

Heating degree days to 15.5C base temperature

	Region	Jul 03	Aug 03	Sep 03	
1	Thames Valley	8	10	47	
2	South East England	17	15	73	
3	South Coast	12	16	57	
4	South West England	15	15	52	
5	Severn Valley	12	21	61	
6	Midlands	17	21	59	
7	West Pennines	20	25	70	
8	North West England	34	50	89	
9	Borders	31	38	87	
10	North East England	23	41	86	
11	East Pennines	19	23	66	
12	East Anglia	20	23	71	
13	West Scotland	27	50	96	
14	East Scotland	27	47	86	
15	North East Scotland	29	43	103	
16	Wales	29	23	66	
17	Northern Ireland	24	46	85	
18	North West Scotland	38	48	104	

(C) Vilnis Vesma Degree Days Direct For earlier data see http://vesma.com/ddd/history.htm



Journal of the Energy Institute September 2003

M POURKASHANIAN, A WILLIAMS, J M JONES, J T HEDLEY, L I DARVELL and R I BACKREEDY

The non-catalytic destruction of ammonia in coal and biomass gasification gases

Y R GOH, R ZAKARIA, Y B YANG, V NASSERZADEH and J SWITHENBANK NOx reduction during municipal solid waste incineration by fundamental combustion technique

L L DONG, C W LEUNG and C S CHEUNG Combustion optimization of a slot flame jet impingement system

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energy

IP awards

On the 20 November at the Savoy, London, the Energy Institute will hold the IP awards. Now in their fourth year, the IP Awards are the Energy Institute's recognition of excellence and innovation in the world of oil and gas. They also offer companies of all sizes the opportunity to showcase their groundbreaking accomplishments in the international arena. Last year entries came for sixteen countries around the world.

The awards demonstrate examples of achievements that have had a resounding impact on the petroleum industry, from companies and individuals, whether in the industry or academia.

The winners will be announced and presented with their trophies during a gala dinner organised in association with Wood Mackenzie, leading consultants to the energy industry. The IP Awards dinner will be held at The Savoy, London, on 20 November.

IP Awards categories are: Communication and People Award, Community Initiative Award, Environment Award, Innovation Award, Safety Award, Technology Award and International Platinum Award.

For futher details about the IP awards please contact Lynda Thwaite on tel: +44 (0) 20 7467 7106, email: lthwaite@energyinst.co.uk



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High voltage insulators at a substation – part of National Grid Transco's UK electricity network. With network failures reported in the US/Canada, Denmark/Sweden, London and Italy in recent weeks, the reliability of electricity networks has come into question – see page 8 for one view. The two following articles also look at power generation – from hydroelectricity to distributed CHP.

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Viewpoint

The hydrogen economy - an emerging reality?



The concept of a hydrogen energy economy has been around for decades now but, like nuclear fusion and magneto-hydrodynamics, has always seemed to be at least a decade away. The promise of a hydrogen economy seems to leave us facing a range of technology barriers, high costs, infrastructure issues and, as ever, the old chestnut of the public perception of hydrogen.

by Philip Sharman, International Technology Promoter – Sustainable Energy (North America), UK Department of Trade and Industry

owever, this situation is changing rapidly, due to a number of factors. Firstly, after years of undelivered promises, the nascent fuel cell industries of Canada, the USA, Japan and Europe stand, arguably, on the brink of commercialisation. Secondly, recent high-profile failures of electricity transmission and distribution systems across North America and Europe have been experienced first hand by millions, and the billions of dollars of consequential losses have caused governments, industry, commerce and the public alike to consider the merits of distributed power generation and uninterruptible power supply options. Thirdly, concerns about the security of energy supplies as major economies move from being net exporters of energy to net importers have sharpened interest in energy systems fuelled by indigenous energy resources.

Finally, the importance of reducing emissions of greenhouse gases and a range of other pollutants to counteract global climate change and improve local air quality is generally understood. As a result, it looks as if the concept of a hydrogen economy is a slowly emerging reality.

In a hydrogen economy, hydrogen would be one of the primary energy carriers or fuels, much as electricity is today. While electricity has advantages in terms of a diversity of production routes, ease of use and because it is free of emissions at the point-of-use, it also has drawbacks, in terms of transmission and distribution losses and storage. Hydrogen holds similar promise of a variety of production routes, but more effective storage, and clean and efficient conversion at the point-of-use in a wide range of applications. However, the major area of debate is how a hydrogen economy will begin to develop.

In Europe, interest in hydrogen is motivated, in almost equal measures, by environmental concerns, industrial policy and security of supply. A 'High Level Group' recently appointed to advise the European Commission on how to prevent Europe from becoming a poor third behind the USA and Japan in the fuel cells/hydrogen race, foresees hydrogen as playing an increasingly complementary role to electricity as an energy carrier, with hydrogen being produced from a diverse range of primary energy sources. A consensus is building in Europe that, in the long run, a hydrogen economy, enabled at least in part by fuel cells and sourced by widely available renewable energy/electrolysis, will be the future. By contrast, interest in hydrogen in the USA is intense and appears a matter of urgency, and President Bush has proposed a \$1.7 billion initiative to develop hydrogen and fuel cell technologies, and infrastructure. The race is on, with the intention that a significant hydrogen economy will be in place by 2020. However, the primary driver for this in the USA is the perceived need to reverse the country's growing dependence on imported oil (currently 55% and predicted to rise to over 60% by 2020). The corollary of this short time-line to a hydrogen economy is that fossil fuels (and possibly nuclear power) are seen as the primary source of hydrogen, particularly gasification of indigenous coal coupled with carbon dioxide capture and sequestration.

In my view, an integrated hydrogen economy will become a reality but even in an advanced technological society such as Western Europe or North America, the transition will take a number of decades, with the development of 'nodes' – microcosms of a hydrogen economy – in response to sometimes differing local drivers. While such nodes may source the hydrogen from a number of different routes, I see fossil fuel playing an early dominant role in hydrogen sourcing, with renewable energy sources serving a niche role where circumstances allow.

Renewable energy sourced electricity will make the most impact on national carbon emissions by being used as green electricity, rather than being consumed generating hydrogen from electrolysis: using it for hydrogen production will only make sense when there is an abundance of renewable electricity.

These local hydrogen economy nodes may use direct delivery to point-of-use or utilise storage. Depending on local requirements, hydrogen may be converted into useful energy using fuel cells, reciprocating engines, turbines or process heaters. Fuel cells have the potential to play a huge role in this emerging hydrogen economy, but some technological developments are needed as well as significant reductions in their costs. Applications of the hydrogen economy at nodes will vary, including one or more of stationary power generation, transportation, heating, cooling and portable power. The configuration of each node will be determined by local drivers.

In the longer term, such local hydrogen economy nodes become abundant, and integration and consolidation will take place, resulting in national and international hydrogen based energy systems. I just hope I'm still around to see it.

Home news

decided to conduct an inquiry into "the

resilience of the electricity transmission

network in the UK, and the preparedness of

the electricity transmission network owners

and supply companies for such events." The

Committee intends to cover similar ground

to that reviewed by Ofgem, as well as "the level and effectiveness of investment in the

national electricity transmission system, pre-

and post-privatisation, compared to that in other countries", and the role of Ofgem in

See page 8 for an electricity industry

ensuring appropriate investment.

Power cuts 'not the result of low levels of investment' – Ofgem

Recent power cuts in London and Birmingham were the result of new equipment failure, and were not caused by a lack of investment, according to a preliminary investigation by energy regulator Ofgem. The outages were caused by the failure of new protection equipment which had been incorrectly installed, says the regulator.

The London power cut occurred in the early evening on the 28 August with over 400,000 customers affected and widespread disruption caused to transport during the rush hour. Another power cut in the East of Birmingham, just over a week later, saw 220,000 customers affected by a power cut caused by a fault on the national grid. Both power cuts were under an hour in duration.

Ofgem's report says that the London power cut was caused by the failure of backup protection equipment, itself caused by the wrong type of fuse being fitted in June 2001. The Birmingham power cut was again caused by a failure in equipment designed to protect the system from power surges. This failure was due to the incorrect installation of equipment.

The investigation seems to end speculation that the two UK cuts were the result of a progressively deteriorating electricity network following privatisation of the industry now more than a decade ago. The occurrence of larger and more serious grid failures in the US/Canada, Denmark/Sweden and Italy recently (see International News) seemed to many to be part of a pattern.

Ofgem's Managing Director, Competition and Trading Arrangements, Dr Boaz Moselle, said: "It is clear from our investigation that these power cuts were isolated incidents on the national grid. While they were very regrettable for those affected, customers should not see them as signs that the network is suffering from lack of investment. Total investment since privatisation in the electricity network is

over £16 billion - a which level higher is much than before privatisation. The grid national network in this country is 99.9999% reliable and power cuts on low-voltage the distribution networks have fallen by 11% since 1991/92."

Nevertheless, the Trade and Industry Committee has

<text>

Environment Agency goes renewable

Every Watt of electricity used by environment watchdog the Environment Agency at its 2,000 plus sites now comes from renewable sources such as the wind, after a three year campaign of gradually switching each of its offices, sites, pumping and gauging stations – including the Thames Barrier and its Head Office in Bristol – over to 'green electricity'. The Agency estimates that the switch will save more than 17,500 tonnes in carbon dioxide emissions a year – the equivalent to that emitted by around 2,100 homes. Buying green electricity also means that the Environment Agency is largely exempt from paying the Climate Change Levy, which is imposed on businesses who obtain their energy from fossil fuel sources.



Home news

PV and wind for UK wire manufacturer

Installing PV panels at Ormiston Wire – the combany's 2.5 kW Wind Turbus, an

> A Hounslow -based manufacturer of steel wire has become one of the first small manufacturing plants in Britain to be supplied with on-site solar photovoltaic (PV) energy. A fifth of the company's electricity needs are now met by PV panels.

> Some 120 panels, enough to generate 7650 kWh per year of electricity, were installed over a period of five days, and are expected to reduce Ormiston's electricity bills by an average of £1,000 a year. Any surplus energy produced will be sold back to the grid, via the company's electricity supplier, Ecotricity.

> Funding for the project has come from the DTI solar grant scheme, managed by the Energy Saving Trust, which provides grants of between 40 and 65% towards the costs of a solar installation. At Ormiston, the DTI grant of £23,000 covered 50% of the total installation cost. The company has also installed a 2.5 kW wind turbine.

Moves into green energy markets

A UK steam turbine manufacturer is teaming-up with a German wind company; a developer of tidal energy devices is joining forces with a regional renewable energy centre; and a Danish manufacturer of micro CHP systems is expanding into Britain. The three moves illustrate how British and overseas energy and technology companies are responding to changing energy markets.

