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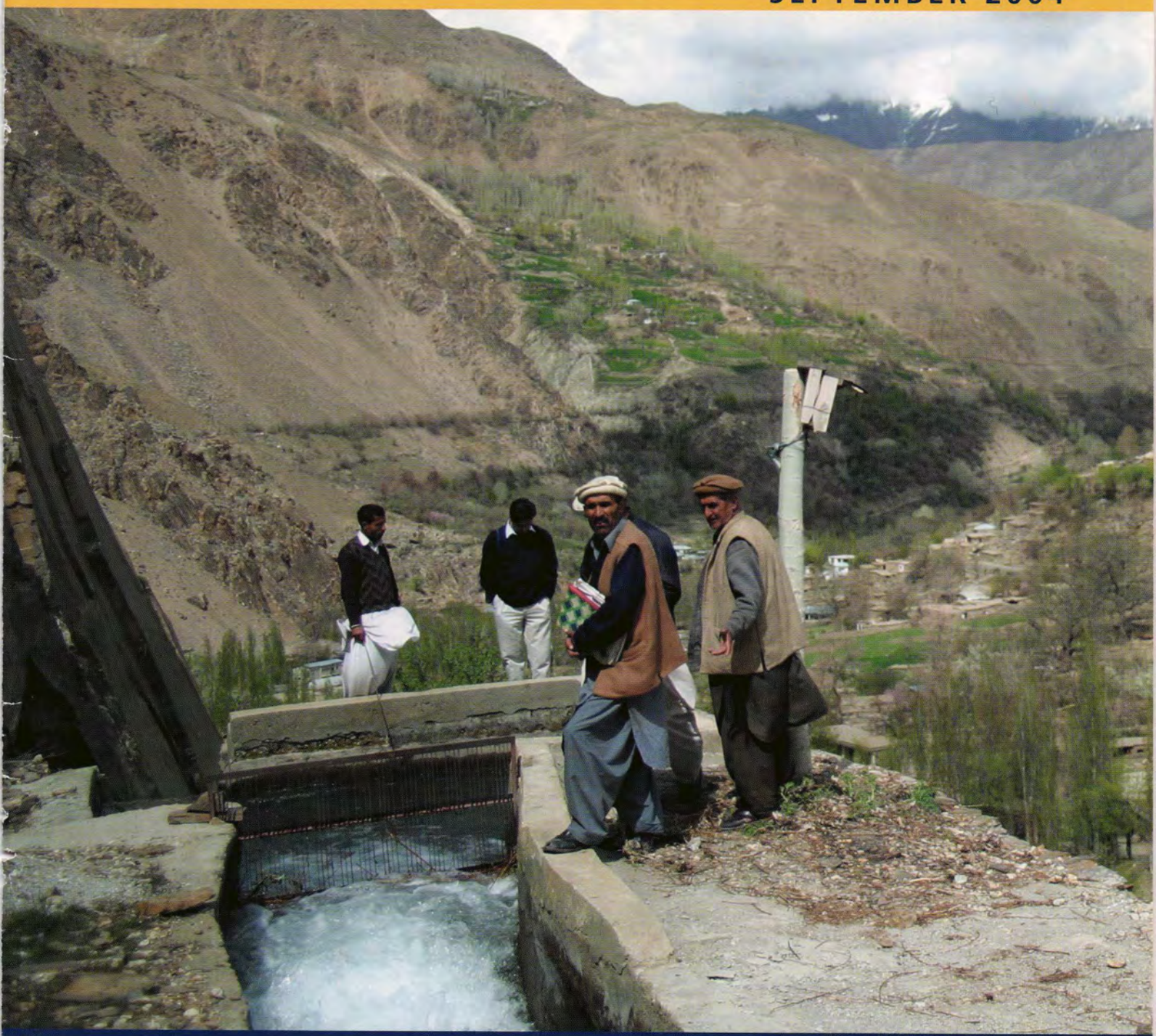

Sustainable energy international

Cornwall's innovative energy strategy

Linking photovoltaics with LED lighting

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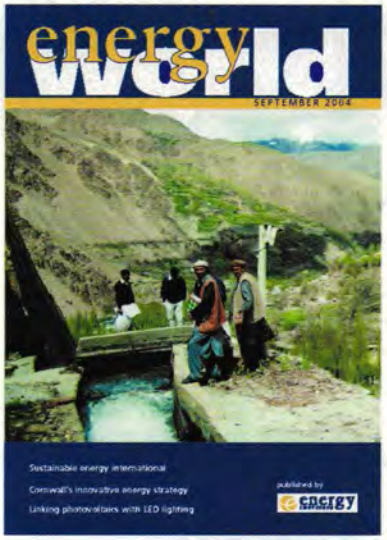
Cover
One of more than 180 micro-hydro projects installed within the Chitral region of northern Pakistan's Hindu Kush with the aid of the Aga Khan's Rural Support Programme. The programme, which has seen 50% of the population of the region benefit, was one of four international winners of this year's Ashden Awards for Sustainable Energy – see page 10 for the full story.



Published by
Energy Institute
61 New Cavendish Street,
London, W1G 7AR, UK
e: **info@energyinst.org.uk**
www.energyinst.org.uk

Editor
Steve Hodgson
t/f: +44 (0)1298 77601
stevehodgson@btinternet.com

Design
Emma Parsons
eparsons@energyinst.org.uk

Subscriptions
Chris Baker
t: +44 (0) 20 7467 7114
e: cbaker@energyinst.org.uk

Advertisement sales
Brian Nugent, McMillan-Scott
t: +44 (0) 20 7878 2324
e: bnugent@mcmslondon.co.uk

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President
Euan Baird FEI

Hon Secretary
Joanna Wade

Treasurer
Eur Ing D Barber CEng FEI

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Making fuel cells a commercial reality

Stephen Voller,
Founder and CEO
of Voller Energy

Fuel cells have offered great promise for so long, but have yet to deliver many commercial products. Voller Energy is one of a new breed of fuel cell companies with a market-driven culture, and one of the first fuel cell companies world-wide to deliver a commercial product.

Everything we do is driven by a simple philosophy that we call Voller's Law: that consumers will not pay a premium to be environmentally friendly nor will they accept a performance premium to be environmentally friendly.

In the summer of 2001 I was enjoying a drink with an engineering friend of mine, Mike Clarke, in a pub in Covent Garden, London. I had just come back from a business trip to San Francisco and had forgotten to take my charger with me for my laptop. I realised this mistake about over Iceland on the way out, when my battery had gone flat.

Although I was using a pretty standard leading brand make of laptop, I could not find a compatible power adaptor or spare battery anywhere in the Bay area. Laptop batteries differ widely even within the same manufacturer's product range. So I had to spend the whole week without the use of my laptop.

Mike had just been working with a construction firm, who had a similar problem with spare batteries for power tools. For safety reasons, cordless power tools are preferred to corded power tools. The trouble is there are no standards for cordless tool batteries, so you have to carry multiple spare batteries for the different types of power tools that you need during the day. Then remember to take them all home and charge them all overnight.

Over our pint, we began to explore this problem of battery charging and wondered if we could provide a solution to this problem. After a little research we came up with the idea of using a fuel cell to charge the batteries and began researching the fuel cell market. As fuel cells output direct current (DC), they make very efficient battery chargers. As a result of this research, Mike and I founded Voller Energy in March 2002 to manufacture portable fuel cell systems that can be used as battery chargers and mobile generators.

This is an example of market-driven thinking, and it is what sets Voller Energy apart from 'old style' fuel cell companies. Most of these fuel cell companies are not market driven but technology driven. This is why fuel cells haven't yet reached commercial reality. This is why a technology developed in 1839 has still to progress much beyond the laboratory and pilot projects for most fuel cell companies.

In March 2004, Progressive Investors issued a report that said:

- everyone is excited about fuel cells, but mostly about when they will appear in cars;
- the first introduction of fuel cells on a massive scale will not be in cars but in energy-thirsty portable devices; and
- this is one of the few cases where an environmentally-friendly product is being led by demand from the market.

We are still at least 10 years away from fuel cells in cars. The reason – Voller's Law. Produce a fuel cell car that sits next to a petrol or diesel equivalent in the showroom and is the same price and has about the same performance, then consumers will buy it. However, put a fuel cell car in the showroom that is orders of magnitude more expensive than the conventional alternative with a shorter range, and fuel supply problem, and few would buy it.

It is now time for the intellectual and academic snobbery that is so characteristic of the old style fuel cell companies to end and for the entrepreneurs and the engineers to take over. People who know how to build and market products that customers want to use. It is not until these products reach the commercial world can you really improve them.

The point is that we are today with portable fuel cells where the first IBM-PC was 20 years ago. In 20 years time the systems will be orders of magnitude smaller, cheaper and more powerful than the systems today. I believe by then our children will laugh at old style devices such as power tools, laptops, vacuum cleaners and hairdryers – that had to have the inconvenience of a power cord. In 20 years time all these devices will contain a low-cost fuel cell that will power them independently of the grid, and without the inconvenience of a power cord.

To progress, fuel cell companies have to be more like the early PC pioneers. Further it is only when you ship products to customers that you really learn. No amount of market research or testing will ever replace customer usage as the real test.

We are learning more each day about fuel cells. I believe it far more likely that fuel cell cars and larger fuel cells for power generation will come out of developments in the portable fuel cell space, because it is here that you find companies who have experience of commercial fuel cells. ●

Contact Stephen Voller
e: Stephen.voller@voller.com

US leads methane reduction partnership

The US, Australia, India, Italy, Japan, Mexico, the Ukraine and the UK have formed a multinational coalition, the 'Methane to Markets Partnership', to promote the recovery and use of methane from landfill sites, coal mines and industrial processes. Several more countries are expected to join as the organisation gets into its stride.

The Partnership aims to promote methane recovery and use as a clean energy source to foster sustainable economic growth. It will focus, through sector working groups, on schemes such as landfill gas-to-energy projects, methane recovery at underground coal mines and improvements in natural gas system operations. It aims to reduce net methane emissions by up to 50 million tonnes of carbon equivalent by 2015.

The US federal government is to commit about $53 million over the next five years to developing and putting in place methane projects in developing countries.

The project could create billions of dollars in revenue for companies in the US that develop landfill-gas-to-energy systems and technology, according to the Solid Waste Association of North America. Developed countries are pledging to partner with developing countries to assist them with installing methane-capturing and power-generation projects.

UK-based Renewable Energy Systems (RES) has completed construction of Wigton wind farm, Jamaica – the country's largest wind project. The 23-turbine scheme has a total installed capacity of 21 MW and has been built for Wigton Wind Farm Ltd, a subsidiary of the Petroleum Corporation of Jamaica (PCJ), which will own and operate the wind farm.

Construction work began on site in October 2003, and the first of the twenty-three 900 kW NEG Micon turbines was installed in mid-February 2004. Power from the wind farm will be sold to the Jamaica Public Service Company (JPSCo). The project has been supported by the Jamaican and Netherlands governments and is part of a Jamaican government programme to identify renewable sources and diversify the country's energy mix.

First gas exports from Denmark to Holland

Shell Olie og Gasudvinding Danmark BV has announced the first direct export of natural gas from Denmark to the Netherlands, through a new 100 km subsea pipeline. The pipeline creates new markets for Danish gas in north west Europe, contributes to a more competitive energy market, and improves security of supply, says Shell.

The 26 inch line, which represents an investment of over $200 million, runs from the Maersk-operated Tyra West platform on the Danish continental shelf under the sea to the NAM-operated F3-FB platform on the Dutch continental shelf. From there, gas is fed into the NOGAT pipeline system to Den Helder on the Dutch coast.

The Tyra West to F3 pipeline is operated by Maersk Oil & Gas and owned by Shell (23%), AP Møller-Maersk A/S (19.5%), ChevronTexaco Denmark Inc. (7.5%) and DONG Naturgas A/S (50%). The new pipeline gives each owner 'divided rights' to transport gas from Denmark for subsequent sale at Den Helder.

