people, particularly in the US, foresee catastrophe and claim that it is already impossible, given the number of programmer-hours available between now and then, to fix the problem in time. Others describe Y2K as merely a mediumsized management problem with an immovable deadline, but no-one is predicting a 100% success rate in making computer systems compliant.

One area being worried about is essential services like energy supplies. The main problem is the uncertainty. While plenty of effort is going in to fixing the problem, no-one can be sure which systems will fail on or after 1st January 2000. And, given Britain's inability to cope with the first snowfall of each year without seizing up, how are we going to cope with a random collection of small failures, each adding to the confusion? Given the interconnectedness of communications systems, the situation in other parts of the world is bound to impact over here too.

One group which has started work in earnest is the y2k Utilities Group, an offshoot of the UK 2000 Interest Group, which kicks-off Energy World's coverage of the Y2K problem on this page. We will return to the subject regularly during 1999. If any reader has specialist knowledge which they would like to share, please contact the editor.

well underway.

Whilst it is essential that each company ensure that its own house is in order, that is not enough. Each of the four utility sectors has a critical dependency on the other three. It is because of this criticality that our Group exists; a joint approach to addressing the year 2000 problem is required if each of the services are to be delivered. We are now working together to ensure that the value of our efforts is greater than the sum of our individual parts.

Although we still have a large amount of work to do, and whilst we will remain in contact with each other until past the Millennium, we have to date achieved a great deal as a Group. One example of this is that we have developed ways of examining the interdependencies between member companies which enables the relationships between key sites and the services they use to be modelled. This enables us to identify areas of risk, address the problems and make appropriate supplementary contingency plans, just in case anything should go wrong.

You might ask 'why are we working together in this way?' The answer is simple.

The viability of each company depends not only on that company achieving year 2000 readiness, but on each utility sector doing the same. Each company and sector has a role to play and each is dependent on the other. By combining our efforts though the y2k Utilities group we maximise our confidence in individual and collective success. The Group is also working with other bodies such as Action 2000, the Electricity Association and Water UK so that time is not wasted in duplicated effort to reach the common goal.

We offer no guarantees that we will be 100% successful, but then we don't know of any business, who fully understands that nature of the year 2000 problem, who can. What we do guarantee is that we are all fully committed and working extremely hard to achieve readiness, understand fully the additional risk posed by the year 2000 and maintain normal levels of service. After all, we want to be in business beyond the year 2000 and nurse the after-effects of the biggest celebration of the millennium in warmth and comfort, just as much as you do. **Contact the Year 2000 Interest Group via www.open.gov.uk/year2000**

Fireineering

Raising the profile



New Director General of the Engineering Council, Malcolm Shirley.

On this, my first occasion of contributing to your Institution journal since becoming Director General of the Engineering Council, I sense that the profession is facing a period of considerable challenge and great opportunity. The biggest challenges are to raise the public profile of engineers and engineering, together with ensuring that more young people of the highest calibre choose engineering as a rewarding career. Arguably the opportunity to achieve this is greater than ever before.

Both of these objectives are inter-linked, of course, and it is clear that no single organisation on its own can successfully bring them about. It is only by combining resources that we in the profession - and the wider engineering community - can hope to succeed. The best way to achieve this is with unity of purpose and clear dialogue, particularly between the Engineering Council and the professional Institutions which it serves.

If the British economy, both

industry and commerce, is not to face damaging skills shortages, the profession must ensure that not only are the best youngsters attracted to engineering, but that their education and training are second to none in order to prepare them for what undoubtedly will be a world of increasing technological emphasis and challenge. This is why raising the profile of engineering and ensuring the profession is widely recognised as an exciting and well-paid career are so essential.

There is a full agenda of proposed and committed programmes to demonstrate engineering's contribution to national wealth creation and the well-being of the public. The most far-reaching if these is the proposed National Marketing Campaign, which is being developed by a major communications agency for a joint venture partnership comprising the Engineering Council, the Engineering Employers' Federation and the Engineering and Marine Training Authority. This campaign will use the power of television commercials and other national advertising to target young people and those who influence them. It is planned to be longterm - but its success will depend upon the strong support of industry.

Driving these initiatives is the realisation that, for UK engineering to remain world class, the brightest and most talented of children and students must be fired with the challenge and excitement of what an engineering career can offer.

Chartered and Incorporated Engineers

Last year's Standards and Routes to Registration (SARTOR 97) increases the standards for registration as a Chartered Engineer (CEng) or Incorporated Engineer (IEng). In particular, Incorporated Engineers now need an accredited three-year degree or equivalent qualification so that, in future, there will be two kinds of graduate professional engineer.

Because of this, the question is frequently and increasingly asked, 'What is the difference between CEngs and IEngs?'