Peterborough-based engineering company Peter Brotherhood designs, manufactures and exports steam turbines, gas compressors and CHP systems. The company has entered into a joint venture with the Hamburg-based REpower which will allow the German company to supply, service and support its wind turbine products throughout the UK. The joint venture has already opened an office in Edinburgh to support Scotland's growing wind industry. REpower manufactures a range of wind turbines up to 5 MW in size and has installed 900 turbines world-wide so far.

Meanwhile, the Northumberland-based Engineering Business (EB) has joined with the New and Renewable Energy Centre (NaREC) in Blyth, also in the north east, to create the Tidal Energy Business (TEB). The technological expertise of EB, coupled with a $\pounds 1$ million investment from NaREC in the new company, will allow vital development work on the 'Stingray' tidal energy demonstrator (see *Energy World* November-December 2002) – currently sited on the seabed in 30 m of water off the Shetland Islands – to continue.



The Stingray programme started its major development two years ago and is part-funded by the DTI. The involvement of NaREC as an equity investor is seen as a new way of encouraging emerging technology to be developed within British industry. TEB will operate from EB headquarters in Riding Mill, Northumberland.

At a smaller scale, Danish supplier of micro CHP systems, EC Power, has opened a new headquarters near Bristol in order to market units with an output of 9-17 kW in Britain and Ireland. Part-owned by Statoil, EC Power says its units include a unique control system which constantly tracks the customer's energy demand and adjusts energy production accordingly, removing the need to dump heat.

Powergen to trial 400 domesticscale CHP units

Whisper Tech, the New Zealand-based manufacturer of the 'WhisperGen' micro CHP unit and Powergen are working together under a joint development agreement to commercialise the system in the UK market. During the past three winters, Powergen has trialled over 50 WhisperGen systems in a range of homes in the UK. Now, 400 units are on order to be installed in UK homes by early 2004.

The unit can replace the traditional domestic boiler, producing all the hot water needed for normal domestic and heating purposes. When it does produces heat, the unit also generates electricity which can either be used in the home or fed back to the electricity grid. The WhisperGen unit runs on either gas or heating oil and is highly fuel efficient – and will reduce the typical UK home's annual energy costs by up to 40%, says the company.

Whisper Tech's managing director, David Moriarty, says the technology is ground-breaking. "The exciting thing for us is that the WhisperGen is the power station equivalent of the personal computer. It has the potential to revolutionise power supply options for the home market."

The WhisperGen will be the first commercially-available, in-home CHP generator in the European market, says the company, where six million domestic boilers are sold each year. The unit is sized as a suitable alternative for the bulk of this market. Powergen has estimated that, by 2020, at least 30% of UK homes could be using this technology.

Home news

Enough gas and electricity to meet Support winter demand, says NGT, but gas stations may avoid interruptions

National Grid Transco (NGT) has told Ofgem that it does not anticipate power cuts this winter, but would like a larger cushion of reserve generating capacity in case of exceptional circumstances. Among moves being considered to help meet peak loads is a proposal that CCGT power stations on interruptible gas contracts be relieved from interruptions during peak periods.

NGT's report to Ofgem was published against a backdrop of wholesale electricity price rises - of 25% in the last 12 months. Market participants, owners of 'mothballed' power stations, have responded to these price signals by returning some of this plant has to the system, says Ofgem. NGT's safety cushion has increased from 16.5% in July to 17.7% in October - the same figure which was available during the winter of 1995-1996, says the regulator.

According to NGT, out of 4,600 MW of generation capacity that is currently mothballed, 2,600 MW can be quickly returned to the system during the winter months. However, generators have told grid operator that they expect only 800 MW to be returned by the end of the year.

Ofgem Chief Executive, Alistair Buchanan, said: "While this [generation margin] is still lower than in previous years, NGT assures us that there will be enough power to meet the forecasted demand for

electricity this winter, under all but the most exceptional circumstances. But there can never be any room for complacency when it comes to keeping the lights on. No system can ever offer a 100% guarantee, when faced with unexpected events."

Ofgem is now working with NGT on measures to improve the way the market can best deliver security of supply. These include a proposal to allow combined cycle gas turbine (CCGT) generators on interruptible gas contracts relief from interruption over peak demand hours, and to direct a temporary restoration of supplies to those that have had their gas shut-off.

· The ending of Britain's near self-sufficiency in energy formed the focus of the first speech given by the new Chairman of Ofgem, Sir John Mogg: "Britain is no longer an energy island. That is why Ofgem intends to devote more resources and effort to help shape the debate on liberalisation of energy markets in Europe. A more integrated Europe could increasingly provide added reassurance that secure supplies in Britain can be maintained." Sir John also used the occasion to stress the importance of the gas network in maintaining a secure electricity supply, all the more so as Britain moves from being a significant exporter to a net importer of gas.

for new PV projects

Funding for a fifth set of solar photovoltaic (PV) energy projects across the UK, totalling £1.65 million, has been announced by Energy Minister Stephen Timms. The funding is part of the DTI's £20 million Photovoltaic Major (PV) Demonstration Programme, which helps householders, public buildings, community projects and commercial ventures convert to solar power. The 12 projects are expected to produce a total of 492 kWp, enough energy to fully power more than 100 homes.

Projects include plans to power a community centre in Bradford, a sports centre in Chesterfield and an initiative to power a block of flats in London. The funding also includes the first award in Northern Ireland to generate power form renewable sources for the offices of Northern Ireland Electricity.



Dartford, Kent's sewage treatment works is now self-sufficient in energy, following installation of a £5 million, 2.3 MW CHP system which is fuelled by 'waste' methane gas produced at the works as part of the treatment process. Based on two 1.15 MW Caterpillar engines, and backed up by a 2 MW Cat engine which burns diesel, the installation generates slightly more than the works' total electricity needs, and provides heat to help break down sewage in the treatment process.

Three new US fuel cell systems but suppliers yet to profit

Three fuel cell combined heat and power plants have been installed at locations in the US in recent months. The City of Los Angeles has dedicated a new, 250 kW fuel cell plant at the Terminal Island wastewater treatment plant in San Pedro. Currently fuelled with natural gas, city officials plan to switch the fuel source for the plant to biogas by next summer. Methane-rich biogas is produced during the treatment process, but the city needs to install a gas processing system in order to feed the gas into the fuel cell system.

All three fuel cell power plants were supplied by FuelCell Energy Inc. In August, the company finished installing a 250 kW fuel cell system at the Sheraton Edison Hotel in Edison, New Jersey. Fuelled with natural gas, the unit provides about a quarter of the hotel's electricity and hot water requirements. The company also provided two 250 kW systems to Zoot Enterprises in Bozeman, Montana.

A fuel cell market is now truly established in the

US and Canada, but its suppliers are still not profitable, according to PricewaterhouseCooper's 2003 Fuel Cell Industry Survey. The North American fuel cell industry enjoyed a huge, 71% increase in revenues to \$219 million in 2002, but also continued to experience significant operational losses, as heavy spending on research and development (R&D) continued in moving fuel cell technology towards commercialisation, says PwC.

The survey also found that:

- the top three revenue earners in 2002 were Ballard Power Systems, FuelCell Energy and Quantum Fuel Systems Technologies Worldwide;
- R&D spending increased by \$42 million, or 19% between 2001 and 2002; and
- operating profits were impacted by the R&D spending and the high cost of low volume production for early-stage customers, resulting in losses totalling \$405 million, an increase of 35% from 2001.

Major power failures hit Denmark, Sweden and Italy

The whole of Italy - excepting the island of Sardinia - was brought to a standstill for more than half a day on 28 September following a major power failure. The chain of events began, apparently, with a falling tree in Switzerland which took-out a 380 kV transmission line taking power over the Alps. Five days earlier, a major grid failure, possibly caused initially by local storms, left parts of the south of Sweden and eastern Denmark in the dark for several hours. Nearmiss failures were also reported in Holland and Austria during September, and parts of the UK had been hit by smaller outages in August and September.

The cause of the Italian event was a matter of dispute between the Swiss grid operator, Atel; its French counterpart RTE (France also exports considerable amounts of power to Italy); and the Italian operator GRTN.

The events in Europe followed the well-publicised 'great blackout' which left large parts of the Northeastern USA and parts of Canada without power for a day in August (see *Energy World* October 2003).

The causes of each incident are yet to be fully-established, but commentators speak of under-investment in transmission and distribution (T&D) lines since privatisation of electricity industries during the 1990s, coupled with rising demand. Remedies range from massive programmes of investment in new T&D lines, to serious efforts to control peak demands and the bringing to the of much system more 'distributed generation' plant which supplies local loads without stressing T&D lines.

One report, from the London-based ICF Consulting, calls the failures a wake up call for Europe's transmission market participants. Although each outage had a different cause at its root, the blackouts highlight the fact that there is a critical need for significant new investment in the European grid, says the report. "Originally the transmission grid was developed to ensure reliability, rather than to support commerce; however, times are changing. Lack of interconnection capacity hampers market integration, limits the scope for consumer benefits from competition and has serious implications with respect to the security of supply," says Simon Allen, President of ICF Consulting.

Emissions trading could increase power prices

Wholesale power prices could rise by 63% across Europe following the start of emissions trading in Europe, according to bankers UBS Warburg. Europe-wide trading is due to commence in January 2005. However, the next, crucial step is the allocation of permits at the national level, scheduled to take place by April 2004.

The introduction of emission trading schemes could result in a windfall for utilities, said UBS, as wholesale prices rise, although taxation could mitigate gains some companies for if governments use the permit allocation process as a tool of energy policy or taxation. Utilities likely to benefit the most are UK's Scottish & Southern Energy, Spain's Iberdrola and Germany's E.on, the bank said.

COGEN Europe's Simon Minett takes a different view. could and should Europe increasingly decentralise electricity production through cogeneration and local renewable energy, which would reduce the strain on our grid infrastructure, reduce carbon dioxide emissions and cut energy consumption. This would also save Europe billions of euros, because building central power stations and reinforcing the grid to accommodate these power stations is more than a third more expensive than decentralising production says Minett.

US renewable energy use increases; California approaches 20%

The use of renewable energy in the US increased by 11% in 2002, according to preliminary data from Department of Energy's Energy Information Administration (EIA). Most of the increase is due to increased hydropower production, following a drought-induced slump in 2001. However, nearly all forms of renewable energy registered increases in their use, including a 56% increase in wind power, a 17% increase in alcohol fuels, and a 15% increase in the use of municipal solid waste and landfill gas (which the EIA combined together).