US states file lawsuit against power companies

Eight US states and New York City have filed a lawsuit against five US power companies for their contribution to global warming. The states are banding together to force the utility companies to cut their carbon dioxide emissions by at least 3% per year for 10 years. The states are invoking a long-held 'public nuisance' law aimed at protecting property owners from the actions of their neighbours.

"If we do not act soon, the steps we will need to take to prevent global warming will be much greater and much harder," says New York Attorney General Eliot Spitzer. He says the companies – American Electric Power Company, the Southern Company, Tennessee Valley Authority, Xcel Energy Inc, and Cinergy Corporation – were chosen because they are the five largest carbon dioxide emitters in the US, operating 174 power plants in 20 states. "These companies together emit 650 million tons of carbon dioxide each year – 10% of the country's carbon dioxide and more than all of the UK," adds Spitzer.

The plaintiffs – which also include California, Connecticut, Iowa, New Jersey, New York State, Rhode Island, Vermont, and Wisconsin – say that the federal government has failed to take action on the problem.

The suit is seeking no monetary damages – simply a steady reduction in carbon dioxide emissions over a decade. Spitzer said increasing the plants' efficiency, switching to cleaner-burning fuels, and using wind or solar power were among the "technologically and economically feasible" fixes his team had studied.

IEA weighs the balance between competition, environment and nuclear power in France, the Netherlands and Sweden

The International Energy Agency (IEA) has published reviews of national energy policies of three countries: France, The Netherlands and Sweden.

"French energy policy has been successful achieving energy security, economic growth and environment protection, with a centralised approach using strong government involvement" said Claude Mandil, Executive Director of the IEA at the launch of the review of French policy. "The main challenge is now to adapt to a changing European energy context in which competition and an increased international scope play important roles."

The French government has taken commendable steps towards a sound legal and regulatory framework for liberalised energy markets. Nevertheless, challenges remain, in particular incumbent market power, which could threaten the success of liberalisation, says the review. Reversing the course of GHG emissions is also a major challenge.

Nuclear power could continue to play a beneficial role, says the IEA. In 2002, nuclear accounted for 43% of total primary energy supply and 79% of electricity generation in France, which has developed a substantial technological resource in this field. The government would like to maintain this capability as an important requirement in keeping the nuclear option open. Substantial government R&D in this field and the marketing and construction of French nuclear plants abroad will help in this regard, says the IEA. The government has also indicated that it would agree to a domestic demonstration unit for the European Pressurised Reactor (EPR) to be completed around 2012. Any such plant should be built under market conditions, adds the Agency.

Meanwhile, "The Netherlands has shown great pragmatism in its energy policy, giving due attention to cost effectiveness and the need for innovative solutions," said Mandil at the launch of the review of Dutch policy. Liberalisation of electricity and gas markets has advanced and the country is pursuing active climate policies. Research and development policy has been rationalised and an initiative to achieve a sustainable energy system launched. There is a clear commitment to energy security with national oil stocks meeting the 90 days obligation.

The country still faces some challenges however, of which the most urgent is reorganising the gas market structure, says the IEA. The capacity of international links in both the electricity and gas networks needs to be increased: this requires intensified international co-operation. Along with other IEA member countries, the Netherlands must encourage adequate investment in the energy sector, adds the Agency.

The Dutch government has made great efforts to meet its Kyoto target of a 6% reduction in greenhouse gas emissions between 1990 and the first commitment period. While the country is apparently on track to meet the Kyoto target, with emissions having almost stabilised, some work still lies ahead, says the review. For example, curbing the rapid growth of energy demand in the transport sector requires strong new policies and measures.

"Swedish energy policy sensibly combines market forces with government influence to achieve economic efficiency, energy security and environmental protection," said Mandil, launching the review of Swedish energy policies. Sweden is to be commended for its liberalised electricity market which, through Nordpool, has been a model of competition for many countries. Sweden also has impressive emergency response measures to deal with any oil import shortages and holds reserve stocks consistently above 90 days of use, says the IEA. "But the major issue impeding the Swedish energy sector today is the continued uncertainty over the future of nuclear power," added Mandil.

Nuclear power has been a political issue in Sweden since the general election of 1976. Debate on this issue has continued, even while Sweden was developing a substantial nuclear power park. In 2002, nuclear provided 46% of the country's electricity generation and 35% of primary energy supply.

While one reactor has already been shut down (Barsebäck 1 in 1999), the debate over nuclear continues. The resulting uncertainty constrains necessary investment in the power sector and puts long range climate change plans in doubt, says the Agency.

Energy policies of IEA Countries – France, the Netherlands and Sweden 2004 are available from IEA Books, e: books@iea.org

No Olympic medals for green engineering

New venues for major sports tournaments have often provided opportunities to showcase the latest, greenest energy technologies. But not in Athens, host to the 2004 Olympic games, according to a new report from Greenpeace: *How Green the games?*

The report suggests that, far from advancing since the last Olympic games in Sydney 2000, the Athens 2004 organisers (ATHOC) have taken a definite step backwards.

One of the biggest areas of concern is the green energy sector. ATHOC stated in 2001 that: "Athens 2004 would like to be the first ever Olympiad using 100% Green Energy", says Greenpeace. Far from achieving this goal, renewable energy accounts for virtually none of the energy produced and distributed at the games. Photovoltaic (PV) cells have not been used anywhere in the Olympic Village or other Olympic venues. Solar thermal systems, for hot water supply and cooling systems have again been ignored, adds the environmental group. All this in a country with one of the most advanced solar manufacturing industries in the world.

Meanwhile, the cooling loads of the buildings are 2.7 times the requirement suggested by the relevant Greek authorities, says Greenpeace. As a result, oversized air-conditioning systems have been installed, using potent global warming gases called HFCs instead of natural alternatives.

"Instead of moving forwards even just a little bit, the Athens 2004 Games have gone back, way back as far as environmental issues are concerned, it is a pretty miserable record. The International Olympics Committee (IOC) has called the environment the third pillar of the Olympics behind sports and culture, right now it takes a Herculean effort to see this pillar as it seems all but invisible" said Nikos Charalambides of Greenpeace Greece.

US DOE to help study new nuclear generation

The US Department of Energy (DOE) has said that it will cooperate with an industry team led by the Tennessee Valley Authority (TVA) to conduct a detailed study of an Advanced Boiling Water Reactor (ABWR) nuclear plant. DOE will fund half the cost of the $4.25 million study, which will help TVA decide whether to build a facility on the site of its mothballed Bellefont nuclear plant, located near Hollywood, Alabama.

TVA is considering building a 2,600 MW, two-unit facility by the middle of the next decade. No ABWRs are currently operating in the US, although three are operating in Japan. TVA is currently working to refurbish its 1,200 MW Browns Ferry Unit 1 nuclear plant, which it intends to restart in 2007. The plant, also located in Alabama, was shut down in 1985.

According to the DOE Office of Nuclear Energy, Science and Technology, DOE has received three applications for technical assistance for its nuclear power plant licensing demonstration projects. In addition to the TVA proposal, Dominion Energy is leading a consortium to develop, license, and build two 700 MW Advanced CANDU reactors at its North Anna site northwest of Richmond, Virginia, and a consortium called NuStart Energy is completing detailed engineering work on two new advanced nuclear reactor designs. The CANDU reactor is a Canadian design that uses pressurised heavy water.

Western US governors launch clean energy initiative

The governors of 18 states at and beyond the western edge of the US have agreed to explore opportunities to develop "a clean, secure and diversified energy system for the West and to capitalise on the region's immense energy resources." The energy resolution, adopted at the annual meeting of the Western Governors' Association (WGA), sets a preliminary goal of increasing the efficiency of energy use in the West by 20% by 2020, and also aims to develop 30,000 MW of clean energy in the West by 2015.

Clean energy, as defined in the resolution, includes renewable energy sources such as solar, wind, geothermal and biomass energy, but also includes clean coal technologies and advanced natural gas technologies. The resolution calls for a study of policies to facilitate wind energy development throughout the region, and notes that the governors have been evaluating an initiative to develop 1,000 MW of concentrating solar power in the West. To carry through on the resolution, the WGA will establish a 'Clean and Diversified Energy Working Group' composed of regional stakeholders, with a steering committee comprised of representatives from governor's offices.

The WGA represents the governors of 18 western states and of American Samoa, Guam, and the Northern Mariana Islands.

Germany increases PV manufacturing capacity

Germany's RWE SCHOTT Solar is increasing the production of solar cells at its headquarters in Alzenau. Europe's largest manufacturer of photovoltaic cells is investing a total of 40 million to create a capacity exceeding 40 MW per year.

'Due to the positive market situation for photovoltaics in Germany, we decided to further expand our production', comments Dr. Winfried Hoffmann, Spokesman for the Board at RWE SCHOTT Solar. This will also result in an expanded range of solar energy modules. Dr. Hoffmann adds: "We're now expanding two further production lines for solar cells in our SmartSolarFab in Alzenau and expect our first output as early as the start of 2005".

The SmartSolarFab is the largest and latest fully integrated production line for silicon wafers, solar cells and modules in the world, says the company.

RWE SCHOTT Solar currently employs around 800 staff – an increase of 160 over the past 12 months, and the annual turnover for the 2003 fiscal year amounted to over €120 million. Following the planned expansion, the total capacity at RWE SCHOTT Solar – including production at partner companies – will amount to some 100 MW/year.

Siemens delivers power plants in Kuwait and Indonesia

Germany's Siemens Power Generation is building new gas-fired power stations in Kuwait and Indonesia.

After a construction period of 13 months, the first unit of the Az Zour plant, located 80 km south of the capital Kuwait City, was synchronized with the grid for the first time in May. The second and third units followed a month later. For Kuwait, commissioning of the gas turbines in time for the hot summer months is particularly important because, during this period, power demand rises three to four times that required in the winter months.

Upon completion in 2005, eight gas turbine generators will provide approximately 1,000 MW of power to Kuwait. The owner of the power plant is the Kuwaiti Ministry of Energy. Once completed, the plant will be able to run on both natural gas and oil.

In Muara Tawar, Indonesia, the first five of six gas turbine units have been completed for the state-owned utility PLN. The first unit was built within 12 months and delivered in May 2004. The plant, which can be fired with oil or natural gas, will then provide approximately 860 MW to the Indonesian power grid.

Muara Tawar is being built by an international consortium under the leadership of Siemens PG on the outskirts of the Indonesian capital Jakarta. The gas turbine plant is slated to make a significant contribution toward meeting power demand in Indonesia, which is increasing at a rate of up to 8% per year.

New planning guidance to aid renewables

Planning Policy Statement 22 (PPS22): Renewable Energy has finally been published by the Office of the Deputy Prime Minister. The document sets out the Government's planning policies in respect of the development of renewable energy resources in England.

Minister for Planning Keith Hill said: "Our communities will only be truly sustainable if their energy needs are met from renewable sources. That is why we have included new policies within PPS22 to allow local planning authorities to set requirements for renewable energy in new buildings, as well as policies on the encouragement of small scale renewable resources in existing development – in both urban and rural areas."

In particular, PPS22 makes clear that:

- the Government believes that renewable energy developments are capable of being accommodated throughout England where the technology is viable and environmental, social and economic impacts can be addressed in a satisfactory manner;
- regional and local plans should contain policies designed to promote and encourage, rather than restrict, the development of renewable energy resources;
- targets for renewable energy generation should be set out in regional spatial strategies, as indicated in the Energy White Paper;
- local planning authorities should set criteria in their plans against which planning applications for renewable energy projects will be judged – rather than identifying any specific locations suitable for certain types of development;
- planning authorities may set policies in their plans that require a percentage of the energy to be used in new developments to come from on-site renewable energy, and
- proposals for renewable energy developments need to be considered carefully in areas on national and international importance for landscape and nature conservation/wildlife, and should only be granted planning permission where the criteria set out in PPS22, other guidance and legislation are met.