The brief definitions given below outline the typical job roles and responsibilities of CEngs and IEngs. These have now been approved by the Engineering Council. Any queries and comments may be addressed to the Director for Engineers' Regulation at the Engineering Council, 10 Maltravers Street, London, WC2R 3ER (e-mail staff@engc.org.uk).

Chartered Engineers are concerned primarily with the progress of technology through innovation, creativity and change. They develop and apply new technologies; promote advanced designs and design methods; introduce new and more efficient production techniques and marketing and construction concepts; and pioneer new engineering services and management methods. They may be involved with the management and direction of high-risk and resource intensive projects. Professional judgement is a key feature of their role, allied to the

assumption of responsibility for the direction of important tasks, including the profitable management of industrial and commercial enterprises.

- Requirements: • 4-year accredited MEng degree, or
- 3-year accredited BEng(Hons) degree plus 1year postgraduate learning (Matching Section) and appropriate Initial Professional Development (training and experience) followed by a Professional Review with Interview

Incorporated Engineer act as exponents of today's technology and, to this end, they maintain and manage applications of current and developing technology at the highest efficiency. Incorporated Engineers require a detailed understanding of a recognised field of technology, so they can exercise independent technical judgement and management in that field. They provide, independently and as leaders, a significant influence on the overall effectiveness of the organisation in which they work, often in key operational management roles.

Requirements:

- 3-year accredited engineering degree, or
- 2-year Higher National plus
- I-year additional learning (Matching Section) and appropriate Initial Professional Development (training and experience) followed by a Professional Review with Interview.

EVENIES

November 1998

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Y2000 compliance Seminar, 17 November, Chester, £250 + VAT Details from EA Technology Ltd, tel: 0151 339 4181, fax: 0151 357 1581

Electricity '98 - strategies for success in a competitive market Institute of Economic Affairs Conference, 17-18 November, London, £849 + VAT Details from Business Seminars International, tel: 0171 490 3774, fax: 01424773334

Oil & Gas PetroTech Exhibition, 17-19 November, Amsterdam Details from Amsterdam Rai, tel: +31 20 549 1212

Dynamic insulation

in practice Seminar, 18 November, Callander, Scotland Details from Gaia Research, tel: 0131 558 7227, fax: 0131 558 7337, e-mail: gaiagroup@aol.com

The technology of steam Conference, 18 November, Warwickshire Details from the Combustion Engineering Association, tel: 01222 555833, fax: 01222 553181

Generating power in India Conference, 18-20 November, New Delhi Details from IBC Conferences Ltd, tel: 0171 453 5491, fax: 0171 636 6858, e-mail: cust.serv@ibcuk.co.uk Energy policy - time for modernisation? CHPA conference, 19 November, London, £260 + VAT Details from Pamela Rudolph, tel: 01403 785409, fax: 01403 786189

European and North African LPG

Conference, 19-20 November, London, £999 + VAT Details from SMi, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: customer_services@smiconfer ences.co.uk

Competition, unbundling and international opportunities Institute of Gas Engineers

conference and exhibition, 23-24 November, Manchester Details from IGE, tel: 01670 514617, fax: 01670 514617

European electricity forum

Conference, 23-24 November, Amsterdam, £795 + VAT Details from dmg Business Conferences, tel: 01737 855380, fax: 01737 855283

Fuel cell technology for power generation Conference25-26 November, London, £899 + VAT Details from IRR Ltd, tel: 0171 8505055, fax: 0171 850 5056, email: registration@iirconferences.com

The consequences of localising energy production Conference, 26-27 November, Brussels, ECU 400 + VAT Details from COGEN Europe, tel: +32 2 772 8290, fax: +32 2 772 5044, e-mail: cogen_europe@compuserve.com

Practical ways to save energy

Course, 27 November, London, £290 + VAT Details from Mid Career College, tel: 01223 880016, fax: 01223 881604, e-mail: courses@mid-careercollege.ac.uk

Solar power - local opportunities for the 21st century Conference, 27 November, Milton Keynes, £90 Details from the Solar Energy Society, tel: 01865 484367, fax: 01865 484263,

e-mail: uk-ises@brookes.ac.uk

The fundamentals of the international coal industry Course, 30 November - 3 December, Surrey, £2175 + VAT Details from CoalTrans Conferences tel: 0171 779 8945, ax: 0171 779 8946, email: shouchin@euromoneyplc.com

December 1998

Climate change impacts on buildings Workshop, 2 December, Watford Details from the BRE, fax: 01923 664688

NEMEX 98

Energy management exhibition and conference, 2-3 December, Birmingham. Details from Inside Communications, tel: 01732 464154, fax: 01732 464454 Operating, maintaining and refurbishing overhead lines Course, 2-3 December, Chester, £696 + VAT Details from EA Technology, tel: 0151 347 2557, fax: 0151 347 2178, e-mail: events@eatl.co.uk