New figures from the International Energy Agency (IEA) suggest a total US solar power capacity of 212 MW, in third place worldwide behind Germany, with 277 MW and way behind Japan, with nearly 637 MW. Japan added 184 MW of solar power capacity in 2002, more than all other countries combined. The IEA report also shows an interesting trend, that while nearly all solar power capacity was off-grid a decade ago, customerlocated, grid-connected systems now dominate.

Meanwhile, US utility Southern California Edison (SCE) drew on renewable energy resources for 23% of its power in June, and 22% of its power in May, achieving and exceeding its part of the state's 20% renewable energy requirement 14 years early. Approximately 150 independent power producers now supply the utility with more than 13 TWh of electricity each year. The utility is now seeking new contracts for up to 20 years of power from renewable energy sources.

The news from SCE appears to verify a California Energy Commission (CEC) statement that the state will have no problem meeting its overall 20% standard by 2017. According to the CEC, the 20% standard could be largely achieved by projects that have already been proposed. Fourteen US states now have rules requiring that a certain percentage the state's electricity come from renewable energy sources.

Tidal power in Norway; way to go on carbon storage

A new tidal power plant located in Kval Sound outside Hammerfest in northern Norway is about start generating electricity. Norway's Statoil owns 20% of Hammerfest Strøm, the company responsible, in collaboration with ABB, Rolls Royce and Sintef for development of the prototype that will supply 700 MWh/y.



The device works by harnessing the strong tidal

current in the Kval Sound, rather than depending on the regular alternation in water height between high and low tide. The 120 tonne submerged structure has glass fibre-reinforced plastic turbine blades that measure 10 m from hub to tip. Their rotation is converted to electricity via a generator, with the power transmitted to the land station via a submarine cable.

Meanwhile, a three-year, multi-nation project operated by Statoil and eight other international energy companies on capturing and storing carbon dioxide, has reached its end with a call for more research. The carbon dioxide capture project (CCP) has assessed and compared available technologies in this area.

"The collaboration has moved us a step forward in carbon dioxide management," says Trude Sundset, Statoil's Research Manager. "But the project has concluded that a greater commitment to technological development is needed in order to capture and store this gas in a cost-effective way. We're still a long way from being able to build power stations with carbon dioxide capture, for instance."

Shell Solar opens second PV line in Germany

Shell Solar Deutschland GmbH has opened a second photovoltaic (PV) cell manufacturing line at its factory in Gelsenkirchen, Germany. The new line will produce more than six million solar cells a year, with a total power generation capacity of 15 MW, more than doubling the output of the factory. In total the factory will produce 25 MW per year. Shell Solar's total investment in the Gelsenkirchen factory, which opened four years ago, is now more than \$34 million.

Shell Solar's Gelsenkirchen factory is one of the most advanced PV cell manufacturing facilities in the world. The new technology in the second cell line allows the production of thinner and more efficient solar cells with a larger surface area, enabling the cells to absorb more light. Another feature is the waste water treatment system which removes fluoride, that is used in the manufacturing process, from the waste water stream thereby removing a pollution hazard.

Shell Solar markets its products in more than 90 countries and has a workforce of 1300 people. To date, the company has supplied solar cells and modules with a total peak capacity in excess of 300 MW, about one-fifth of the entire capacity installed worldwide, says the company.

Electricity networks

How reliable is the UK elect

Way back at the start of electricity industry privatisation, one of the main arguments used by critics was that, under the new order, the job of keeping the lights an' would fall to no-one. Now, with some wellpublicised network failures recently, both in the UK and elsewhere, perhops it is time to look again at the reliability of the UK system. Here, Robert Davis from EA Technology, gives an industry view.

t's not too often that electricity network reliability hits the national headlines. Most of us working in the industry prefer it that way. But, with the incidents in the USA, Italy and the high profile south London outage recently (see Energy World October 2003), everyone is suddenly interested in network reliability, at least for a short time. So-called experts appear in front of TV cameras with predictions of forthcoming disaster. How in-touch some of these people are with known failure statistics, current condition of network assets and latest best practice in the industry remains in doubt. Certainly, most with direct involvement in the industry believe that, whilst there are many challenges ahead, there is no cliff edge over which we are about to fall.

With this sentiment in mind, I would like to make my own bold prediction: there will be no major collapse of the UK electricity network in the next 20 years. Whilst this maybe a forecast of Michael Fish proportions, all the evidence and, therefore, the smart money should be put on the next 20 years being not dissimilar in performance to the first decade following privatisation.

I would venture a further prediction: there will be ongoing network failures through various causes which will directly impact on performance, though not significantly outside current performance parameters.

Neither prediction will raise even the stiffest eyebrow in the electricity industry.

The risks

A number of risks face the electricity industry at present:

- storms;
- condition-related asset failure;
- · inadequacy of supply;
- · the impact of distributed generation; and
- · loss of expertise.

Below is a short profiling of the level of risk that each of the above represents. However, we need to understand these risks in the context of the current performance of the network. Since privatisation, performance has improved quite notably. There are now 11% fewer customer interruptions than prior to privatisation and those interruptions are 30% shorter. At the same time, domestic electricity bills have reduced in real terms by 40%. The activities of both the regulated businesses and the regulator, suggest there is no reason for this performance to change markedly. The visionary leadership of John Scott, Technical Director of Ofgem, in addressing several of these issues represents a new approach. There is now much greater co-operation between the regulator and the electricity companies in arriving at the best practice to address these risks.

Storms

Many customers in some parts of the country are probably still sore about the extended outages last year resulting from the storms. Most industry commentators would agree that the performance of some of the electricity companies allowed room for improvement. The DTI review which followed uncovered a number of opportunities for improving response in emergency situations, and many of the electricity companies are taking up the recommendations within the DTI report. Managing resources effectively was an area of particular focus. The challenge is to ensure that the right people are available at those places where faults are most likely to occur and where they will have greatest impact. A number of resource management packages are now being rolled out within the industry, notably EAStorm, which significantly enhances a company's ability to improve efficiency.

I will make a further prediction: there will be serious storms which will impact on the networks quite significantly over the next ten years but, having learnt from the mistakes of the past, the electricity companies will meet the challenges more effectively and the impact will be minimised.

Condition-related asset failure

Most people working in the electricity industry understand that we are working with a progressively ageing asset base. A significant proportion of the network was constructed during the post war period, through into major builds in the 60s and 70s. Many of the assets on the network are therefore 40 or more years old and often beyond their design life. Considerable research has gone into understanding how plant life can be extended and some comfort can be drawn from the fact that the condition of much of this old equipment is good. It is unlikely, therefore, that a precipice awaits any unwary asset managers in the electricity companies. What should be expected is a steady and continuous deterioration in condition.

Most asset managers today are conducting risk assessments on their asset base to determine an optimum investment strategy. This means

ricity network?

targeting capital spend on those assets which are most likely to fail and impact on performance. Programmes such as the condition-based risk management (CBRM) approach supports this process by using condition data to predict the remnant life of assets. This combines with a calculation of the consequences of a failure to give the asset managers an informed perception of total risk. This and other such programmes have been stimulated by the 'Asset Risk Management' programme, instigated by John Scott and his team at Ofgem, which seeks to encourage long term stewardship of high voltage assets.

Whilst Ofgem should expect significant increases in capital expenditure requirements in the next price control submissions, much of the expenditure requests should be substantiated by an informed understanding of where that expenditure should be directed and how it will address risk of asset failures.

The risk of ageing assets, therefore, is being mitigated through regulatory leadership and good practice amongst asset owners.

Inadequacy of supply

There is much talk in the press of a dark winter ahead of us. For the purposes of this article, we will side-step the potentially thorny issue of reliability of primary fuels. This area would justify an article of similar length to this one.

At the time of privatisation of the electricity industry in the UK, the regulator provided incentives to stimulate the construction of new generation capacity to encourage competition between the incumbent generators. This competition has been successful, and this, together with the introduction of NETA has resulted in a significant reduction in the price of electricity, to levels that many consider is unsustainable.

The natural reaction to a market which is over supplied is for suppliers to reduce supply and so drive the price up. Indeed many generators have decommissioned unprofitable plant, or have 'mothballed' it, and construction of a number of new power stations that have received planning permission has been postponed. Prices have begun to rise – demonstrating that the market mechanism is beginning to work. What is possibly in question is whether the natural inertia in the market (ie the time between a generator deciding to bring mothballed plant on-stream and the plant actually being able to reliably generate on demand) will result in a mistiming of restoration of capacity and demand. The capacity margin has recently dropped to 16.5%, its lowest recorded level and well below the NGC indicative figure of 20%.



NGC has proposed that the terms of the balancing market are altered to reveal these peak prices. This may well provide an additional mechanism to assist the market in responding correctly to the reserve capacity requirement.

I believe that the dynamic described above is likely to ensure that supply continues to match demand. Whilst weather conditions could conceivably conspire to freeze the whole nation for several weeks and therefore put excessive demands on the network, the risk of this seems relatively low. Though I may live to regret it, I shall not be buying a standby generator for my house in Wales this year.

In the longer term, security is enhanced by a greater level of diversity in generation. The combined capacity of generators connected into the distribution network (known as distributed generation) is forecast to grow significantly in the future.

Distributed generation

Most of you will know of the government's initiatives on reducing emissions, notably its targets for carbon dioxide emissions over the coming decades. Distributed generation (that is the generation of electricity within the distribution network rather than from power stations) is expected to increase significantly. Today, there is approximately 7 GW of renewable and CHP electricity generation in the UK. The government's



The UK electricity industry is working with an ageing asset base

EA Technology was originally formed as the R&D centre for the UK electricity industry in the 1960s. The company was transformed in the 1990s and became fully independent in 1997 with a management and employee buy-out - it is now directly owned by its staff. The company has provided power asset management solutions for over 37 years. It has evolved into a global technology and service provider with business offices in Europe, Australia, New Zealand and Singapore. It operates Strategic the Technology Programme which has attracted worldwide membership of utility companies.

www.eatechnology.com

Distributions systems can fall over



2010 target is to achieve in excess of 20 GW.

Distribution networks have not been designed to accommodate significant numbers of generators. They have been designed for a 'top down' flow of power from grid supply point through the various voltage levels to the customer. The introduction of power sources in the distribution network causes engineering issues that need to be addressed by network operators, who argue that these will increase the risks to networks. Concerns revolve around five main issues: voltage control, fault level, power flow, stability and security of supply. An 'embedded generation' working group established by the government includes representatives of the generation community and the distribution network operators. This has produced a number of recommendations for addressing the issues, which are now being addressed by the Distributed Generation Co-ordinating Group (DGCG). This body, which is co-chaired by Ofgem and the DTI, is tasked with taking forward the recommendations of the working group.