Keith Hill added: "PPS22 ensures continued protection for our most valued landscapes, such as national parks and Areas of Outstanding Natural Beauty. But we must also recognise that some small-scale renewable energy developments will be capable of being accommodated in such areas – such as solar panels on buildings – without serious environmental impact."

The new document has been welcomed by renewables organisations. Chris Tomlinson, Head of Onshore at the British Wind Energy Association, said, "As the emergence of the need for renewables has become abundantly clear, so has the need for a national planning policy statement to guide its development. PPS22 is a vital stepping stone in the renewables revolution, providing the much needed link between renewable energy targets and project delivery on the ground. It paves the way for more consistent planning policies and more informed decisions across the country."

BP's Clair deck has left AMEC's Wallsend, Tyne and Wear, yard to begin a journey to her new home 75 km west of Shetland. Fabrication and integration of the deck, which weighs over 11,000 tonnes, was successfully completed in 18 months by AMEC, which will now carry out hook-up under a £10 million contract. AMEC will assemble the deck on to its jacket and hook up the drilling support module, living quarters, flare stack, waste heat recovery unit and stair towers.

Lifting and transport firm Mammoet, who undertook the load-out of Clair at the Wallsend yard, have nominated her for an official world record as 'the heaviest object ever to have been moved on wheels on land.'

Cutting NO_X ahead of the Combustion Directive

GE Energy has been awarded one of the first contracts in the European Union to help meet the lowered NOx emission limits recently set by the EU Large Combustion Plant Directive for 2008. The contract was awarded by EDF Energy for its West Burton Power Station in north Nottinghamshire. Under the contract, GE will deliver a turnkey NOx reduction solution custom designed for the facility.

GE will supply and install an advanced separated over-fire air (SOFA) system, with triple-compartment over-fire air nozzles installed on the furnace corners and side walls. The SOFA system will stage the combustion process to reduce NOx emissions while maintaining optimised combustion conditions.

The Large Combustion Plant Directive sets lower NOx emission standards for power stations across Europe, with emission targets set for 2008 and 2015. GE's NOx control solution for EDF Energy West Burton should achieve 400 mg/m^3 NOx levels with a broad range of coals, 100 mg/m^3 lower than the 2008 limit, says the company.

GE plans to complete the installation on the first unit in 2005, with subsequent installations on the other three West Burton units in 2006 and 2007, in time for full plant compliance with 2008 levels.

NGC found wanting over 2003 blackouts

Energy regulator Ofgem has found that the National Grid Company (NGC) did not breach its legal obligations as a result of last year's power blackouts in London and Birmingham. But the regulator's wider conclusions, which follow an extensive investigation, do not give NGC a clean bill of health.

Ofgem found that the blackouts in London (37 minutes duration) and Birmingham (42 minutes) were caused by a series of unrelated events, some of which were the result of mistakes by NGC. These were judged against the legal obligations on NGC, under the Electricity Act and its licence, to operate, develop and maintain an efficient, coordinated and economical electricity transmission system. What went wrong was not material enough for Ofgem to find NGC in breach of its legal obligations. But the regulator had concerns, in particular about the adequacy of certain installation procedures and the lack of evidence to show that procedures had been followed.

Ofgem also announced plans for a new scheme to complement the existing legal obligations on NGC and strengthen the incentives on the company to improve system performance. Under the new scheme NGC will, in future, be penalised automatically in the event of blackouts of the kind seen in London and Birmingham with costs that could run into millions of pounds.

£50 million funding package for wave and tidal power

Britain's emerging wave and tidal stream power industry is to benefit from a new £50 million Marine Research Development Fund announced by Secretary of State for Trade and Industry Patricia Hewitt. The fund will "support innovative and visionary businesses throughout the UK who can take first class research and development and bring it to market," says the DTI.

The announcement coincides with publication of a study from the Scottish Executive's Forum for Renewable Energy Development in Scotland's subgroup on marine energy, which sets out an action plan to:

- accelerate the commercial deployment of marine energy devices in Scotland;
- maximise the contribution from marine energy to Scotland's energy mix by 2020; and
- develop a sustainable manufacturing base for marine energy technologies in Scotland.

Work on the precise mechanism for development of wave and tidal stream is underway with the Scottish Executive, Carbon Trust and other key stakeholders.

Tom Delay, Chief Executive of the Carbon Trust, said: "This is excellent news and a significant boost to the UK marine sector. The Carbon Trust is already working with the leading wave and tidal stream companies through our Marine Energy Challenge to accelerate the development of these technologies. With the DTI and the Scottish Executive we are supporting the world's first marine test centre in Orkney. The next step is to make the UK a global centre of excellence and we look forward to working with the Government and the Scottish Executive to make this a reality."

Trigeneration scheme for DVLA

On-site generation plant supplier ENER•G has completed the installation and commissioning of a trigeneration packaged energy system for the Driver Vehicle and Licensing Agency (DVLA) in Swansea. The new system has the capacity to reduce dramatically DVLA's energy consumption and carbon dioxide emissions.

Specified following a competitive tender, ENER•G has provided a containerised system, featuring a 1 MW CHP unit and a 700 kW absorption chiller. These systems operate seven days a week, providing electricity, medium temperature hot water (MTHW) and chilled water (CHW) to the site.

The natural gas-fired CHP unit recovers heat from both the engine cooling circuit and from the exhaust gases, enabling it to provide 1400 kW of heat at full output. The unit also delivers 1150 kW of electrical power at 100% output and is configured to match the electrical demand of the site, thereby preventing the export of excess power to the grid. The absorption chiller is driven by hot water to complement the three existing 1.2 MW electrical chillers. This enables high utilisation of the CHP heat output during warm periods when there is a small demand for heating and hot water, but when cooling demand is high.

The scheme is financed by ENER•G with investment recovered via the company's Discount Energy Purchase (DEP) scheme. The DEP scheme is based on a sliding, variable scale dependent upon the level of generation of the CHP unit – the more the unit is able to run at full output, the lower the DEP rate.

Restriction of competition in domestic bulk LPG?

The Office of Fair Trading (OFT) has referred the market for the supply of domestic bulk liquefied petroleum gas (LPG) to the Competition Commission, following a preliminary review of the market which found that there are features which appear to prevent, restrict or distort competition, and which may lead to customers paying higher prices for their household LPG supply.

LPG customers tend to be based in rural areas with no access to mains gas. Most suppliers retain ownership and responsibility for the maintenance of the tanks, with a small minority of customers owning their tanks. The review was prompted by a number of complaints to the OFT from consumers about this market.

Customers wishing to change supplier typically face sizeable switching costs, with the current and new suppliers often charging for the removal and installation of their respective tanks.

Other obstacles to customers switching supplier identified by the OFT include lengthy contracts, with customers often incurring charges for early termination, and long notice periods for contract termination, with the possibility of a break in supply as a new supplier's tank is brought into use.

John Vickers, OFT Chairman, said: "There are several features of this market which appear to restrict competition and customer choice. The Competition Commission will now investigate further and determine whether any remedies are required."

Renewable energy grants top £5.5 million

The Clear Skies renewable energy grant scheme has offered a further £650,000 in grants to a range of schools, housing associations, local authorities and other not-for-profit community organisations, following the 5th round of applications. This brings to more than £5.7 million the funding awarded through this DTI funded and BRE managed scheme, for projects to generate renewable energy in buildings.

Thirty-one grants, ranging from more than £60,000 to less than £2,000 have been offered in round five applications, for projects such as:

- a solar thermal system for 32 existing and 31 new build housing association dwellings for Kirklees Metropolitan Council;
- a wind turbine for an education centre at Harlington Community School in London;
- a hydro scheme using an existing turbine house for Talybont-on-Usk Energy;
- a ground source heat pump for a new community building for the Pendeen Parish Members Institute; and
- a biomass boiler for a refurbished mill/furniture workshop for New Deal trainees and the Keighley Furniture Project.

Clear Skies manager Chris Roberts of BRE says, "I hope this sort of success will encourage many more community organisations to apply for grants. The deadline for the seventh round of applications is 29 October 2004."

Meanwhile, Energy Minister Stephen Timms has announced a further £2.2 million in funding awards for solar energy projects throughout the UK. Twenty-four projects were chosen for funding, resulting in almost 650 kWp being directly funded in this round. Projects were awarded to eleven regions and to nine different installers. Housing associations, councils and schools and businesses are among those who will benefit.

Further information is available via the Clear Skies Helpline on 08702 430 930, or: www.clear-skies.org

The Scottish Executive is putting up £3.7 million to fund its own parallel scheme. Further information from 0800 1388 858 or: www.est.org.uk/schri

New solar panel plant for Wrexham

Solar energy producer the Sharp Corporation has opened its first solar module manufacturing plant in Europe, based in Wrexham, North Wales. The facility will assemble mono crystalline and poly crystalline solar modules for residential and commercial installations.

Annual production for 2004 is predicted at 20 MW and it is planned to double the capacity in order to meet the expansion of the demand for photovoltaics in Europe – principally in Germany and the UK.

The opening of the new plant in Wrexham is part of Sharp's global strategy to capitalise on the increasing worldwide demand for solar products. In June, Sharp Corporation announced the expansion of solar cell production lines at its Shinjo Plant in Nara, Japan to 315 MW per year. In May last year, the company started solar module production in its manufacturing facility in Memphis, Tennessee.

Sharp began research and development in solar energy in 1959 and, in 1963, began mass-production of solar cells. The manufacturing facility at Wrexham currently employs 475 staff of which 63 are employed in the new solar module facility.

Assembling photovoltaic panels in the new Sharp plant at Wrexham

Energy World

This month sees a re-design of *Energy World* to bring it in line with EI branding and to reflect its place as one of two monthly magazines published by the Energy Institute, alongside *Petroleum Review* (three if you count *Energy Network* – distributed with each copy of *Energy World* and *Petroleum Review*). The re-design, which marks quite a shift from the old version, brings a more unified, professional look and allows more information to be included. *We hope you like it.*

Win return flights for two to anywhere in the world

In celebration of the EI's first anniversary we are offering all members the opportunity to win a fabulous prize by taking part in this year's membership challenge.

The EI is committed to growing its membership in order to increase access to its services. To help us achieve this, we need the help of the EI's most successful ambassadors – each of you! The EI is grateful to all members that have given so freely of their time and commitment in the past, and we have decided that it is time to offer you a chance to win a prize for your continued support.

The Energy Institute is pleased to offer two return flights up to the value of £3,500 to the EI Member who recruits the most new Affiliate members between 1 September 2004 and 31 December 2004. This membership challenge is open to all members across the world regardless of your grade of membership. New members must be accepted for Affiliate membership, the EI's most flexible grade of membership.

Affiliate membership is the EI's newest grade of membership and is suitable for anyone with an active interest in the energy field, wishing to improve their knowledge and network with like-minded individuals. The key advantage to this grade, is that once new Affiliate members join, they can take advantage of the all of the benefits of membership immediately.

The attached form can be photocopied, however, additional copies of membership application forms can be either downloaded by visiting **www.energyinst.org.uk** or by contacting the EI Membership team on t: +44(0)20 7467 7100.

Happy recruiting!

making people enthusiastic about renewable energy, they are turning thousands against it." Ministers have bet everything on land-based wind farms, say the Conservatives and, in doing so, they are alienating local people and excluding other technologies from the market.

The Conservatives say they oppose the current planning proposals (PPS22 – see separate story) which "allows the Government to override local objections to renewable energy planning applications." The party will set out its plans to make Britain more energy efficient, including a "more balanced and long term approach to renewable energy" later this year.