Global electricity forum

Conference, 4 December, London, ££949 + VAT Details from IBC UK Conferences, tel: 0171 453 5491, fax: 0171 636 6858, e-mail: cust.serv@ibcuk.co.uk

Microwave and radio frequency heating Course, 7-8 December, Cambridge Details from Dr AC Metaxas at Cambridge University, tel: 01223 332680, fax: 01223 332662, e-mail: acm@eng.cam.ac.uk

South American oil and gas industry Conference, 7-8 December,

London, £949 + VAT Details from IBC UK Conferences, tel: 0171 453 5491, fax: 0171 636 6858, e-mail: cust.serv@ibcuk.co.uk

Climate change impacts on buildings Workshop, 8 December, Watford Details from the BRE, fax: 01923 664688

Embedded generation Conference, 8-9 December, London, £899 + VAT Details from IIR Ltd, tel: 0171 850 5055, fax: 0171 850 5056, e-mail: registration@iirconferences.com



Branch events

NOVEMBER 1998

LONDON & HOME COUNTIES

Thursday 12 November, 6.00pm Visit/talk "Energy Centre Developments at Guinness" at Guinness, Park Royal, London. Speakers: Mickey Rooney & Tim Dumenil of AHS Emstar. Contact Mr PM Johnson, tel: 01793 893330

NORTHERN IRELAND

Wednesday 18 November to Thursday 19 November, all day Energy Show 1998. Meeting with IRR members (time to be confirmed). Burlington Hotel, Dublin. Contact Dr P Waterfield, tel: 01232 364090 email: p.waterfield@ulst.ac.uk for more details

YORKSHIRE

Wednesday 18 November, 2.30pm

'Energy from Waste' - Dr Paul Williams from Leeds University. To be held at Dept of Chemical & Process Engineering, University of Sheffield. Contact Mr A Mallalieu, tel: 0113 276 8888

NORTHERN IRELAND

(Date and venue to be confirmed) Committee Meeting & talk on Northern Ireland Electricity Green Tariff. Contact Dr P Waterfield, tel:01232 364090 email: p.waterfield@ulst.ac.uk for more details

SCOTTISH

Wednesday, 25 November, 7.00pm "Engineering Your Future". Joint meeting with the Institute of Chemical Engineers, at BP Chemicals, Grangemouth. Contact C Boyd, tel: 0141 270 7060

DECEMBER 1998

YORKSHIRE

Wednesday 2 December, 7.30pm Site visit to AHS Emstar CHP Plant supplying Leeds General Infirmary and Leeds University. Contact Mr A Mallalieu, tel: 0113 276 8888

LONDON & HOME COUNTIES

Wednesday, 2 December, 6.00pm. Brunel University, Uxbridge. Award winners for 1997

Intertek Testing Services Awards a paper presented by Prof N Ladommatos. Contact Don Barber, tel: 01494 783142

MIDLAND

Thursday 3 December, 7.00pm Austin Court, Cambridge St. Refreshments available from 6.30pm.

"Energy Savings from Compressed Air Systems" -Eric Harding from Air Technology Ltd. Contact Mr H Freeman, tel: 0121 353 2397

LONDON & HOME COUNTIES

Thursday 10 December, 6.00pm "Energy in Newspapers"- Karl Smdstad, Operations Director at Aylesford Newsprint. Contact Mr PM Johnson, tel: 01793 893330

SOUTH WALES & WEST OF ENGLAND Wednesday 16 December, 6.30 for 7.00pm.

Joint IoE/IGE Quiz Night, Lecture and Dinner (£8.50 per head) at Harry Ramsden Restaurant, Cardiff Bay. Contact Dr I Weslake Hill, tel: 01222 757527

JANUARY 1999

MIDLAND

Thursday 7 January, 7.00pm Austin Court, Cambridge St. Refreshments available from 6.30 pm. "Energy in Transport" - Dr John Butson from ECOTEC Research & Consulting Ltd. Contact Mr H Freeman, tel: 0121 353 2397

SCOTTISH

(Date to be confirmed) Site visit to Blantyre Mini Hydro Plant. Contact Mr C Boyd, tel: 0141 270 7060

FEBRUARY 1999

MIDLAND

Wednesday 3 February, 6.30pm Birmingham Chamber of Commerce, jointly with CIBSE. Refreshments available from 6.00 pm."Energy Management converting energy information into lower costs". Alan Aldridge, Sales Manager, Energy Auditing Agency Ltd, (TEAM Software). Contact Mr H Freeman, tel: 0121 353 2397

LONDON & HOME COUNTIES

Thursday 4 February, 6.00pm "Sugar, Coal, Heat & Power" -Steve Daldry, Engineering Manager at British Sugar, Ipswich. Contact Mr PM Johnson, tel: 01793 893330

Merry Christmas to all members

The offices of The Institute will be closed between 24th December and 4th January 1999.