The DGCG is directing a number of initiatives to move forward current knowledge and understanding – details of outputs can be found at www.distributed-generation.gov.uk. It has been recognised that the present regulatory framework may not be conducive to stimulating the innovation and demonstration of technology required to reduce the risk to the customer of the changes in the network which will be required in order to accommodate large quantities of distributed generation.

John Scott at Ofgem, with his colleagues in the price control team, has presented further challenges to managers in the industry by instigating several ground-breaking initiatives. The proposed programmes seek to financially support the electricity companies in their drive to develop the technology to convert the network to active operation and thereby to reduce the risks associated with thousands, and possibly millions, of supply points across the network. Whilst these programmes are still at an early stage, there are promising signs that a collaborative approach will be adopted by the electricity companies which will ensure best practice across all of the regions and an integrated and co-operative approach in the management of this risk.

Whilst I remain unconvinced that distributed generation will achieve the ubiquity predicted by some of the interested parties, it will nevertheless have a significant foot-hold within the next decade. I am reassured that the above-mentioned initiatives will assist in reducing the potential negative impacts on reliability. Indeed, through increasing the number of supply points, the security of supply may well be enhanced once all of the integration issues are addressed.

Loss of expertise

Some very uncomfortable numbers are banded about when levels of expertise within the industry are discussed. I have heard it said that as few as 25 graduates per year are leaving UK universities, destined for the UK electricity sector, with power engineering qualifications. This is in an environment where early retirement, though now on the wane, is still fairly commonplace within the industry and specialist areas such as protection, fault level, policies and procedures continue to suffer from serious lack of expertise in many companies. We have somehow to encourage our young people to take up power engineering as a profession. It is generally a well-paid industry, offers a variety of career paths and is often driving the leading edge in a number of new technologies. Until we can get this message across to our A Level students, the apparent glitz and glamour of a media studies degree are likely to attract many more applicants.

Addressing the increasing skills shortage remains the biggest task within the industry. I suspect that regulatory and governmental support may be necessary to stimulate awareness and interest amongst our bright young things. We ignore them at our peril.

Conclusions

I would conclude that the electricity network within the UK is intrinsically reliable and is being appropriately managed and regulated. Some of the traditional asset management challenges are being addressed effectively whilst the growth of distributed generation and its impact on the network, are receiving due attention. However, the skill shortage that now exists is likely to worsen, with apprentice schemes, significantly enhanced training programme and some industry PR all forming part of the solution.

Most critical is a proactive approach to the challenges arising, the vision to identify clear and appropriate objectives and the passion to lead the industry in its critical role in supporting the infrastructure of the UK. We must seek out and promote these leaders wherever and whenever they arise.

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Hydropower

Hydroelectricity – the power of falling water

Hydroelectricity holds a curious position in relation to sustainable development. There is widespread opposition to large, new, capital-hungry schemes - yet many countries of the world rely very heavily on existing schemes for the majority of their power supplies. New, small-scale schemes are seen as a 'good thing' while the renovation and upgrading of existing hydro plants delivers efficiency benefits without an environmental downside. Refurbishment is where a lot of Austrian company, VA Tech Hydro's, business comes.

n 14-15 August, when millions of Americans and Canadians were hit by the biggest power outage in North American history, Hydro-Quebec, Canada's largest power producer, came to the rescue by making available an average of 2,200 MW to New England and New York and some 1,200 MW to neighbouring Ontario, Canada's most populous province.

Quebec, three times the size of France, is known for its abundant and cheap hydroelectric resources. The public utility, which is independent from the rest of the North American grid, did not feel any impact from the blackout.

The company draws most of its energy from massive dams built during the 1960s and 70s in the northern parts of the province. The Quebec government is not in favour of electricity market deregulation and has refused to privatise Hydro. It does, however, have agreements with Ontario, New Brunswick and US utilities to share the flow of electricity.

Hydropower's important role worldwide

The World Water Forum held at Kyoto, Japan in March 2003 concluded with a declaration acknowledging the environmental benefits of hydropower: "We recognise the role of hydropower as one of the renewable and clean energy sources, and that its potential should be realised in an environmentally sustainable and socially equitable manner."

Hydroelectric power potential is distributed among the continents in rough proportion to land area; China alone possesses one-tenth of the world's potential. Mountainous regions and large river valleys are the most promising. Besides the United States, the eastern area of the former Soviet Union, and southern Canada, the regions that have done the most to harness hydroelectric energy are Europe and Japan. Europe has exploited almost 60% of its potential. Although it has only one-fourth of Asia's resources, it generates nearly twice as much hydroelectric power. In contrast, Africa has developed only 5% of its potential, half of which comes from only three dams: Kariba in East Africa,Aswan on the Nile, and Akosombo in Ghana.

In some areas of the world, hydroelectric power is the main source of electricity. More than 35 nations already obtain more than two-thirds of their electricity from falling water. In South America, 73% of the electricity used comes from hydroelectric power, compared to 44% in the developing world as a whole. Norway gets 99% of its electricity and 50% of all its energy from falling water.

Hydropower in Europe

About 22% of the total world demand for hydroelectricity is attributed to western Europe. There is an observable trend in Europe towards building new pumped storage plants. This trend is due to the growing need for electrical power to cover peak demand, and for network stabilisation.

After a construction time of more than six years, Vattenfall Europe Generation put the first unit of the Goldisthal pumped storage power plant, in the southern part of the German state of Thuringia into commercial service in February 2003. Goldisthal is one of the largest pumped storage power plant projects in Europe. When completed, the plant's four underground turbines will produce 1060 MW of power.

Currently, France, Norway and Sweden account for more than half of Europe's total



by Peter Binggeli, Senior Vice President, Business Development, VA Tech Hydro

First Joint Implementation project

VA Tech Hydro has signed its first contract to be supported by use of the flexibility mechanisms of the Kyoto protocol. The emission certificates generated by the new hydropower plant at Tsankov Kamak, situated at the Vacha Hydropower Cascade on the Vacha river in Bulgaria, will be transferred to the Austrian carbon credit programme via the 'joint implementation' (11)mechanism. The scheme is located in the Rhodope mountains, 250 km south east of Sophia.

The implementation contracts were signed in Sophia, Bulgaria, on October between Natsionalna Elektricheska Kompania plc (NEK) -Bulgaria's national electricity company and the investor of the project - and an Austrian industrial group led by VA Tech Hydro. The total investment of around 200 million euros includes civil works, engineering and the complete electro-mechanical package.

The contract involves the construction of an arch dam and an 80 MW hydropower plant, rehabilitation works on the existing cascade and the integration of all works to improve the utilisation and water management of the cascade hydropower stations. hydroelectricity consumption. Norway and Sweden alone have double the hydropower production of Germany, Austria and Switzerland put together. Switzerland has a total installed hydropower capacity of 13,300 MW, representing approximately 60% of electrical energy production. In Austria, about 11,700 MW are installed, which is about 70% of the country's energy needs.

Italy is almost entirely dependent on imports to meet its energy needs. The country's heavy reliance on foreign oil and gas sources, such as Libya and Algeria, has made energy security and diversification of energy sources top concerns. Modernisation is encouraged by 'green certificates' that allow renewable energy power producers to receive a bonus from the State for each kW produced.VA Tech Hydro is supporting Enel Power Spa Milan, Italy's dominant electricity company, with a 10 million euros modernisation programme for its small hydropower plant at Zevio in northeast Italy.

With a lack of significant indigenous fossil fuel resources, the countries of the Balkans region have turned to hydroelectricity to meet their power needs. Fully 40% of all installed electricity-generating capacity in the region is hydroelectric, and over 20% of the region's total energy consumption is from hydropower. Albania, in particular, is greatly dependent on hydropower, as it accounts for 86% of the country's installed generating capacity. Croatia (54% of installed capacity) and Bosnia-Herzegovina (50%) are also highly reliant on hydropower.

Last year's floods in the Czech Republic left the 100 MW Orlik hydroelectric power station's four generators out of operation. Orlik, operated by CEZ, the Republic's foremost electricity

External views of the 100 MW Orlik hydroelectricity plant in the Czech Republic



producer, is a vital part of the Vltava Cascade, the country's largest retention reservoir. Orlik was accumulating substantial losses during the outage, so swift action was necessary. VA Tech Hydro was asked by CEZ to reconstruct two of the generators, in a contract which also included delivery and erection supervision of stator windings, cleaning the stator core and rotor and all testing prior to operational start-up.

In preparation for EU accession, the Visegrad countries (Poland, the Czech Republic, the Slovak Republic and Hungary) are required to liberalise their electricity sectors, and they have all introduced legislation to fulfil this requirement.

In Romania, Hidroelectrica SA is the commercial company in charge of generation and sale of electric power, power system services, raw water supply and water management services. The company, which already generates about 25% of the country's production, is currently trying to attract foreign investors for the completion of 21 hydropower plants under construction.

Some 40% of Hidroelectrica's output is from the Iron Gates Hydropower plant. VA Tech Hydro has been involved for many years with Iron Gates I and II and is currently working on a 55 million contract for the overhaul and modernisation of bulb turbine sets for the company's Gogosu plant. Following the modernisation, output will be boosted by approximately 15%. As a result, utilisation of the Danube River's hydropower will be improved, increasing the ability to meet peaks in electricity demand. The project is expected to provide jobs in the region for the next ten years.

Ecology and economics

Around the world, considerable energy generation potential can be released, without significantly

environmental increasing impact by modernising or low-head upgrading hydropower plants and mills. In Scotland, VA Tech Hydro has been awarded a contract to refurbish three power stations in the Highlands, near Inverness, by Scottish & Southern Energy. The work make major will improvements the to environment and guarantee high reliability and life extension of the plants for at

least 30 years.

But there is rarely a standard solution to deal with the various local environmental conditions and, at the same time, maximise benefits to the operator. Each project has to be designed to be right for the particular location and surroundings, and the designer has to evaluate a choice of technologies.

In this context, VA Tech Hydro's compact turbo-generating unit, the ECOBulb concept, based on permanent magnet technology, has a number of clear advantages. It has no step-up gear, offers less environmental risk and impact and has high electrical and hydraulic efficiencies. It is suitable for applications with an output range of 0.5–5 MW, and heads of 3–15 m.

The ECOBulb was first put into commercial operation in Aubas, Central France at the end of 2002. It has since proved the benefits of the greatly simplified mechanical systems that all work to reduce maintenance costs.

The presence of massive amounts of oil in a standard submerged generator's gear system, even when all precautions are taken – special seals, double wall, etc – is potentially harmful to the environment. When gears are used, significant sound and vibration can also be generated, which may create noise pollution in neighbouring areas.

The elimination of the step-up gear is a huge leap in clean hydropower electricity generation. More than 90% of the oil contained in the bulb was used for gear cooling and lubrication. No gears means no oil. The ECOBulb also achieves reduced maintenance costs and provides the highest possible energy generation.