Shadow Secretary of State for Environment and Transport, Tim Yeo MP said: "Across Britain, a voice of protest is growing louder. From Wales to my own constituency in Suffolk, local communities are angry at the way that wind farms are being foisted on them by this Labour Government. The problem is going to get bigger. Under Labour's current plans, the number of wind turbines in the UK, will increase from 1,000 today to over 6,000 by 2010. Almost every area of the country will be affected."

The British Wind Energy Association is not pleased. Chief Executive Marcus Rand said: "Michael Howard's announcement is disappointing on a number of fronts. In just a few words and pictures he is danger of breaking the strong political consensus that has been built up over recent years on the urgent need for a major expansion of wind and other forms of renewable energy to help combat climate change and improve our nation's energy security. His apparent desire to curb the expansion of a vibrant new industry at such a critical moment in its development will not just threaten our national renewable and climate targets but will also potentially jeopardise the long-term investment conditions necessary to ensure that Britain benefits from the thousands of new jobs that an expanding wind industry will bring to Britain. And perhaps most disappointing of all, it appears to be a major misreading of public sentiment. The vast majority of the public wants to see the UK embrace wind and other renewables."

small and medium enterprise (SME) customers has risen sharply in recent years during the summer months (June-September), while winter consumption has remained relatively constant.

The company believes that much of this increase is as a result of the greater use of air conditioning units. If this trend continues, Powergen warns companies could be facing higher energy bills in summer than in the winter in just a few years' time.

Neil Gould, SME manager at Powergen, said: "Where air conditioning was once considered a luxury in a hot spell, some businesses now use it routinely all day. You might be keeping your company cool, but you're going to have to work up a sweat to pay for all the extra energy you're using.

Powergen has a dedicated energy efficiency helpline for its half a million UK SME customers on: 08000 858525.

- Energy regulator Ofgem has signalled its intent to impose financial penalties totalling £700,000 on Powergen after the company unfairly stopped more than 20,000 domestic customers from switching to new gas or electricity suppliers. The customers were paying off debts to the company. Powergen has since confirmed that it has reviewed and revised its procedures and believes it complies fully with arrangements concerning customers in debt.

Middlesbrough-based Marine Projects International Limited (formerly Mayflower Energy) has secured its first contract since the purchase of the business by the Company's management in April of this year. The contract, worth in the region of £3 million, is for the installation of sub-sea foundations for the Kentish Flats offshore wind farm development.

The work will be carried out by MPI using Resolution, its unique £38 million offshore installation vessel. The contract was awarded by Danish civil engineering contractor MT Hojgaard, which is carrying out the design, supply and erection of foundations on a turnkey basis for turbine producers NEG Micon.

Ashden Awards for the best small-scale, international sustainable energy projects

The Ashden Awards for Sustainable Energy reward outstanding and innovative energy projects world-wide which, through the provision of renewable energy, protect the local environment and the global climate while simultaneously improving the quality of life for participants. They are designed to encourage the wider take-up of small-scale, sustainable energy solutions elsewhere.

Research by Ashden Awards partner the Green Alliance shows how micro-generation can, with the right political will, play a major part in helping the UK close its looming 'energy gap' in a way which also tackles the threat of climate change. Further research, by Ashden Awards partners the New Economics Foundation, shows how the provision of local sustainable energy can help to meet basic needs in the developing world, slow down the growth in demand for fossil fuels — while simultaneously facing up to global warming.

Below are brief details of this year's four winning international projects – which each received a £30,000 award. There was also a UK winner – the Rural Energy Trust which develops waste wood-fired heating systems – but this article concentrates on projects in the developing world.

International runners-up involved 'pico-hydro' projects in Kenya, a fuel-efficient stove designed for use in Guatemala and a project to renovate traditional water-mills in the Indian Himalayas.

Fuel-efficient stoves for forest villages in Pakistan

The Changa Manga Forest is the largest man-made irrigated forest in the world, covering an area of 12,500 acres. It is home to an ecologically diverse habitat that contains an important 'gene-pool' of flora and fauna. As a result the forest has been designated as a protected area. Despite this, the forest is fast disappearing due to the immense pressure on it to meet the fuel-wood needs of surrounding communities who use wood for heating and cooking purposes. The disappearance of the forest not only threatens the ecology of the habitat itself, but also the future survival of the communities who depend on forest resources for their livelihoods and as their main source of income.

Motivated by the desire to protect the forest and secure a sustainable future for the surrounding villages, the Escorts Foundation, a Lahore-based NGO, has been working hard to design and promote a fuel-efficient stove that not only cuts the need for fuel-wood by 50% but is also simple, easy to construct and cost-effective. The view of the Foundation is that only by developing a technology that is simple and as close as possible to the traditional stoves used by the local women, will the stoves be sustainable and widely used. Previous projects that have been driven more by the technology than by local needs have required outside subsidies making them ultimately unsustainable.

The Escorts stove, by contrast, uses the same materials as the traditional stove and is constructed in the home of the women who will use it by local women who are trained as 'Chulah Mechanics' and local blacksmiths. The simplicity of the stove together with involvement on the community through training sessions and workshops, has meant that there has been a take up rate of 70% in the 56 villages

where the stove has been introduced. To date the Foundation has installed nearly 12,000 stoves in the communities surrounding the Changa Manga Forest.

The Escorts stove project has both eased the pressure on the protected forest and significantly transformed the lives of the women users. Not only are the health hazards associated with cooking on open fires reduced, but women users have found their status in the household enhanced now that they are able to cook two meals at once and keep the food warm.

Future plans include introducing the stove technology in the remaining 24 villages surrounding the Change Manga Forest ,as well as establishing a Fuel-Efficient Stove Resource Centre in order to facilitate the widespread dissemination of the technology on a national level. Award money will contribute towards these efforts.

Building renewables business networks across India

Small is beautiful and important, but 'thinking big' is also critical in the fight to make renewable energy widely available to all. This is especially the case in India where the potentially huge market for this energy is not being fully penetrated due to the lack of availability, affordability and reliability of renewables. In order to overcome the obstacles to widespread adoption especially of solar energy, there is a need to create a link between all stakeholders in order to reduce costs through bulk purchasing, create clustered markets to enable the government to subsidise effectively, develop trained manpower to ensure quality and maintenance of products and, last but not least, provide easy access to finance for purchasing solar energy devices by linking NGOs and banks.

Under the leadership of Hemant Lamba, a young Indian executive, Aurore has done just this. By successfully combining business acumen, technical expertise and a zealous commitment to renewable energy, Hemant and his team from the international township of Auroville, have succeeded in delivering affordable and reliable renewable energy products and services across 12 Indian states, directly benefiting 80,000 people.

To achieve this, Aurore has acted as a networking agency between government, banks, NGOs, manufacturers and end-users to provide financially-viable products, has created successful prototypes which have accelerated the take-up of renewables in urban and rural communities, has provided reliable installation and after-sales services and, perhaps most importantly, has developed a network of sustainable enterprises among economically deprived communities, including training at least 250 people in installation and maintenance of solar photovoltaic systems.

The Aurora Project has supplied solar lanterns for Indian street sellers

Aurore's projects to date include installing 1,025 solar water pumps to farmers in 11 Indian states, providing solar lanterns to street hawkers in Chennai and co-ordinating a rural electrification project in Ladakh using 8,700 solar home kits and 6,000 lanterns. Small and medium sized farming has become viable due to the installation of solar pumps as no longer do farmers have to rely on the notoriously blackout prone state grid and they are able to save 35,000 rupees annually otherwise spent on diesel fuel. Solar lighting has provided opportunities for income generation, improved health and education and more than 250 Indian youths have been trained as a result of Aurore's activities.

A network of NGOs and local service providers including Sahjeevan, SELCO India and Sunmin, has been created with commitments from leading suppliers such as Tata-BP, BHEL, Shell, AEP & Ritika to provide partnership services to the net-

One of over 180 micro-hydro units facilitated by the Aga Khan Rural Support Programme (see over)

work. This, combined with policy and funding support from Indian Ministry of Non-conventional Energy Sources (MNES), Indian Renewable Development Agency (IREDA) and other funding agencies, means that Aurore is ready to take their next stride.

Aurore will use award money to expand its activities, re-engineer and re-design products, promote local energy enterprises and continue to build NGO capacities in service delivery skills.

Micro-hydro replaces resin and diesel in Pakistan's Hindu Kush

For the 90% of the population in the remote mountains of the Hindu Kush in Northern Pakistan, having access to electricity was always a remote dream. Instead, communities had been relying for decades on pine resin torches and kerosene for their lighting needs and, since the 1980s, diesel generators installed sporadically by public and private agencies, all of which were expensive, hazardous to human health and damaging to the fragile eco-system of the mountain region. These were the only alternatives.

That is until Aga Khan's Rural Support Programme (AKRSP), began its pioneering efforts in the region with the aim of providing clean, affordable electricity to the population using water as the source of energy. This innovative technology, which has transformed the lives of 20,000 households in the Chitral region of the Hindu Kush, simply uses rushing water to create electricity. Unlike dams, which invariably damage the local eco-system, the micro-hydro technology used by AKRSP, involves simply digging a narrow channel to divert water along a hillside and into a pipe creating enough pressure to turn a turbine and so produce 20–100 kW of power. The water is then released back into the river.

Together with community members, who are actively involved in the project implementation and management, AKRSP, under the leadership of Miraj Khan, has succeeded in installing over 180 micro-hydro units supplying electricity to 50% of population on Chitral. The projects are implemented, maintained and managed by the communities who also provide 40% of the installation cost and pay a monthly tariff to meet operating costs. AKRSP works not only with Ismaili communities, for whom Aga Khan is their spiritual leader, but also with Sunni Muslims and Kalash people who are not Muslim.

With access to clean, affordable light, children have the opportunity to study longer, stings from scorpions, previously a common occurrence, are now rare and indoor air pollution from kerosene and pine torches – the cause of respiratory problems – are greatly reduced. The provision of electricity for washing and the churning of butter – previously done manually, has meant that women are saving a lot of time and energy which they are now putting into income generating activities. Most importantly, the self-esteem of the communities – who are part owners of the technology, has been greatly enhanced.

Longer term, AKRSP is looking to introduce larger plants, which will provide energy for cooking and heating and so reduce dependence on fast diminishing firewood resources. Award money will be used to construct a model hydro power station in one of the remotest villages of Chitral, which will act as a pilot for the provision of energy for cooking and heating.

Dung-to-biogas plants help save tigers in India

With the human population around the Ranthambhore Tiger Reserve growing at a staggering rate of over 3.2% each year, the demand for fuel wood is no longer sustainable. If alternative means from renewable resources are not found to meet this growing demand it will not be long before the world famous Tiger Reserve is raised to the ground, threatening the Indian rare tiger with extinction. Faced with this reality and motivated by his desire to protect the tigers, Dr Rathore, the son of the courageous field director of the Tiger Reserve, who risked his life to protect their habitat, founded the Prakratik society, with aim of helping local people find an alternative means of survival.

The answer has come in the form of biogas digesters that provide gas for cooking to villagers around the park and so ease the pressure on the dwindling forest resources. So far Prakratik, under the leadership of Dr Rathore, has installed 225 biogas plants using cow dung as the raw material. Over 1,350 villagers are currently benefiting from this technology that not only produces gas for cooking but also provides organic fertilizer in the form of slurry which is proving to be a better and cheaper alternative to commercial fertilizer. This is benefiting villagers in numerous ways including improving the health of women and children by reducing indoor air pollution, saving time and energy otherwise spent in collecting fuel wood, reducing dependence on chemical fertilizer which saves much needed rupees. Employment is also created through the use of skilled masons as well as unskilled labour in the construction and maintenance of the biogas energy plants.

It is estimated that 1,500 tonnes of fuel wood is saved by the use of the installed biogas digesters, which in turn contributes to saving an entire habitat including rare tigers and an extremely fragile biosphere. As part of an integrated project of health care, family planning, afforestation, breed improvement, literacy and environmental education, this is a model that can be replicated in other areas where pressure is being placed on protected forests by the survival needs of surrounding communities.