Here's to a prosperous and peaceful 1999 for all.

Can we Proposition You?

The Membership and Education Team wishes to compile a list of members within each branch who are willing to act as proposers for prospective new members.

If you are prepared to have your name and contact telephone number added to the list of possible proposers, please contact the Membership team on 0171 580 0077 or email membership@ioe.org.uk

Partnership practicality for the wasteful workforce

It is essential for

organisations who want to improve their environmental performance to train the management, but managers represent just 10% of the workforce. It is often the Environmental or Energy Manager who has a duty to encourage everyone in the organisation to waste less and work more efficiently with regard to resources, but the delivery of the message is not easy. The Environmental **Technology Best Practice** Programme at ETSU is working with the Amalgamated Engineering and Electrical Union and The Institute of Energy to provide several workshops on a 'partnership' approach to waste reduction and energy efficiency.



Presenting the Partnership Approach, Maria Adams, IoE and Marian Beaver, ETSU explain how!

The workshops are part of a recent initiative to encourage the entire workforce to contribute to an energy and waste saving strategy by analysing their working practices in terms of



A partnership team from Air products UK Ltd, Wrexham

resource use. Everyone is encouraged to adopt a more holistic approach to working practices resulting in better environmental performance and reduced costs. Consequently the event

comprises short presentations on energy efficiency and waste reduction followed by practical exercises supported by two waste-saving guides and a workbook. Free copies of 'Everyone's Guide to Saving Energy & Reducing Waste' are available from Maria Adams at the Institute. tel; 0171 580 7124, fax: 0171 580 4420, email: madams@ioe.org.uk

Institute approves energy management foundation course



The four week Energy Management Foundation Course offered by Energy and Environmental Training Services Ltd. was one of the first external short courses to receive Institute of Energy approval, back in May 1996. In August 1996, the DfEE granted funding under Schedule 2A, for the foundation programme, following an application made by the Institute, as the awarding body for the qualification. On 24 August 1998, a panel from The Institute made a return visit to EETS Ltd. in Halifax to re-assess the revised modular energy management foundation programme, prior to its re-submission to the QCA for external funding. During the visit, the panel was able to meet the students and view their work and assessments, meet the staff and tour the facilities. The panel concluded that it was satisfied with the quality of the programme and its delivery.

Further discussions between EETS Ltd and The Institute of Energy resulted in an agreement that students successfully completing the four week foundation course being able to enter into membership of The Institute, gaining access to its range of services and benefits that can aid career progression, including the advanced level energy management programmes such as TEMOL.

Companies wishing to obtain more information about Institute of Energy approval of their workshops, conferences, short courses or training programmes should contact the Membership and Education Manager, Tracey Fisher on tel: 0171-580 007 or email tfisher@ioe.org.uk.



Mrs Diane Davy, Secretary and Chief Executive of The Institute of Energy left the employment of the Institute to pursue other interests on 16th October 1998. Mr Mark Baker CBE, President of the Institute, said "I am sad to see Mrs Davy leave and wish her well for the future". Louise Evans, Deputy Secretary and Chief Executive, will act as Secretary and Chief Executive with effect from Monday 19th October 1998.

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YEARBOOK

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The meaning of membership

Once again your subscription notice is due for payment and once again you will acknowledge your membership with your chosen professional body. The Institute endeavours to provide a portfolio of membership benefits and to encourage members to particiapate in our activities and in our development.

Take a few minutes to digest some our achievements made possible by your valued contributions;

10 UK branches

development of international branches

special interest groups

Awards

The Energy Efficiency Accreditation Scheme



Professional recognition

training initiatives

the 1999 Yearbook available free of charge to all members, normally priced at £95

assistance with careers

the 'new look' Journal for a nominal fee of £10 & energy world for free

the credit card that saves you money

Remember The Institute is here to serve YOU - its members. It is the only professional body that reaches out to all energy & environmental professionals, developing routes to membership and access to the Institute striving to meet the needs of the profession in the next century. We look forward to being of further service to you and encourage your comments on the work we undertake on your behalf. For further information regarding the services on offer, please contact the Membership and Education Department on 0171 580 0077 or email membership@ioe.org.uk



Your Institute will be there! Will you?

Both the membership & the projects team will be on the Institute's stand, so if you have queries about membership grades, transferrals or if you want to be involved in innovative projects with the Institute, then make yourself known to us.

On our stand there will be:

- membership special gifts
- free gifts
- refreshments
- show specials
- discounts on services
- the local branch representatives
- energy management training initiatives
- information on the AMinstE grade of membership for energy managers

Stand 184-185 is all yours!



To find out more call Maria Adams on 0171 580 7124, email: madams@ioe.org.uk