Balancing act

Despite the tremendous benefits of hydropower as a renewable and non-polluting energy source, it still manages to generate strong opposition from some lobbying groups. Some environmentalists oppose electricity generation by harnessing the natural power of rivers through hydroelectric dams, citing the dams' impact on fish.

In an effort to balance the desirability of increasing hydropower generation worldwide with the natural environmental concerns of committed citizens, VA Tech Hydro has been paying particular attention to improvements in the environmental performance of Kaplan turbines. Some of these turbines, built decades ago, do have the potential for improvement, not only for fish passage, but also performance. The research programme identifies the main danger zones for fish as the distributor, the runner, and the draft tube. These hazards can be reduced.

For example, rounded and thicker runner blade inlet noses are more beneficial to fish, compared

with sharper leading edges. This may also help performance, especially during low-level operation. Similarly, the minimum gap runner can reduce the impact of sharp blade edges and gap vortices on passing fish. Physical tests with living fish have demonstrated that there is a threshold of maximum shear stress a species of fish can safely withstand. Modern Kaplan runners generally fulfil the threshold identified by these experiments.

President Bush, on a recent visit to one of four dams in the Columbia River Basin in the western US, was emphatic that hydroelectric power and plentiful salmon runs can co-exist. He sided firmly with those who believe that the network of dams and reservoirs that make up America's largest federally-built hydroelectric system, should be preserved to generate electricity, supply water to farms and maintain a water transportation route to the Pacific. This view was upheld by Bob Lohn, administrator of the regional National Oceanographic and Atmospheric Administration Fisheries Service. He asserts that the number of salmon that survive the passage through Ice Harbor and other dams along the Columbia and Snake rivers has increased dramatically over the past two years.

Without specifically mentioning the widespread power blackout in August, President Bush said: "We've got an energy problem in America. We don't need to be breaching any dams that are producing electricity. And we won't."

Meanwhile, over the border in British Columbia, the provincial government is encouraging hydro companies to create more electricity by offering tax breaks. Companies willing to build 'run-of-river' projects are being offered penstock piping and equipment exempt from sales tax. Canada's Energy & Mines Minister Richard Neufield said: "Providing a tax exemption of this nature to independent power producers ensures continued private sector development of new and innovative energy sources while also generating investment and job opportunities throughout the province."



Contact VA Tech Hydro via the website: www.vatech-hydro.com

Distributed energy

Making green power pay

Suppliers of CHP plants for both buildings and industry have had a tough time recently relative as movements in gas and prices electricity have conspired against the technology and new electricity troding arrangements (NETA) have penalised intermittent power exporters. But one company that specialises in CHP and power from landfill gas, the ENER-G Group, seems to be thriving. Energy World asked Its Chairman, Tim Scott, how they do it.

he ENER'G Group has a clear focus on green electricity generation technology which few others have embraced as a raison d'etre. Why have you and the company taken this particular route to making money in the energy business?

Governments, commerce and people alike are all waking up to the need to reduce our dependence on fossil fuels, protect the environment and use our energy resources more sparingly. Energy markets around the world are being deregulated, competition is increasing and technology is changing. Many companies are too large or too slow to see the change coming, let alone see the opportunities on the horizon. What were once seen as niche market opportunities are becoming more mainstream and as this change takes place, opportunities exist to link these niche areas into a holistic approach to our changing energy needs. ENER G believes there is a growing trend towards clean, distributed energy and energy efficiency that not only helps reduce carbon dioxide emissions but is also able to provide security of supply to its customers. I am personally delighted, therefore, that our business model not only embraces this growth potential but also enables us to contribute towards providing a cleaner environment.

How bad did market conditions for the CHP market become recently, following the introduction of NETA in 2001? Is the situation improving?

Following the introduction of NETA, CHP plants that exported electricity to the grid were immediately made uneconomical and many were mothballed due to the unsustainable low level of electricity prices. The market for small-scale CHP also became more difficult although, as our business is the supply of base load energy (electricity and heat) to customers, our price is set against the commercial level rather than the wholesale price. This helped to protect our position.

The current price of electricity means the market has never been better for customers to take advantage and secure long-term CHP contracts but, as is true to all markets that have fallen to a rock bottom level, customers don't yet see it.

I guess it's a human failing – if you think of the stock market, where the FTSE has fallen from almost 7000 to its current level of 4200, which must mean, as a long-term investment, that now is a good time to invest. However, current trading volumes have been wallowing around their lowest levels for years. Ironically, when the prices increase substantially, investors will pile in and buy – missing the majority of the benefits they could have had. I suspect this analogy will be true to the distributed energy market. C'est la vie.

How strong is the market for new landfill gas generation centres? Is all such generation used to supply the grid or are there cases of power (and heat) being supplied locally?

Currently we are installing a number of new installations for landfill gas, although many of these contracts were agreed some time ago. The market in the UK remains strong but is mature and therefore clearly has a finite expansion rate. Overseas the picture is a different one not only for landfill but also CHP. Expansion overseas is a major opportunity for ENER-G. The majority of generation is supplied to the grid; this is mainly due to the isolated location of the landfills however there are a few where other services can be supplied locally. For example, we have one site at Chavey Down in Berkshire that is close to a local private school to which we provide the heat that otherwise would have been wasted.

What (if anything) is improving the case generally for green energy – increasing electricity prices; the climate change levy; the Renewables Obligation; other factors? The Renewable Obligation has improved the case for certain renewable projects but, unfortunately, remains woefully inadequate for many other forms of renewable projects. For example, since its introduction, I am not aware of any new projects in the biomass sector.

Whilst the climate change levy has, to a limited degree, helped the case for green energy, it does not counteract the damage caused to the industry by NETA, nor does it adequately compensate for the carbon dioxide savings that are generated from a green energy policy.

One important foundation of your business is nocapital, energy purchase schemes. Is this the key to getting business operators to adopt CHP and other onsite energy technologies?

Yes, the benefits of no-capital energy purchase schemes are being embraced by our customers – we call them DEP – discounted energy purchase. These are really a win-win for the customer who can secure a long term energy supply contract at a known rate for up to 10 years. Given the present all-time low prices for electricity this means customers are able to substantially lock in these low prices for a 10 year supply – as the

a supplier's view

Americans would say: 'a no brainer'.

Another aspect of our business is to provide energy savings and, although customers are keen to save energy, they do not always have the capital budget enabling them to purchase and install the necessary equipment. Therefore, we offer a service that is paid for out of their savings. In fact we guarantee the customer a predetermined level of financial savings after our charges.

There is a lot of talk of new generation technology – both microturbines and stationary fuel cells are a reality. When will these be a significant force in the UK? Is ENER G going to use these technologies?

Yes, new technologies will become viable and, I believe, will play an important part in distributed energy at some stage in the future. I certainly see ENER?G being involved when the time is right. However, as a veteran and vintage car enthusiast I have learned that history is an excellent teacher and, if products are offered commercially before they are either proven technically or economically, they only damage the reputation of the industry and the company providing them. ENER:G is a very forward-thinking company and has a number of areas under development – from the continuing improvement of its patented monitoring and control system for CHP units to new technologies

for the renewable industry. However, we will not lose sight that our business is to provide customers with the most cost-effective form of clean energy and energy efficiency controls.



In theory there are no reasons for distributed generation not to play a significant part in the future of power generation. If one looks at the attributes, the argument is even compelling:

- most efficient way of producing energy (almost double the next best);
- eliminates the need for national transmission lines;
- removes potential major terrorist targets; and
- localised security of supply.

If the government is prepared to install an economic platform that reflects the full environmental benefit being provided, there is the potential for the local and on-site power market to become a significant contributor to the UK's power requirements.



The clean energy company

While the ENER-G Group may only have been founded in 1998, the component parts have a much longer history. Through a process of organic growth and acquisition, the Group now turns over in excess of £20 million. The Group's primary activities centre on the provision of clean and renewable power generation technology and energy reducing technologies.

Combined Power Ltd leads the UK market in the provision of small-scale (less than 5 MW) CHP units. Founded in 1984, the company now has more than 650 units operating throughout the UK and Ireland. Using patented remote monitoring technology, Combined Power's units provide onsite heat and electricity for a wide range of customers, mostly on long-term operational contracts. Using gas reciprocating engine technology, units are available in capacities ranging from 30 kW–1.15 MW. Recent customers include both the DVLA and Ofgem. The recently-acquired business in Holland, now Nedalo ENER.G BV provides similar products and services in continental Europe from its base near Amsterdam. In addition, the Group also has a Polish-based subsidiary, ENER.G Polska. While principally set up to expand the Group's biogas generation capacity, ENER.G Polska will be able to provide products from throughout the Group's portfolio.

Renewable generation is provided by Natural Power Ltd. Using similar gas reciprocating engine technology to Combined Power, Natural Power provides on-site modular generator sets designed to take advantage of renewable biogas produced in abundance on most landfill sites and collected using gas collection systems manufactured by associate company Biogas Technology Ltd.

The Group also formed ENER'G Efficiency in 2002, which hires energy management systems from associate company smartkontrols Ltd to customers.

Contact ENER:G, tel: 0161 745 7450, or via the website: www.energ.co.uk

Nuclear decomissioning

Trawsfynydd – decommissioning reach

Running in parallel with the debate about whether Britain is ever to invest again in new nuclear power generating capacity, are the current activities of the industry spread between generating power and decommissioning closed sites. The latter. involving huge and lengthy site operations and pioneering technology, is becoming ever-more important. First to be closed, and thus furthest ahead in the decommissioning process is the Trawsfynydd Magnox station, where reactor buildings are about be reduced in height.

uilt in the early1960s, Trawsfynydd nuclear power station is located in the Snowdonia National Park, Gwynedd, North Wales. During the plant's operational life, its 390 MWe twin Magnox reactors generated about 72 TWh. These reactors were shut down in 1991 and decommissioning of the station began in 1993.

Since then, BNFL Environmental Services, the specialist decommissioning and remediation business, has removed all of the fuel from the site and sent it to Sellafield for reprocessing. The defuelling of the reactors was completed within 21 months. To date, main plant installations such as the turbine hall have also been demolished and recovery/ packaging processes have been developed for all of the main intermediate-level waste (ILW) waste streams, including fuel element debris, miscellaneous activated components, sludges and pond water treatment resins.

Following the granting of planning permission, work has now commenced on the detailed design, prior to starting work on the conversion of the reactor buildings into long-term safe stores pending final site clearance. Design work is also underway for the construction of an ILW store for the packaged ILW wastes.