Award money will be used to expand the energy programme to all of the villages around the park by constructing a further 150 biogas units and developing a wood for wood programme where people are encouraged to plant trees to meet their fuel needs instead of relying on forest resources. ●

Contact the Ashden Awards at
www.ashdenawards.org

Accredited training to install solar power

Action from the pilot PV course run by Empower in May. ***Photo: IT Power***

Education on photovoltaics in the UK has so far predominately focused on design rather than installation. Now, IT Power and project partners Loughborough University (CREST), TNEI and ISPQ have developed a new City & Guilds course on the installation of domestic photovoltaic systems. It is being delivered in further education colleges and training centres, *writes Rita Shaw of IT Power.*

The new course covers a range of skills and knowledge, including module mounting techniques, information on grid connection, good installation practice and commissioning. The syllabus was developed in consultation with the British Photovoltaic Association (PV-UK). Successful completion of the course now forms a part of a new route to accredited installer status under the current PV grant scheme.

The project is supported by The Carbon Trust and by STREEM (Skills Training for Renewable Energy in the East Midlands). The project has provided training and assistance for college staff and carried out detailed work with City & Guilds on test specifications, and theory and practical assessments. By working with City & Guilds, the course is given an enhanced reputation within the electrical industry, with each training centre working to predefined standards. Teaching materials have been developed by the project partners. These include resources for the trainers plus an installer guide and practice questions.

City and Guilds course 2372 is aimed at practising qualified electricians with knowledge of wiring regulations and electrical testing and inspection.

Each training organisation has set up or is in the process of setting up test rigs including a mock roof and small PV system for use by students. A pilot course was run by Empower Training Services near Loughborough in May 2004, and initial feedback was positive.

Leicester Energy Agency and IT Power are working together to promote the course further with the support of an EC project. However, Empower Training Services and Guildford College have both commented that they are so far pleasantly surprised by the level of interest from electricians. In Blackburn and Redcar, a council and electrical contractor have confirmed that they wish to send their employees on the first courses run by their local colleges.

IT Power is also working with the Solar Trade Association and Filsol to set up a course for domestic heating engineers on the installation of solar water heating systems. Working with the British Plumbing Employers Council (BPEC) the pilot course for this project will be run later in 2004.

The PV course will be run in Bedford, Blackburn, Guildford, Loughborough and Redcar in September 2004, with other course dates to be announced in the future. ●

Contact IT Power via the website: www.itpower.co.uk/pvtraining.htm

Two months to deadline for final solar PV grants

The deadline is looming for the end of current Government funding for solar photovoltaic (PV) installations. Some £2 million in funds is forecast to be allocated in this final funding round. The closing date for applications is 31 October 2004. Previous rounds have already seen £15 million awarded to 134 different projects throughout the UK.

The DTI grants are available for between 40 and 50% of the total PV costs for private commercial developments, and 55% for public sector projects. There is continued emphasis on attracting innovative projects from the property development sectors.

Integrating PV into commercial property developments can be used in low carbon buildings to help to meet tougher building energy performance targets. Installing PV can help developers to attain planning consent where renewable energy technologies are required in local authority unitary development plans.

Projects that have benefited from previous grants include a regeneration project at Spitalfields Bishops Square, which received £180,000 and a project of 14 low energy houses in Cambridgeshire with a grant of £68,000. Other successful bidders include Middlesbrough Football Club and the Eden Project in Cornwall.

Kirk Archibald, Solar Photovoltaic Programme Manager, Energy Saving Trust, said: 'In particular, we are keen to hear from commercial organisations and developers who want to take a lead in constructing excellence as well as meet their corporate social responsibility targets.' ●

To find out more about the grant scheme, contact EST on 0800 298 3978 or log onto: www.est.org.uk/solar **before 31 October.**

Partnership delivers Cornwall's innovative energy strategy

Energy Minister, Stephen Timms was on hand in Cornwall in July to help launch of a new energy strategy for the county. But, says its authors, Cornwall's strategy has a much wider scope than plans published by other counties and regions of the UK, reflecting the unique partnership approach used.

The strategy, entitled: *Action Today for a Sustainable Tomorrow* marks a major milestone in the Cornwall Sustainable Energy Partnership's (CSEP's) work. Whilst other counties are producing renewable energy strategies, the Cornish strategy promotes a more holistic approach where energy conservation and renewable energy generation are considered as mutually inclusive.

The Cornwall strategy is thought to be the first in the UK to include cohesive actions to address:

- social issues such as fuel poverty;
- economic issues such as local electricity generation; and
- environmental issues such as climate change.

It's not just the strategy itself which is ground-breaking, but the unique way it will be delivered. The document has been signed by 80 strategic level organisations (including Cornwall County Council and all of Cornwall's District Authorities), that have agreed to work in partnership to deliver 32 key actions.

The release of the document is the culmination of a planning and consultation exercise that lasted twelve months and generated over 100 responses. The key focus of the strategy is the incorporation of energy into sustainable development and, in this way, it pre-empts the government's national sustainable development strategy currently under consultation. It is expected that the Cornwall strategy will have a major impact on the county, with a broad range of actions that deal with carbon dioxide emission reduction, the alleviation of fuel poverty (known to be the worst in the south west) and reducing the energy drain on the local economy. It will also provide mechanisms that will eventually lead to every resident having access to better quality and affordable energy services.

Prior to the strategy launch, the CSEP Steering Group agreed to sign a memorandum of understanding between the London and Cornwall energy partnerships to share information and work together. A similar arrangement is now being considered between CSEP and the Orkney Renewable Energy Forum and ISLEnet (European Islands Network on Energy and Environment).

At the launch event, the Minister announced that Cornwall will be one of five key areas to pilot a new DTI-funded 'Pathfinder' project involving the installation of renewable energy measures as a method of reducing fuel poverty in rural, off-gas areas.

How the Partnership was formed

The Cornwall Sustainable Energy Partnership is an innovative, cross-sector, sub-regional approach to addressing the social, environmental and economic issues of energy supply and demand. It is made up of a consortium of eighty organisations including all the Cornish local authorities, health trusts and business, community, education, environmental, and energy related organisations from Cornwall and the Isles of Scilly.

It was initially developed at the request of a consortium of local authority officers who have responsibility for the delivery and administration of the Home Energy Conservation Act 1995 (HECA). These officers realised that there was the need to work together, preferably with other external partners in order to be able to deliver effective energy saving and carbon reducing programmes across the communities and authorities of Cornwall. The Partnership was developed and is now facilitated by the Cornwall Local Authority Support Programme (LASP), based at Community Energy Plus (CEP) and funded by the Energy Saving Trust.

The Partnership is overseen by a strategic steering group, which comprises of chief executive/director level representatives from each of the participating sectors. There are four task groups within the partnership, covering:

- domestic energy and health;
- the business sector;
- the public sector; and
- renewable energy.

The Partnership's overriding mission is to actively integrate sustainable energy into public, private and community sector activities across the county.

CSEP works from the top down (policy and partnerships) while the host organisation, CEP, works from the bottom-up (local communities and public advice service). This enables a truly joined-up approach to be achieved, with the CSEP secretariat acting as an intermediary between local communities and strategic decision-makers.

Locally-delivered projects

CSEP has delivered an award-winning fuel poverty project, Home Health "Here

Renewable energy resources and industries in Cornwall

Cornwall has the highest solar level of gain per square metre of land in the UK, the second highest wave resource in the UK, and a good tidal stream, wind and bio/waste (domestic/dairy/agricultural) resource. There are sufficient renewable resources in Cornwall to supply and even exceed the county's energy demand.

In Cornwall, renewable electricity supplies 6% of local demand from a combination of wind, landfill gas and hydro power (the UK as a whole, only derives 1.3% of its electricity from renewables, the EU = 6%). The UK government target is to achieve 10% of renewable electricity supplies by 2010.

Cornwall has long been at the forefront of renewable energy initiatives. The first wind turbine was constructed in Redruth in 1892. Cornwall is also home to the UK's first commercial wind farm (in operation since 1991), led the world on the development of hot rocks (geothermal) projects and pioneered the use of heat pumps. Cornish companies and research institutions are now exploring the potential of marine renewables, hydrogen fuel cells and innovative technologies to generate energy from the county's disused mines.

to HELP", to five deprived communities in west Cornwall. The project involves the creation of all-inclusive zones where residents are entitled to a range of free energy efficiency and security measures, energy advice and signposting to charity partner services, regardless of tenure and benefits status. Doctors and health workers join community groups and charities in referring vulnerable 'hard to reach' people to the scheme for help, leading to a public participation rate of up to 67%. The holistic package of measures and inclusive zoned approach was made possible by a combined funding approach from a host of sources: Neighbourhood Renewal Fund, Single Regeneration Budget (SW RDA), British Gas, Cornwall County Council LPSA, Eaga Warm Front scheme, Penwith Housing Association, Kerrier Homes Trust, Devon & Cornwall Housing Association, EST Innovations Programme, National Lottery New Opportunities SEED fund, CAfE (Community Action for Energy), Penwith District Council HECA budget, Home Office Safer Communities Initiative and in-kind support from local authority partners, CEP, the Cornwall EEAC and other members of the CSEP.

The local need for the Home Health projects is demonstrated by the finding that 81% of homes surveyed in the first five zones needed a major energy efficiency measure (insulation or condensing boiler). Due to the success of the initial five projects, CSEP has now obtained over £3 million to roll the project out across the whole of Cornwall, including a new improved 'Decent Homes' version of the project for the private sector, which involves a consortium of district councils. The Home Health will contribute towards the achievement of a pioneering energy deprivation target that CSEP developed for Cornwall County Council, potentially releasing some £800,000 reward funding for future fuel poverty projects in Cornwall from 2006.

CSEP is also working on a range of projects including:

- the development of a Fuel Poverty and Energy Efficiency Action Plan for Cornwall (commissioned to CSE);
- a local energy services company (ESCO);
- feasibility studies and funding bids for sustainable energy projects;
- a single gateway environmental advice service for businesses;
- green procurement policies for the public sector;
- production of local planning guidance for renewable energy schemes; and
- development of an energy/deprivation GIS mapping resource for the county.

The CSEP office has also been active on informing and influencing national policy, such as the UK Government's Energy White Paper and the Mayor of London's Draft Energy Strategy. In May 2003 the Partnership won its second UK HECA award for its work with disadvantaged communities.

Partnership Manager Tim German (left) at the launch of The Energy Strategy for Cornwall with Energy Minister Stephen Timms

Advantages of partnership working

Partnership working isn't easy, but it is rewarding. Coordinating multi-sector consultation exercises or projects where several partners are responsible for key project milestones requires inspiring leadership, careful planning, flexibility, openness and good communication networks. CSEP believe partnership working is the best way to ensure sustainable energy targets are met in the most inclusive, efficient, cost-effective and holistic way.

As a result of CSEP's work in Cornwall, sustainable energy has now become a standard element of the strategic, policy and practical work of many of the partner organisations. Partners are now more aware and informed regarding the social, environmental and economic impacts of energy supply and demand. They have learnt from each other and have received training organised by CSEP/CEP. Through working in partnership they have also been able to access major grants that would not otherwise have been forthcoming.

The European Commission, the London Assembly, Devon County Council and various other councils in the UK are currently using the partnership as a best practice example. ●

Contact CSEP via the website: www.csep.co.uk ●

Selected key actions of the strategy

- the creation of an energy services company by 2006;
- the integration of this Strategy and Action Plan into all relevant local, regional and national strategies;
- to roll out a fuel poverty programme Home Health across Cornwall by 2010;
- to create GIS Mapped databases for fuel poverty for the whole of Cornwall by 2006;
- to work with local, regional and national partners to ensure that renewable energy targets are met – including the target of 93–108 MW of installed capacity in Cornwall by 2010;
- to secure funding and support for a wavepower energy generation test bed off Cornwall;
- to achieve a biomass energy demonstration plant by 2006;
- to achieve a biomass CHP project by 2006;
- to achieve 30 trainees on renewable energy skills and increase skills capacity in RE technology development;
- to promote the procurement of green energy to achieve 100% by 2010 in all public sector organisations in Cornwall and to achieve sustainable procurement policies by 2006; and
- to promote greater engagement with the tourism industry, including an exemplar sustainable energy development in a tourism related organisation by 2007.