In this respect, Trawsfynydd is the most advanced UK commercial reactor site with respect to waste recovery solutions. This, coupled with its location within the Snowdonia National Park, means that Trawsfynydd presents a unique set of challenges. BNFL is involved not only in the development of innovative waste retrieval methods but also with the high profile consultation of

The Trawsfynydd site in 2002



stakeholders as the project progresses.

Unique location

Trawsfynydd is the only power station in the UK to be situated within a National Park. Following local consultation, site-specific proposals were produced for decommissioning the site recognising the importance of the power station's visual impact in such a location.

In August this year, the Welsh Assembly Government gave the go ahead to Trawsfynydd Power Station's planning application, which will enable decommissioning work to be progressed in accordance with the company's declared strategy for the site. This means that BNFL, which runs the site, is now able to lower the height of the two reactor buildings, and to construct a building to store the intermediatelevel radioactive waste which has been generated on site. An on-site store is needed until a national radioactive waste repository is built.

The proposals allow for BNFL to lower the height of the reactor buildings from 55 m to 35 m, and to construct a new building to store packaged intermediate level radioactive waste which has been generated and processed on site. The store will be approximately 91 m long, 34 m wide and 19 m high. The site will be landscaped to help further integrate the altered buildings into their surroundings. The station has already planted more than 40,000 native trees and additional planting will further reduce the visual impact of the site.

Don Nightingale, Site Manager, is responsible for taking the work forward: "We have worked very closely with the local community and Snowdonia National Park to draw up plans in keeping with Trawsfynydd's unique location. The local community made it clear they wanted the visual impact of the site to be reduced by lowering the height of the power station's two former reactor buildings, and this is what we can now do. The roofs will be curved to be more sympathetic with the surrounding landscape and the walls will be clad in a range of materials including local Welsh slate and tinted rain screen stainless steel panels".

In order to lower the roof of the reactor building, work has begun on the cutting and removal of the hot gas duct sections from the boiler circuit at Trawsfynydd. This 'partial relocation of the primary circuit components' (PRPCC) in the reactor building will facilitate the lowering of the buildings and subsequent construction of the 'reduced height safestore'. With work on site now well underway, the entire PRPCC project will be completed by Autumn 2006.

Sections of floor and structural steelwork have been removed from the spaces between the boilers, to aid the relocation of plant items and enable new steel floors to be installed onto which the removed boiler sections will be placed.

Prime contractor

BNFL Environmental Services is acting as the prime contractor for BNFLALFA (an organisation set up by BNFL to act as a customer in

nes reactor buildings

preparation for full commercialisation under the Nuclear Decommissioning Authority (NDA) to complete this multi-disciplined project. The inhouse design team has carried out detailed assessments of all design proposals and safety submissions prior to commencement of site works, and the business is now managing site activities to ensure co-ordination with other projects on the Trawsfynydd site.

Rachel Barry, Project Leader, BNFL, said: "There are two separate reactor buildings at Trawsfynydd. The existing buildings will be reduced in height to form weather-tight, safe and secure enclosures over the residual plant and civil structures. To allow the height of the reactor buildings to be reduced, all plant and structures currently above the new roof profile will have to be removed. The scope of this project is to remove the hot gas ducts and upper sections of the boilers, all of which are contaminated items of plant."

There are 12 primary circuits at Trawsfynydd, consisting of a boiler and hot gas duct connected to the reactor vessel, six for each vessel. The fuel was removed from the reactor vessels and buildings in 1995. The primary circuit has been safely decoupled from the reactor vessel and the hot gas ducts and boilers will be removed and prepared for long term safe storage within the reactor buildings. Non active items such as structural steelwork will be removed from the site and concrete structures, floors and stairwells will, where possible, be used for landscaping of the site.

The roof profile of the buildings will be curved and achieve a height reduction of between 20 m and 30 m. The boilers will be reduced in height by a corresponding amount. Rachel Barry explained: "This will be achieved by cutting the boilers into sections, each approximately 100 tonnes in weight. Each section is cut using automated hot gas cutting techniques and handled using a boiler lifting rig specifically designed for this task. In total, approximately 5,000 tonnes of boiler section will be cut and relocated in the course of the project. The hot gas ducts are also removed in sections, of approximately 5 tonnes each, and relocated using a combination of hoists and a 10 tonne gantry crane. In total approximately 700 tonnes of hot gas duct section will be removed."

Turbine hall comes down

The turbine hall is the third largest structure on the Trawsfynydd site, after the two reactor buildings, measuring approximately 110 m long by 72m wide and 34 m at its highest point. When operational, it housed the four turbines and generators that produced 580 MW of electricity between them, 80 MW of which was used to operate the site.

Phase one of the demolition of the turbine hall was completed in August 2002. The work, which began in 2000, involved the full mechanical and

electrical isolation of the turbine hall from the rest of the site. In order to isolate the turbine building, the team had to install a new site electrical infrastructure and a site-wide plant alarm monitoring system.

Chris Barnes, Project Leader, BNFL, said: "All of the power supplies to and from the site from the national grid compound were fed to the turbine hall and from there it was then fed to the various plant areas. To isolate the turbine hall from these supplies we had to design and install an electrical distribution system for the site that circumnavigated the turbine hall."

Other key tasks during phase one included the removal of the four generators, the installation of two new steam generators to replace the existing ones that were situated in the turbine hall and relocation of the site's telephone exchange into the administration building. All of which needed to be carried out to achieve full isolation of the turbine hall.

Phase two, the actual demolition of the turbine hall, started in September 2002 and was completed in July 2003 with the site cleared in August 2003. This work included the removal and segregation of waste. The masonry arisings from the building were crushed and reused to back-fill the basement void. Scrap metals were cut down to a manageable size and transported off site for reprocessing.

During the building demolition, the BNFL Environmental Services team had to use precision dismantling techniques to remove the south wall of the turbine hall because of its proximity to adjacent facilities that had to be protected.

Diverse waste streams

While the demolition work is forging ahead, work on recovering the different waste forms found on site also continues. BNFL has an enormous range of experience to draw on here, having completed



Decommissioning the cooling ponds

Milestones

September 1995 Spent fuel removed and sent for reprocessing February 1999 Fuel ponds desludged and emptied From May 2002 Boiler ancillary plant and pipework removal September 2002 Ion exchange resins retrieved and encapsulated June 2003 Main sludge vaults retrieved, conditioned and encapsulated using TILWSP - see page 18 July 2003 Turbine hall demolished July 2003 Planning permission received following a thorough Public Inquiry September 2003 Miscellaneous activated component vault successfully

emptied and ILW

encapsulated

energy world Nov-Dec 2003 no. 314

Mobile waste plant

BNFL Environmental Services has commissioned the first mobile waste solidification plant to process intermediate-level waste (ILW) in the UK – and its first task is to process radioactive sludge at Trawsfynydd.

The 'Transportable Intermediate-Level Waste Solidification Plant' (TILSWP) is a mobile solidification plant, designed and developed by BNFL Environmental Services' Waste Management Group.

TILWSP is able to process and package waste into standard Nirex containers. The waste sludges and resins are handled as a slurry and put into a 3 m³ drum, where they are dewatered and then solidified in a cement-based matrix. The product is then checked for quality before the containers are capped off with an inactive grout and lidded. These packages are remotely handled and put into shielded over-packs and removed from the processing plant. They are then deposited into packaged waste store on site.

Once the plant has finished recovering waste at Trawsfynydd it will be decontaminated and transported to another plant, such as Hunterston or Berkeley, to process waste there. decommissioning projects throughout the UK and Europe. Indeed, it can claim to have successfully and safely handled virtually every type of nuclear power station waste that there is, including sludges, resins, desiccants and solid wastes. The team is currently retrieving wastes from all of the main ILW vaults and packaging them in accordance with Nirex requirements ready for long-term storage.



New MSc in decommissioning and environmental clean-up

ancaster University's Engineering Department, Lancaster Environment Centre and the Westlake Research Institute have joined forces to launch a new MSc in decommissioning and environmental clean-up. This is in direct reaction to the government's White Paper: Managing the Nuclear Legacy – A Strategy for Action published in July 2002, and the new draft: Nuclear Sites and Radioactive Substances Bill published in June 2003.

The formation of the Nuclear Decommissioning Authority (NDA) will open-up opportunities for engineering contracting firms to supply nuclear decommissioning services in the UK and overseas (particularly the former Soviet Union) by bidding for decommissioning site licenses. It is estimated that decommissioning activities will require up to 50,000 trained personnel in the near future and will extend beyond the nuclear industry to chemical and offshore facilities, for example.

The draft bill stresses that concern for the environment and safety will be priorities in the clean up operations. A result of this will be an increased need for specially-educated and trained engineers.

Lancaster University's unique MSc directly addresses these issues by providing an innovative syllabus, equally balanced across the issues of engineering, safety and respect for the environment. It is a challenging course, run on a two-year parttime timetable and yet only requires four weeks away from the workplace per year. Individual projects are designed to be as close as possible to relevant industrial activities in each case.

Professor Derek Seward, Head of Department, Lancaster University Engineering Department, said: "Through our close association with the nuclear industry and safety engineers in particular we have found there is a high demand for advanced post-graduate level education for experienced engineers wishing to take on more responsibility in senior roles. The draft bill will open up new challenges for nuclear engineers needing to comply with the government's high standards of safety and environmental protection, and the nuclear industry will need to demonstrate a high level of commitment to these issues to the new NDA and the public. Having engineers educated to masters level in these areas will help achieve this and I know this course will be welcomed by the nuclear industry and the government alike."

The University says that the course will be of particular interest to:

- technical directors of engineering and construction firms, who will benefit from having recently-educated and speciallyqualified engineers within their teams;
- engineers, based in the UK and overseas, with at least five years industry experience who wish to move or progress into the specialist field of nuclear plant decommissioning;
- engineers, based in the UK and overseas, currently working in the nuclear industry who wish to improve and their skills related to safety and environmental protection; and
- the NDA as it will be responsible for ensuring education and training is available to the workforce employed in decommissioning activities.

Contact Evelyn Shaw, MSc Admissions Administrator, tel: 01524 594058, email: evelyn.shaw@lancaster.ac.uk, or via the website: www.engineering.lancs.ac.uk

Climate Change and Power – Economic instruments for European electricity

Christiaan Vrolijk

Published by Earthscan (www.earthscan.co.uk) £24.95



The imposition by governments of 'economic instruments' such as emissions trading, taxes and voluntary agreements are the keys to controlling emissions of carbon dioxide from European electricity industries - the continent's largest source. But, national electricity industries come in a variety of forms.

In this work, Christiaan Vrolijk describes the

characteristics of different electricity regimes, defines the range of instruments available, and assesses the potential for each instrument under the different regimes and for Europe as a whole. Particularly useful, perhaps, for senior electricity industry people about to face new challenges from government.

Focus on Energy – a practical introduction to reducing energy bills

Published under the Action Energy programme (www.actionenergy.org.uk) by the Carbon Trust, free

New to the job of energy manager, or had energy management and purchasing duties thrust upon you? This is your (free) starter source of structured guidance. This second edition benefits from feedback from users of the first.

Organised as a series of checklists under eight main chapters (management, buying energy and water, HVAC, lighting, electrical equipment, hot and cold water, compressed air, vehicles), the book starts with a list of no-cost measures under each; only subsequently moving-on to costed measures. Stronger on buildings than industry, the book omits steam boilers, refrigeration and process energy.

Well-organised, brief and to the point, Focus on Energy is unlikely to teach experienced practitioners anything at all – but it's an ideal (no-cost) introduction to beginners and reference work for part-timers.

Energy Efficiency in New Housing Published by the Energy Saving Trust (www.est.org.uk) free

This brief work is a summary of how to achieve higher-than-standard levels of energy efficiency in homes in England, Scotland and Wales. Built around specifications for 'good practice' (legal minimum plus some); 'best practice' (including tried and tested add-ons) and 'advanced design' (for sustainability enthusiasts).

Detailed (but very brief) guidance is given on energy ratings, Uvalues, heating system efficiencies and controls, lighting and ventilation; and the 8-page leaflet starts with a table of predicted cost and energy savings from each standard, for seven standard house types.

Climate Alarmism Reconsidered

Robert L Bradley Jr

Published by the Institute of economic Affairs (www.iea.org.uk) £12.50

Dr Robert Bradley, President of the Institute for Energy Research in Houston, Texas, claims to present a "devastating critique of the research of environmentalists, who he describes as 'climate alarmists'." His 150 page book (not published by the other IEA, the International Energy Agency) suggests that we should "welcome carbon energies not only for their intended consequences but also for some of the unintended consequences – carbon fertilisation, proportionately higher minimum temperatures, longer growing seasons and a more active hydrological cycle."

His conclusion concludes with: "The best environmental policy is the best energy and economic policy, which means a continuing primary role for carbon energies the world over, in accordance with private property, voluntary exchanges and consumer sovereignty."

www.oilmarketreport.org

This website is from the International Energy Agency – it's an electronic version of the paper-published *Oil Market Report* but with more data, more analysis, and downloadable. The authoritative *OMR* has long been required reading for those involved in oil market forecasting and decision-making, and the IEA prides itself on getting a vast quantity of data and analysis published very quickly. The web version is an obvious progression – even more data (2000 charts updated each month), and with add-ons like a choice of 'views' that allows readers to look at developments according to their own needs. Not cheap, a single paper or PDF version costs 1750 euros.

	Oil Marl	ket Report
	by the Inter	national Energy Agency
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Events

November

Coal science Conference, 2-6 November Australia Contact: ICCS Email: iccs@aie.org.au www.aie.org.au/iccs

Harnessing computer technology to deliver better E&P returns 4 November, Aberdeen Contact: Energy Institute Email: Iviscione@energyinst.org.uk

The World Energy Investment Outlook: Highlights from the 2003 IEA Report 4 November, London Contact: Energy Institute Email: Iviscione@energyinst.org.uk

El Branch Event Lunch presentation 5 November Contact: Ireland Branch - Tony Murray Email: wardc@statoil.com

El Branch Event Visit to new combined cycle gas turbine 5 November 2003 Contact: Northern Ireland Branch - Ciaran McGrath Email: mcgrathc@ belfastcity.gov.uk

El Branch Event Paladin's role as an operator, with support from Petrofac and Helix RDS 11 November Contact: Aberdeen, Highlands

and Islands – Denis Pinto Email: denis@pinto92.freeserve.co.uk

El Branch Event Recent advances in gas - fired air heating 13 November 2003 Contact: Midland Branch - Vian Davys Tel: 01970 880667 Email: vian.davys@eme.co.uk

A commitment to CHP Conference 13 November 2003, London Contact: CHPA Email: info@chpa.co.uk

Photovoltaics in buildings 17 November 2003, Watford Contact: BRE Email: morrisj@bre.co.uk

Taking regulation forward 18 November Contact: Energy Industries Club – Chris Maude Email: maudec I @asme.org

El Branch Event

Visit to refuse incinerator at Crymlyn Burrows 19 November Swansea Contact: South West, South Wales and the Channel Islands - Dr John Whitehead Tel: 01242 674489 Email: j_whitehead@onetel.net.uk

El Branch Event Update on India oil and gas industry 25 November Contact: London and Home Counties Branch - Ian Robinson Tel: 01932 783774 Email: irobin1040@aol.com

IP Awards 20 November, London Contact: Energy Institute Tel: 020 7467 7174 Email: Iviscione@energyinst.org.uk El Branch Event Scottish Annual Lecture 20 November Contact: Southern Scotland Branch - Fatima Uygun Email: f.uygun@strath.ac.uk

Energy auditing Course, 26 November, London Contact: Energy Institute Tel: 020 7467 7178 Email: ndlm@energyinst.org.uk

Electricity markets overview Workshop, 25-27 November Brighton www.power-ink.com/ emo/home.htm

December

The implementation of renewables in our energy economy Lecture, 9 December 2003, London Email: uk-ises@brookes.ac.uk

Delivering world class energy networks 16 December Contact: Energy Industries Club – Chris Maude Email: maudec I @asme.org

January 2004

El Branch Event Bonga project 13 January 2004 Contact: Aberdeen, Highlands and Islands – Denis Pinto Email: denis@pinto92.freeserve.co.uk

El Branch Event Visit to the new energy research facility at Ulster University 14 January 2004 Contact: Northern Ireland Branch – Ciaran McGrath Email: mcgrathc@belfastcity.gov.uk

El Branch Event Asbestos revisited – history of uses and occupational diseases 14 January 2004, Corringham Contact: Essex and East Anglia Branch – Arnold Carlson Email: arnold.carlson@lineone.net

Scottish Energy Lecture

The Southern Scotland branch (with principal centres in Glasgow and Edinburgh) is hosting its Annual Energy Lecture on 20 November 2003 at the Glasgow Trades Hall. The title of the lecture is 'The Energy White Paper - Leading Strategy or Missed Opportunity'. The event will continue to be based on the familiar BBC Question Time style debate and will be chaired by Sally Magnusson, anchor of Reporting Scotland and copresenter of Newsnight Scotland.

For further information, please contact Fatima Uygun at Suite 312, Claymore House, 149 Kilmarnock Road, Glasgow G41 3JA or telephone 0141 423 1243, fax 0141 632 7726 or email f.uygun@strath.ac.uk

Latest from the library

Copyright

The new rules for copyright eventually came into force on 31 October 2003 with the passing by Parliament of Statutory Instrument 2003 No 2498 - The Copyright and related rights regulations 2003. At the time of writing the Copyright Licensing Agency is still finalising details for the licences which will allow us to supply you with copies of articles should you require them for commercial purpose. a Unfortunately, an additional

payment will be incurred. If your need for the copies is noncommercial we can continue to supply them at our standard photocopy rates, once you have completed a photocopy declaration form. Please talk to any member of LIS staff for further information.

Christmas opening hours 2004

The library will close at 12.30 on Christmas Eve, Wednesday, 24 December 2003 and will reopen at 9.15 on Monday, 5 January 2004.

Advanced Energy Management one-day course - Energy auditing

26 November, London

The Advanced Energy Management one-day courses cover specific areas of energy management in more depth, providing students with practical solutions to assist in producing an effective energy management strategy, increasing efficiency and reducing energy consumption.

The courses are aimed at those wanting more in-depth information on specific energy management techniques and areas of interest. They are ideal for those who have already attended the Introduction to Energy Management course but this is not a prerequisite to attending the advanced courses. Those more experienced in energy management will also find the courses beneficial in developing their knowledge and expertise.

The Advanced Energy Management courses employ interactive techniques including the use of group discussion and case studies from business.

Energy auditing

This course provides a standard methodology to conduct comprehensive energy audits to help identify where energy is being wasted, together with appropriate energy efficiency measures to consider in order to reduce energy consumption. Course fees:

Member rate for individual courses: £199.00

Non-member rate for individual courses: £279.00 Contact: Energy Institute, tel: 020 7467 7178, email: ndlm@energyinst.org.uk Most of these items can be borrowed by Energy Institute Members either by visiting us in person, or contacting us by email, fax or phone. If we send the items to you through the post we just ask that you refund the cost of postage.

Before they closed at the end of September the Electricity Association Library kindly donated some very useful items to us – some of which are included in the list below.

- Climate alarmism
 - reconsidered. Bradley Jr, Robert L. Institute of Economic Affairs; IEA. 1st ed. London, England: IEA, 2003. 177pp. ISBN 0255365411
- Electricity and the environment 2003.
 Electricity Association; EA.
 London, England: Electricity
 Association, April 2003.
 I 20pp.
- Electricity Industry Review
 7. Electricity Association;
 EA. London, England: EA,
 March 2003. 112pp. ISBN
 0851882072.
- The eve of the petroleum era: Key issues of the history of Russia's and US oil industries in the second half of the 19th and early 20th century. Alekperov, Dr Sc Vagit, ed. Russian Academy of Natural Sciences; Oil and Gas division. 1st ed. Moscow, Russia: Russian Academy of Natural Sciences, 2003.
 263pp. ISBN 5935460606
- Guide to the new electricity legislation.
 Electricity Association; EA.
 London, England: Electricity

Association, 2002.

- International exploration economics, risk, and contract analysis. Johnston, Daniel. 1st ed. Tulsa, Oklahoma: PennWell, 2003. 401pp. ISBN 0878148876.
- The International Who's Who 2003. Sleeman, Elizabeth, ed. 66th ed. London, England: Europa Publications Ltd, 2003. 1809pp. ISBN 18574315452.
- McCloskey's big coal book 2002. Mclosky Group.
 Petersfield, Hants, UK: Gerard McCloskey, 2002.
 483pp.
- Safety management: A qualitative approach. Davies, John; Ross, Alastair; Wallace, Brendan; Wright, Linda. 1st ed. London, England: Taylor & Francis, 2003. 220pp. ISBN 0415303710.
- Striking a balance 2003: The sustainability strategy update and progress report of the UK offshore oil and gas industry.; UKOOA. London, England: UKOOA, 2003 76pp.