Renewables Obligation breathes new life into historic hydro plants

The bedrock of the UK's existing renewable energy generation is hydropower, generating over 40% of the country's renewable electricity. Much of the existing conventional hydro generating capacity (about 1,500 MW) is in Scotland but there is the potential to double or even triple capacity, through the refurbishment of existing mill sites, using existing structures such as weirs or utilising water utility infrastructure.

The Renewables Obligation provides an incentive to the development of these sites and has spurred refurbishment of small hydropower plants – including two plants in Devon owned and operated by South West Water.

The Mary Tavy and Morwellham plants in Devon have both benefited in this way. Constructed in the 1930s, Mary Tavy and Morwellham hydro generating stations brought electricity to the rural areas of parts of Devon in the south west of England.

The Mary Tavy power station consisted of six turbine generators (three Francis and three Pelton Wheels) with a combined output of 2.6 MW, and the Morwellham power station has a capacity of 640 kW from two Turgo Impulse turbines. Both these power plants have been in continuous, daily operation since the 1930s. The efficiency of these turbines had changed little over their years in operation, but the recent introduction of New Electricity Trading Arrangements (NETA) saw the sudden collapse of the wholesale market price for electricity and made the future of the stations uncertain.

However, hydropower is a renewable energy technology and as such these plants became eligible for accreditation to trade Renewable Energy Obligation Certificates (ROCs) and enhance their income stream. To gain accreditation, the Regulator laid down strict criteria for qualification and, for plants commissioned before the end of December 1989, this meant a refurbishment programme had to be put in place. The criteria specified the minimum work to be undertaken.

In 2003, a decision was made to refurbish the eight turbine generators of the two power stations and apply for accreditation to trade ROCs. A refurbishment plan was put in place by the management team responsible for the power plants. It was decided to add to the plan the upgrading of all the switchgear, as the LV equipment was of the same age as the turbines and the HV switches were last upgraded in the 1950s.

The management team also made the decision that, due to the historic significance of the plants and their popularity with visitors, refurbishment would retain the original appearance of all the items of plant, ie turbines, generators and switchgear, as far as was possible, and that all of the original gauges should remain functioning. This decision meant that much of the work would be carried out in-house, by the hydro group's own staff, and that partners would be sought that could supply the new equipment and assist with aims of the refurbishment project. The partners chosen were Gilbert Gilkes and Gordon Ltd of Kendal for the supply of the turbine equipment; Eaton Cutler Hammer for the HV switchgear; Mells Engineering for the design work for the AVR, power factor control and LV switchgear modifications; and Rotork Controls who supplied the guide vane, valve and spear valve actuators.

As mentioned before, it was very important that all those involved were able to work in partnership with the company's hydro team, and this arrangement worked extremely well. Another important dimension to the project was the need to keep the power plant in operation throughout the refurbishment project. This was made possible by having several machines running from each of the water resources and the ability of the project team and its partners to work and react quite flexibly.

The project was divided in to three stages:

- Stage 1 was the refurbishment of Mary Tavy system No1. This consisted of three 15 inch diameter Francis turbines installed in 1932. These turbines are supplied with water along a 3 km leat to a 1.5 million gallon storage reservoir giving a 73 m head. Generator output from each of the three machines is 220 kW.
- Stage 2 was the refurbishment of the Morwellham Power Station's two 30 inch Turgo Impulse turbine generators. (Note: Eric Crewdson of Gilkes, Kendal, was the inspiration and inventive genius behind the Turgo Impulse Turbine which he designed and patented in 1920. Further patented improvements were made in 1936 and 1960. The object of the design was to provide an impulse or 'free jet' turbine which, on any given conditions, would run at a higher speed than a single jet Pelton and cost less than a twin jet Pelton. As a general rule, a higher speed electrical generator costs less and is smaller than a lower speed machine. The Turgo machine had the advantage also over the Francis or reaction Turbine that it did not rely on fine clearances and hence was less susceptible to wear from dirty or sand laden water.) Constructed in 1934 this system made use of the Tavistock to Morwellham Canal, built in 1803 to convey goods to and from the inland port of Morwellham. A 1.5 million gallon reservoir was constructed at the end of this canal providing a head of 75 m to drive two 320 kW generators.
- Stage 3 was carried out to the 65 inch Pelton Wheel turbines at Mary Tavy Power Station commissioned in 1936. These worked of a head of 170 m, water being supplied via a 6 km leat to a 9 million gallon reservoir.

Stage 1, the refurbishment of the three Francis machines, took place in early 2003 and was a good test to see how the refurbishment plan would stand up in practice.

The machines were refurbished one at a time so that generation would not be interrupted. The procedure adopted for the first turbine set the standard for refurbishing the remaining seven and it was as follows.

1. The turbine runner and vane control gear was stripped out and all components sent to the Gilkes factory in Kendal. The new components were then manufactured.

2. Whilst the new turbine runner, vane gear etc. were being made, the old LV oil

circuit breakers were stripped out by the company's own team and new air circuit breakers purchased, along with new busbars made up in the hydro station's workshops – and the whole retrofitted into the existing cubicle. Design work was carried out by Mells Engineering

3. Also at this time Mells Engineering supplied the designs for AVRs and power factor controllers. The units were supplied by Roper Electronics of Wolverhampton, the panels and installation work again carried out by the hydro group's own staff.

4. Rotork Controls also produced the actuators, both ac and dc, for the turbine control and main inlet valve operation (Francis machines only). Also at this time a training course was set up, for the power station staff, on actuator operation and maintenance.

5. As each part of the plan was completed it was tested, with final commissioning taking place when the turbine runner and equipment were fitted – this work having the longest lead-time.

With the successful completion of the refurbishment of the three 220 kW Francis turbines and with the experience gained we were confident that the rest of the project would follow the same pattern. However, 'Murphy's Law' intervened manifesting itself in two ways:

- the late delivery of the Turgo and Pelton Wheel runners from the foundries to Gilkes at Kendal; and
- the decision by Eaton Cutler Hammer to close its HV factory at Ottery St Mary in Devon and relocate to Holland.

This meant that the planned installation work would be thrown out of kilter. This was resolved by establishing a very flexible and more reactive approach to the installation work. Good communication between all parties became essential.

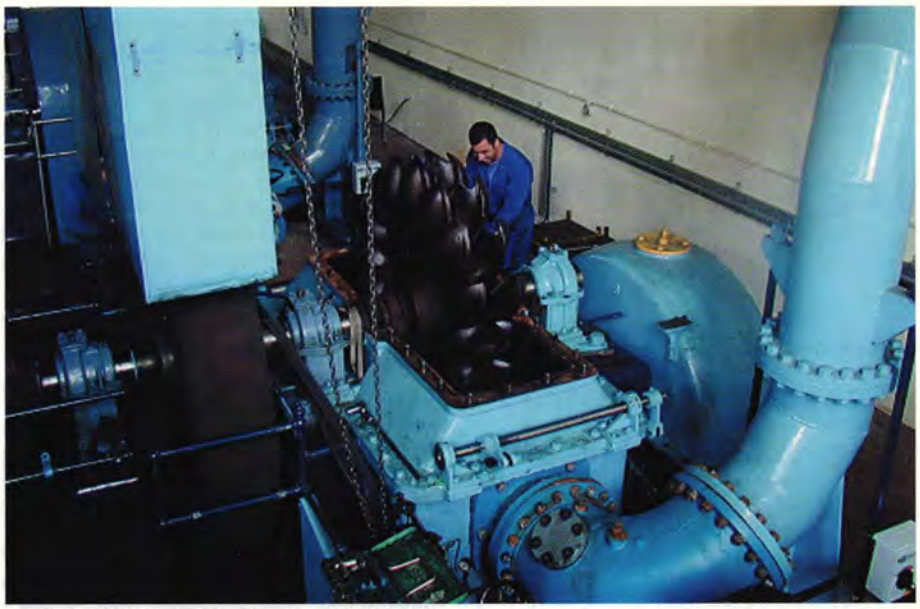
Delivering the project to budget was now important, as it became impossible to deliver on time. Tight control of costs and the ability to keep generating from plant, not being worked on, helped to keep to budget.

Once Gilkes had received the runners from the foundries, they stepped up production and working hours at the factory in the fettling and final machining work. Eaton Cutler Hammer carried on their work despite the factory being closed around them and even, on occasions had to go to Holland to retrieve parts that had inadvertently been sent there.

The programme changes meant that the turbine, actuator and AVR and power factor work were completed on all the machines, with the remaining HV switches being completed later. Despite the difficulties our experience was that good communication and the willingness of individuals in different organisations to buy into a project and take responsibilities with a flexible outlook helps to lead to success.

The full involvement of South West Water's own hydro team was most important, as these are the people who will have responsibility of future operation and maintenance.

Good relationships were established between all the partners, which have been taken forward to other projects. Earlier this year the two Turgo Impulse machines at South West Waters' Avon Treatment Works were refurbished. The project was completed to time and budget. ●



Removal of the original 65 inch Pelton Wheel turbines at Mary Tavy

The British Hydropower Association represents the interests of those involved in the hydropower industry and promotes the development and use of small-scale hydropower systems. Members include equipment manufacturers; civil, mechanical and electrical engineers; utility companies and scheme developers.

Contact the BHA via its website: www.brit-hydro.cwc.net

Fettling of the new 65 inch turbines at Gilkes' factory

Making light work

By Neil Jones, Managing Director, Ex-Or

Lighting control has been used to reduce energy consumption in industrial and commercial buildings for many years, but early methods of controlling the lights were crude, not particularly effective, and were disruptive to occupants. It is only twenty years ago that simple, reliable and effective lighting control using presence detection and photocell technology was brought to the market. Here Neil Jones looks at the types of lighting control now available, how significant lighting control is compared to other opportunities to cut energy use, and how the future of lighting control is shaping up.

There are various ways to automatically control lighting in industrial and commercial buildings in order to cut energy consumption. The crudest method, and the one that has been around the longest, is by timer control – setting the lights to switch on and off at preset times. So if most staff in a particular office building start work at 9 am and finish at 5 pm, then the lights are set to come on only in that time frame.

This ensures lights do not burn needlessly when the office is unoccupied. But it is not difficult to see the disadvantages. Early birds will come into work and will have to manually change the timer settings to provide light. Anyone working late risks being plunged into darkness without notice. Simple time-of-day systems can have difficulty coping with Bank Holidays. And let's face it, in an age of flexitime and hot-desking, there are few workplaces today where such a rigid approach to controlling the lighting would be appropriate.

As building management systems (BMS) began to be installed in commercial buildings, many energy specialists recommended incorporating a lighting control function in addition to heating and air conditioning function. But experience has shown that this is not an ideal solution. BMS systems are ideal for controlling a small number of large and static loads such as heating and ventilation plant. But lighting management is all about controlling a large number of small loads (the light fittings themselves) distributed throughout the whole building.

It became clear that technology was needed that would control individual light sources in direct response to the needs of the individual building occupants. Enter lighting control systems using presence detection and photocell technology. The principle is simple. The technology ensures that lighting is switched on only when needed – when monitored areas are occupied and daylight levels are insufficient.