Contact Details

Information, careers and educational literature queries to: Chris Baker, LIS Officer +44 (0)20 7467 7114 Sally Ball, LIS Officer, +44 (0)20 7467 7115 Library holdings and loans queries to: Liliana El-Minyawi, LIS Officer, +44 (0)20 7467 7113 LIS management queries to: Catherine Cosgrove, LIS Manager, +44 (0)20 7467 7111 IFEG queries to

Sally Ball, Secretary of IFEG, +44 (0)20 7467 7115

Achieving a low carbon policy for organisations through change management and effective leadership

he Government's policy for creating a low carbon economy requires a doubling of the rate of energy efficiency improvement seen over the last 30 years.

Energy efficiency is a proven means of saving money and reducing the environmental burdens of an organisation. This approach, however, is not enough. Presently, energy remains a peripheral business issue to most organisations.

The aim must now be to find a means to create a paradigm shift in the UK's energy performance and this is made more difficult during a cycle of cheap energy. Energy managers know the difficulty of engaging senior management to support energy efficiency and, in cases, even the many environmental agenda. The Climate Change Levy and the aims of Corporate Social Responsibility provide a new opportunity energy for managers to integrate efficiency into every element of the organisation's business plan.

In the past many energy and environmental improvement programmes have been undertaken outside the context of the strategic direction of an organisation. The result of this approach is that the project lacks the backing of senior management. This fundamental omission creates a situation where the resultant benefits can be short-lived.

Energy managers make a major contribution, both to the

By Peter Jenner CEng FEI, William Battle Associates Ltd improved competitiveness of UK industry, and cost reduction in the public sector. This has largely been accomplished through the use of technical innovations.

However, "technical fix" solutions alone will not deliver the magnitude of savings required by government targets. Most energy managers will agree that senior management needs to be involved to help engage people to change behaviours. The crucial issue is that energy managers often have great difficulty in influencing senior management to adopt programmes that will both reduce costs and meet targets for reducing CO₂ emissions.

The Carbon Trust, in its drive to deliver CO_2 reduction, has identified the need for a step change in performance through innovation in the following areas:

- low carbon technology to create sustainable energy saving; and
- behavioural change, to engage management and the workforce in changing working patterns.

It is often this behavioural change which is most difficult to achieve but, without it, technological solutions will struggle to meet government targets.

Questions every energy manager needs to ask

The role of the energy manager is changing: they need to become energy leaders, they need to be pro-active in creating the circumstances to deliver a step change in energy performance. An energy manager needs to ask him/herself the following questions:



- Have I scanned the business horizon to consider the opportunities and threats which will affect my role?
- Am I part of an effective management team that works together to solve business problems and exploit opportunities.
- When was the last time I made a radical change to the way I work and why?
- What is the most important impact I have had on my organisation?
- Am I satisfied with our current energy performance?
- Do I lead change to improve my effectiveness or simply manage what already exists?
- What are the main political, legislative, economic, sociological, environmental and technological issues that are likely to affect my role in the next five years?
- What am I going to do about these key external issues?

Strategy

The crucial element of the energy manager's role as a leader is to use experience and insight to consider their organisation three to five years ahead. Many business leaders see their role as anticipating trends years in advance and creating a sense of urgency within their organisation, but this alone would not achieve results. With a realistic strategy and action plan to address these issues this exercise will energise those involved to make changes to produce real results.

The strategy provides the essential urgency necessary as a spur to innovation and to deliver results. The development of a strategy creates the context for what the energy team will become.

Energy leadership

Energy leadership is one of the critical factors in developing a successful energy programme. Energy leaders set the pace and direction of their element of the business. They must think outside the box and challenge what currently exists.

The key characteristics of an effective energy leader are:

- focuses on people rather than technology;
- innovates new approaches and regularly re-appraises existing systems;
- seeks to build enthusiastic partnerships for action;
- challenges the way energy is used;
- manages change so that energy efficiency becomes the norm rather than the exception;
- long-sighted knows where the organisation is going and looks for synergies for action;

New Energy Institute publications

Quality Control now available online

As the first step towards the online publication of all its codes and standards, the Energy Institute is about to launch its flagship title, Standard Test Methods (STM), online at www.energyinstpubs.org.uk. STM - Standard Methods for the Analysis and Testing of Petroleum Products and British Standard 2000 Parts - is a compilation of test methods based on traditional and modern instrumentation techniques (including joint methods with BSI, EN ISO and ASTM). These Standard Methods are an essential part of any quality control regime, and necessary for national and international trading of petroleum and petroleum products. For several years, STM has been available as two printed hardback volumes, with a CD-Rom to assist searching. STM is used by refineries, laboratories, testing houses and individuals across the industry. The next hardback book edition will be published in February 2004 and can be ordered from

Portland Customer Services. Email: sales@portlandservices.com.

STM Online for the first time

Energy Institute will The continue to publish STM in book form. In addition, it is launching STM Online, which can be purchased in its entirety on an annual subscription basis, or in the form of single copy sales. Global, Site and Individual Subscriptions are available. This means that individuals and companies can access the latest petroleum test methods from their desk or laptop anywhere in the world at any time. Subscriptions start at £1,300 annum. 25% discount per for FL Members. For information, visit more www.energyinstpubs.org.uk or email: sfm@energyinst.org.uk.

Also new online:

Transport Fuels Technology (TFT) Update Service

Available quarterly, online or via email, the TFT Update Service delivers carefully selected

- builds an irresistible business case for action;
- · inspires others to act; and
- empowers by explaining the end result.

Energy leadership requires both knowledge and ingenuity but also diligence, persistence and commitment. A new energy leader training course aims to link the energy/environmental agenda directly to business goals through the engagement and motivation of people. For those who have previously attended the Introduction to Energy Management or Advanced Energy Management courses it forms a natural progression route for increasing the skills, knowledge and effectiveness of the energy manager.

The El and William Battle Ltd will be running the first Energy Leadership programme on Wednesday, 3 December in London. If anyone wishes to obtain further information regarding the course please contact Nellie on 0207 467 7178 or email: ndlm@energyinst.org.uk.

abstracts from worldwide literature, including technical journals, conference proceedings, special reports, books and databases. Bibliographic and reference details are provided to assist with further study where needed. An online index is also provided for the accompanying textbook, Transport Fuels Technology (available from Portland Customer Services). Essential source material for scientists and engineers interested in transport fuel

science and technology, as well as librarians, information scientists, managers and planners. Subscriptions start at £195 per annum. 25% discount for El Members. To subscribe, email sfm@energyinst.org.uk. Publications can be ordered from Portland Customer Services, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. tel: +44 (0)1206 796 351. fax: +44 (0)1206 799 331 email.

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Senior Energy Consultant Required

Salary circa £35k with pension, laptop, mobile and other office equipment. Location: home base when not on client premises. Technically qualified team leader with preferably ten years experience in the energy sector and good computer skills.

Please send CVs to Jes Rutter, Director, JRP Solutions Ltd. Email: jesrutter@aol.com

Energy Consultant Required

Salary up to £30k with pension, laptop, mobile and other office equipment. Location: home base when not on client premises. Technically qualified and good communicator with five years minimum experience in the energy sector. Please send CVs to Jes Rutter, Director, JRP Solutions Ltd. Email: jesrutter@aol.com

energy 121.com

A specialised Search and Preselection Recruitment Service in the Energy Sector. Under no obligation, enquire in confidence to Steve Howe BSc, MBA, CEng, MEI Email: line8@energy121.com

A chartered engineer with 22 years experience in building services engineering in specification design, operations and maintainance of all types of local authority buildings is seeking a suitable position in the UK or overseas. Please contact Mr M Haque on 020 8907 2191 or email: mohammadfhaque@aol.com

new members

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Deceased members Mr Noel C Crighton CEng MEI

Energy World printing and paper

As you will have noticed, the paper stock that Energy World has been printed on this month has changed. This is a result of the printing of the magazine moving to a new printers, Thanet Press based in Margate, Kent. This is where our sister magazine, Petroleum Review, is printed. The paper Energy World is printed on, the that Petroleum same paper Review is printed on, is produced in

Italy by Burgo, Italy's largest paper manufacturing group.

Burgo is committed to sustainable development, having set up an environmental management system in compliance with ISO 14001 standards; this includes an emphasis on water treatment; discharge and energy self-sufficiency. Burgo states that "sustainability of our activities can be guaranteed only through respect for the environment and its natural equilibrium". This is achieved through stateof-the-art effluent treatment systems, chlorine free bleaching of internally produced pulps, highly efficient cogeneration plants fuelled by methane, and wood originating from sustainable forests. The plant is supplied only by PEFC (Pan European Forest Certification) forests.

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To advertise in *Energy World* please contact Paul Hollidge at McMillan Scott Plc: Tel: 020 7878 2339 Fax: 020 7379 7118 paul@mcmslondon.co.uk Discounted rates are offered to Individual and Group Members of the Energy Institute For media information please email: eworld@energyinst.org.u Mechanical Data Full Page 210 mm x 297 mm Half Page 185 mm x 130 mm Quarter Page 90 mm x 130 mm

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Petroleum review

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WEEK Welcome to 90th IP Week

IP Week is the focal point in Europe each year for leading oil and gas industry professionals. It offers an intensive round of conferences, seminars, industry and trade association events, oil industry's largest Annual Dinner and Annual Lunch.

This is the first IP Week staged by the new Energy Institute, a professional body created in 2003 by the merger of the Institute of Petroleum and the Institute of Energy formed to support individuals and organisations across the energy industry.

The week will include conferences focusing on:

- Energy price
 Oil and gas in FSU



Selected IP Week 2003 events are organised in partnership with / sponsored by:



IP Annual Lunch

• Gas

Tuesday 17 February, Dorchester Hotel, London

The Annual Lunch provides a unique opportunity to hear one of the world's senior figures in today's oil and gas industry discuss the key issues facing the industry in the context of the changing economic, social and political environment.

> Guest of Honour and Speaker: Inge Ketil Hansen, Acting President and Chief Executive Officer. Statoil





IP Annual Dinner

Wednesday 18 February, Grosvenor House Hotel, London

The 90th Annual Dinner is a unique event in the international petroleum industry, which brings together over 1000 of its leading figures, and provides an opportunity to meet with old friends and acquaintances.

> Guest of Honour and Speaker: John Simpson cbe, BBC World Affairs Editor

Exhibition

16 - 19 February, London

Maximise on business and promotional opportunities connected with IP Week 2004 by participating in the oil and gas information services exhibition. The exhibition will be held alongside 2004 events.

All conference and seminar refreshment breaks will be held in the exhibition hall, enabling exhibitors to take full advantage of networking opportunities offered by IP Week. Each conference and seminar session will attract a number of senior oil and gas executives.

Space is very limited so book your stand now!



The rest of the industry will be there, plan now to join us in London! For more information on IP Week 2004, contact the Events Department at the Energy Institute: Tel: +44 (0)20 7467 7100 Email: events@energyinst.org.uk or visit: www.ipweek.co.uk

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