This creation of intelligent lighting control enables a building to 'think for itself'. It knows the movements of occupants and maintains the correct level of lighting wherever they happen to be. It turns the lights off when an area is no longer occupied. It automatically adjusts the lighting for optimum working levels. And of course, it can keep certain key areas permanently lit, such as corridors, exit routes and toilet facilities if required. The end

Managed savings at Harlow Civic Centre

Ex-Or was chosen to provide a range of controls and systems to automatically switch and dim the lights according to need throughout Harlow Council's prestige new £8.7 million Civic Centre. Its brief was to achieve maximum energy cost savings for the council, ensure automatic compliance with lighting legislation and deliver the most productive lit environment for Civic Centre staff.

Kevin Barry, of Jones King Partnership, the lighting consultants for the scheme, said Harlow Council was keen to meet its environmental responsibilities by ensuring energy wastage was kept to a minimum in their new headquarters. With optimum levels of light being constantly maintained by the Ex-Or MLS system, Harlow Council is benefiting from energy cost savings of between 40 and 70% when compared to a non-managed lighting system.

result is a simple, reliable and effective method of lighting control which affords substantial energy savings.

Control technologies

So what are the control technologies that really work and deliver these results? Lighting management systems incorporate detectors which are either discrete, ceiling-mounted units, or tiny units built into the luminaires themselves and linked to the luminaire digital dimming ballasts. Depending upon factors that include the size of area monitored, the detectors will either be passive infrared, ultrasonic or microwave.

Ex-Or pioneered the use of ultrasonic and microwave detectors, which triggered the introduction of effective presence detection-based lighting control. Ultrasonic and microwave units are capable of detecting the smallest movements, ensuring that lights remain on in occupied areas. Less sensitive presence detection methods can be fooled into switching the lights off even when monitored areas are occupied.

Natural light plays an important part in automatic lighting control. It would be wasteful to have a system that responds only to the presence of occupants and switches lights on during periods of bright natural lighting. So photocells are also built into the systems, along with the presence detectors. Photocells measure the levels of natural light and switch or regulate the lights accordingly.

Regulating photocells are active – which means they gradually dim or brighten the lights in accordance with changes in natural light levels, so that a constant light level is maintained. Passive photocells, which abruptly switch lights on and off, are an obvious annoyance to occupants.

The technology is capable of controlling all current lighting types, including the latest LEDs.

There is no doubting the ability of the latest lighting control systems to drastically cut the amount of hours that lights burn. But lights themselves are becoming ever more efficient. For example, the latest T5 luminaires consume just 28 W and deliver higher light levels than their 65 W predecessors. So why bother controlling them at all? How can an acceptable payback be achieved when luminaires and lamps are themselves increasing in efficiency all the time? These are the questions often asked by lighting designers installing systems in new build projects, and by building owners/managers who commission refurbishment schemes.

The answer is simple. Significant amounts of energy can still be saved by controlling the lighting, however efficient that lighting might be. In an office building with manual on-off switching, how many staff will be persuaded to switch off the lights if they leave their workstation, or are the last to leave the office? Lights left on burning needlessly for hours are simply wasting energy. And look at the wider benefits of installing lighting control: office 'churn' – the constant change of use in office layout – is currently in the spotlight. The constant re-arrangement of office space and people can be costly in terms of rewiring lighting systems above workstations. An installed lighting management system eliminates the need for hard wiring and makes any future office reorganisation simple and cost-effective.

Significant savings

How concerned are building operators and managers about the need for lighting control? It is true to say that many still do not fully appreciate the energy cost savings that lighting control delivers. In fact, lighting accounts for up to half of a commercial building's electricity costs. And with electricity usually making up half of a typical building's energy bill, there is the potential to save 25% of the total electrical load.

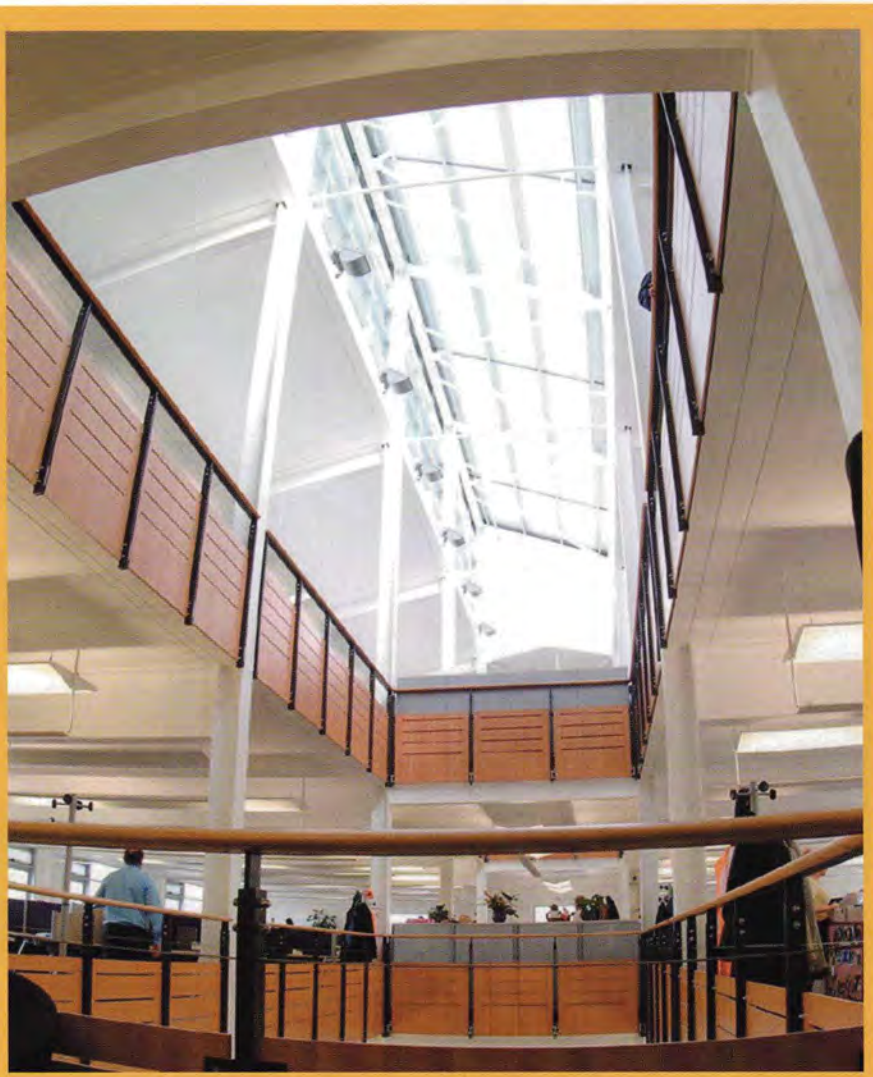
Lighting controls have been shown to save 60% in electricity usage in non-domestic buildings, with 30–50% considered to be an average figure. Ex-Or has found that savings of up to 75% have been achieved by the specification and installation of appropriate lighting systems (depending on the type of building and the use to which it is being put).

Cutting call centre lighting costs

More than 500 people work in Prudential Assurance's open plan Abbey Gate call centre in Reading, occupying groups of workstations. Before the Ex-Or MLS Managed Lighting System was installed, every light in the building was switched on at 6.30 am and not switched off until 11.30 pm every day, regardless of how many people occupied the office during the 17 hour period.

"Lights were left blazing when they were not needed – it was obvious there would be great financial and environmental gains to be made if the lights only came on when they were required," said Tim Winter, engineering contract manager for Prudential Corporate Property. "Cutting our lighting bills and saving energy were the main reasons for choosing Ex-Or MLS. We estimate we are making savings of around 40% per cent in our lighting electricity bills."

The system's success in delivering savings, increasing staff comfort and ensuring compliance with health and safety legislation has now lead to Prudential Assurance designating the Ex-Or system as the preferred lighting management system for Prudential-occupied buildings in the UK.



Flexibility at Yorkshire Water

Yorkshire Water needed a lighting management system for its new three-storey office headquarters in Bradford that would deliver light only when needed – when office areas were occupied and when levels of natural light were not sufficiently high. The system needed to combine maximum flexibility with optimum efficiency and cope with changing levels of occupation and space usage.

The solution was the Ex-Or MLS Managed Lighting System and Ex-Or worked closely with consultants Arup and contractors Shepherd Engineering Services to ensure that the objectives were successfully fulfilled.

"Ex-Or came up with the solution we needed," said Arup's senior electrical engineer Andrew Hudson. "The MLS programming needed to be highly versatile and simple to operate. The detectors and controls do the job extremely well and provide the client with all the flexibility they need."

But it is the other benefits of lighting control that are currently catching the imagination of building operators, in particular its ability to automatically guarantee compliance with legislation.

For example, the installation of managed lighting control systems guarantees compliance with Building Regulations and Health and Safety legislation governing office lighting and the use of computer screens.

The Building Regulations have extended the obligation to be more energy efficient to developers and occupiers of buildings other than office and storage buildings. Architects and developers of residential buildings, particularly apartment blocks with communal lobby and corridor areas, must design in features to ensure the lights are not used unnecessarily during the times when space is unoccupied to ensure compliance with the regulations.

As well as imposing legislation to force building operators to consider lighting control, the Government is offering a 'carrot', too, in the form of the Enhanced Capital Allowance (ECA) scheme. This has had the effect of accelerating the transformation of the UK lighting market in favour of more efficient, energy saving products. Under the ECA scheme, the Government allows 100% capital allowance against the cost of a lighting management scheme that covers the purchase and installation of energy effective lighting and control systems. ●

Contact Ex-Or at www.ex-or.com

Better control at Nationwide HQ

Nationwide's HQ has been a landmark in Swindon since it was built in 1992. It comprises four blocks centred round a large glass atrium. Home to 3,000 employees, it is almost like an enclosed town. Internal trees and shrubs, a boulevard of cafes and shops, even a Starbucks coffee shop, all contribute to the street scene atmosphere created inside the building.

Energy efficiency is the responsibility of David Bailey, Nationwide group energy manager. His concern was that the lighting within the building was not being effectively controlled. A review revealed there was some staff dissatisfaction with the high levels of artificial light, with a number of people complaining of headache and eyestrain as a result.

"This was the first reason for us looking at how we should effectively control levels of lighting in the building," said Bailey. "The second reason was that the lighting needed to comply with the latest requirements of the Display Screen Equipment Regulations, especially as the majority of the staff in the building used computer screens.

"The third reason was the company's desire to become even more energy efficient. We run a 24 hour operation within the building, all the lights were operated manually, no-one had ownership of the off switches. Consequently lights remained on throughout the complex whether they were needed or not. Further energy wastage was caused by the air conditioning plant which had to work harder to combat the excessive heat generated by the lights being left on needlessly."

Ex-Or installed its MLS Digital Managed Lighting System throughout 60% per cent of the occupied office space within the complex. A total of 3,000 luminaires are now under control. Bailey estimates that a 70% reduction in lighting costs has been achieved. Electricity savings have been brought about by reduced light demand, and then the resulting reduced demand on air conditioning load.

Controller links photovoltaic and LED technology

From a background in automotive control systems, ZETA Controls, based in Bicester, Oxfordshire, has recently stepped in to the solar-powered LED (light emitting diode) lighting market by developing sophisticated LED lighting controls.

The controller is seen as key to harnessing the synergy between solar energy and high output, LED-based lighting; a development so promising that the DTI recently awarded ZETA an 'Exceptional Research and Development Grant Award' to develop the idea further and bring new products to market.

Over 12 months ago the R&D team at ZETA Controls was approached by a client and challenged with developing a controller which could optimise the amount of energy being provided by a solar energy resource and manage this energy to ensure a reliable light source for use in off-grid situations in the UK. Conventional solar theory would say that, if there is unreliable daylight available, then increase the size of the solar collector. The greater the area covered, the more energy available. However, this theory did not suit the purpose. The end objective was to keep the use of PV to a minimum, reducing the cost and improving the aesthetics. With a finite energy supply, the next angle was to look at the light source. Once again, conventional lighting could be improved upon by using light emitting diodes (LEDs).

ZETA Solar's solution is currently being used on local passenger transport schemes throughout the country. The custom-built canopies on the top of the stop house purpose-built curved photovoltaic panels. The energy source charges the batteries during the day. At dusk the ZETA controller triggers the LED lighting to illuminate the flag and to provide low level illumination to the time table. A push button switch on the timetable is also illuminated and when depressed the LED's brighten up allowing the public to read the timetable information with ease.

Global production of LEDs has been on the increase for the last few years. Always recognised as a technological success, associated manufacturing costs remained a barrier to their mainstream use. Demand is resolving this issue, however, with regular announcements of increased production. Recently, LumiLed Lighting, the world's leading manufacturer of high-power LEDs announced the opening of a new plant in Malaysia to meet increasing demand for its high brightness 'Luxeon' LEDs. This move is designed to help them stay ahead of the curve and continue to grow. The growth in production brings down costs and facilitates inspiration in a growing number of applications, none more suitable than solar lighting solutions.

By using high efficiency LEDs, energy wastage is kept to a minimum. With a high percentage of the electrical power directly generating light, global electricity demand can be seriously reduced and this reduction will only increase as the efficiency improves over the next few years. LEDs combined with lighting control systems ensure the most efficient and best protection available to ensure an average 15 year life span for the light fitting. Furthermore, the small size of LEDs allows them to fit easily into modern lighting designs. Discreet, powerful and reliable LED's were selected as the perfect partner in what was now a complete solar lighting solution.

The ZETA-designed controller is the bridge between the solar energy source and the LED output. Very high efficiency energy collection allows the controller to capture the maximum energy available from the solar source and use this to drive the LEDs. Ongoing diagnostics analyze the available light and adapt the lighting charge accordingly, dimming the light when necessary and redirecting when available any extra energy to power other features of the system. The system is tried and tested and has had great results, adapting as planned to leaf cover, rain, cloud and any other light conditions the UK weather has come up with. With a growing awareness of light pollution, intelligent management of light is viewed as necessary to reduce waste in both urban and rural settings. The LED's small size and their power allow for directional light control which helps to reduce light pollution.

This combination of a renewable energy source and energy efficiency should mean that solar-LED lighting is set for huge global expansion, as the technology will be economically competitive with more traditional forms of lighting technology for a wide range of applications.

It is intended that the R&D award will help to develop this combination of renewable energy sources, LEDs and energy control systems, making UK technology a market leader in the development of this solution both in the UK and overseas. ●

Contact ZETA Controls Ltd on t: 01869 322500 e: solar@zetacontrols.co.uk

Glasgow pioneers LED floodlighting

High intensity light emitting diodes (LEDs) have been used to dramatically and beautifully floodlight three of Glasgow's bridges over the Clyde: the George V, the Glasgow and the Victoria. This is believed to be the first time LEDs (here from Philips) have been used for complete bridge lighting anywhere in the world.

Each bridge is around 120 m long, and the designer's brief was to floodlight the bridges' external and under-arch surfaces, taking account of installation and maintenance costs. The work was funded by the regeneration services of Glasgow City Council, part of the City's planning department, and therefore was expected to comply with Glasgow's 'City of Light' strategy.

The lighting design section of Glasgow's Land Services, who designed the scheme, conducted trials with conventional light sources such as linear fluorescent, high-pressure sodium and self-coloured metal halide, before selecting 'LEDline' linear floodlights. The scheme was installed by Lightways (Contractors) Ltd on a contract won under tender.

Balustrades are lit by Philips 48 W linear 4500 K LEDline lamps, chosen for their clean lines and low profile. The blue LEDline, emitting at 470 nm, lights the under arch surfaces. A few 150W metal halide floodlights highlight the piers. The bridges are therefore displayed in the colours of Scotland's St. Andrew's Cross.

From all viewing positions the night-time effect is dramatic. It shows strong clarity of colour and emphasis of the bridge structure. The relationship of the blue underside arches with the white balustrades complements the bridge and water below.

John Fagg, Glasgow City's designer responsible for the scheme, says: "The excellence and strength of the colour far exceeds our original aspirations. It provides a bold and positive statement linking the two sides of the City. It also provides a constant visual moving effect with the changing heights, waves and calm of the river."

"Our challenge was not only to produce a beautiful scheme, but also to provide a low cost maintenance installation. The application of LEDs for floodlighting three major road bridges should do the job. The luminaries should last for 20 years, burning for 2,500 hours a year, so effectively this is a fit-and-forget installation."

Glasgow's bridges are lit by easily-installed LumiLeds LEDLine 1.2 m linear floodlights, each containing twelve high-brightness power LED modules. LumiLeds are the results of a joint venture between Agilent Technologies and Philips Lighting, and are a very considerable technological advance on the tiny red, green and yellow LEDs used for signalling purposes on today's electrical equipment.

Like all LEDs, LumiLeds produce a specific wavelength of light at the junction of a solid-state diode 'poisoned' with materials chosen according to the colour of light required. Consequently, they are entirely solid-state, with no filaments, glass envelopes or vacuum tubes to break or go wrong, and therefore have life expectancies usually equalling or exceeding that of the equipment in which they are installed.

Unlike ordinary LEDs, LumiLeds contain heat sinks to increase power handling capability and therefore light output. Because the light-emitting area of an LED is small (typically 1 mm^2), precise optical control is possible, and an integral lens system is used to focus the light into a beam that, in the case of LEDline floodlights, can be chosen between 2 x 25° and 2 x 3°. LumiLed spacing and light distribution are designed so that the floodlight appears to project a continuous linear beam. Virtually any light colour is now available. White light is obtained either by mixing the light output of red, green and blue LumiLeds, or by coating a blue LumiLed with a yellow phosphor.

LEDLines – floodlights of the future?

LumiLeds may well prove to be the light source of the future. They are already superior to conventional tungsten and halogen light sources in terms of luminous efficacy, says Philips Lighting; the rate of development is so fast that they are soon expected to rival the efficacy and light quality of fluorescent and discharge lamps. They could become first choice because of the unique benefits they bring to all lighting applications:

- Life expectancy is a massive 50,000 hours for only 5% failure incidence – twelve years of year-round burning during the hours of darkness. This is a massive cost and labour-saving benefit, particularly if luminaires are difficult to access.
- LEDs are low-voltage devices, and are therefore safe to use near people, even outdoors and in wet conditions.
- System efficacy is high, giving exceptionally low lighting ownership costs.
- Unlike discharge lamps, full light output is obtained as soon as the devices are switched on.
- LEDs can be switched on and off indefinitely without affecting life expectancy.
- Dimming to extinction is possible without affecting life expectancy or causing colour shift.
- Since LumiLeds are available in virtually any colour, the need for colour filters, with associated light loss, is eliminated.

Contact Philips Lighting on t: 0208 665 6655 or: www.lighting.philips.co.uk

One of three Glasgow bridges now floodlit with LEDs

Talent is key to success

The Energy Institute awarded the 70th Melchett Medal to Sir Roy Gardner, Chief Executive of Centrica. The award was presented at the annual ceremony, held in June at the Royal Aeronautical Society, London, where Sir Roy spoke of Centrica's success story and the challenges of privatisation. The following is a highly abridged version of his speech. The full version can be found on the EI website at www.energyinst.org.uk

In his lecture, Sir Roy looked back over the last seven years and spoke of the challenges that Centrica had overcome. "The first priority was to retain our domestic gas customers in the face of competition... To survive, we had to study our customers and understand how to serve them better – better than we had in the past, and better than the competition. The key was changing the internal mindset so that people would start thinking of customer service not as a cost, but as a source of competitive advantage."

"To do this, I brought in a new management team to infuse the company with new ideas and energy. We also restructured the bonus scheme so that people were rewarded not only on financial performance, but also on customer satisfaction levels. In short, we worked to create a whole new culture."

The next generation of employees

He went on to explain that while the team worked to transform Centrica's culture, it also acted decisively to improve its ability to attract, develop and retain the very best talent, identifying and nurturing the next generation of employees. "We can now spot areas where we are strong, as well as areas where we are underweight in certain skills or experience. With this insight, we then focus our training and recruitment efforts to maximise value for the organisation," he explained.

Concluding his presentation, Sir Roy commented: "For the long-term viability of any company, employee development must be a priority. Giving people the opportunity to develop new skills and experiences also increases their marketability both internally and externally... We also have several initiatives underway to address the potential skill shortages in the future. We have established a number of training centres around the country to support our aim of recruiting and training some 5,000 engineers over the next five years – of which about half will be modern apprenticeships. We are also looking to extend the use of government-backed schemes to recruit and train customer service advisors." (Sir Roy chair's the UK Government's task force on modern apprenticeships).

A role for the EI

"I am committed to working with other companies – as well as with organisations such as the Energy Institute – to move the agenda forward on this important issue. The way I see it, it is a three-way win – for young people, employers and ultimately UK plc."

Responding to Sir Roy's presentation, Louise Kingham, Chief Executive of the Energy Institute, added: "Organisations like the Energy Institute play an important role in addressing this issue by working with educators and employers. The EI develops people and provides them with the skills that energy industry employers need and, at the same time, rewards individuals with much valued professional recognition from student to technician or graduate and on to become tomorrow's energy industry leaders."

The Melchett Medal

The Melchett Medal is named after the first President of the Institute of Energy – now merged to form the Energy Institute, The Rt Hon Sir Alfred Mond, who later became Lord Melchett and Chairman of ICI. The Medal is one of the EI's most prestigious annual awards and is given in recognition of outstanding services to the energy industry. ●

Sir Roy Gardner HonFEI, receiving the 70th Melchett Medal from Professor Martin Fry, CEng FEI, EI Vice-President (right)

HEATING DEGREE DAYS

to 15.5C base temperature

	Region	May 04	Jun 04	Jul 04
1	Thames Valley	83	27	21
2	South East England	111	43	34
3	South Coast	97	28	27
4	South West England	104	38	33
5	Severn Valley	94	30	30
6	Midlands	106	45	38
7	West Pennines	108	51	44
8	North West England	118	64	48
9	Borders	157	75	62
10	North East England	140	66	53
11	East Pennines	112	46	39
12	East Anglia	128	51	42
13	West Scotland	127	77	62
14	East Scotland	147	69	73
15	North East Scotland	152	84	74
16	Wales	146	54	49
17	Northern Ireland	142	54	59
18	North West Scotland	169	100	78

For earlier data see http://vesma.com/ddd/history.htm

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COURSE DATES:
28 - 30 September, 2004
COURSE VENUE:
London, UK
EI MEMBER:
£1400.00 (£1645.00 inc VAT)
NON-MEMBER:
£1600.00 (£1880.00 inc VAT)

This **three-day course** comprehensively covers the oil and gas supply chains from exploration through field development, valuation and risk, production, transportation, processing and refining, marketing, contracts, trading, retailing, logistics, emerging markets and competition with alternative energies. As such, it provides understanding and insight to the processes, drivers, threats and opportunities associated with the core industry activities.

WHO SHOULD ATTEND?

Personnel from a range of technical, non-technical and commercial backgrounds, new industry entrants and those with expertise in one area wishing to gain a broader perspective of all industry sectors. It also provides a valuable industry overview for those requiring an informed introduction to the economic and commercial background and general trends within the oil and gas industry.

PRICE RISK MANAGEMENT IN TRADED GAS AND ELECTRICITY MARKETS

COURSE DATES:
4 - 8 October, 2004
COURSE VENUE:
The Møller Centre, Cambridge, UK
EI MEMBER:
£2550.00
(£996.25 inc VAT)

On this **five-day course** delegates will identify the areas of price risk in different areas of operation; trade futures, forward, swaps and options markets; hedge and then manage a corporate position; analyse price charts; separate price and supply through the use of exchange and otc instruments.

WHO SHOULD ATTEND?

Those affected by changes in international gas and electricity prices, including those in companies affected by traded markets in the gas and electricity industries; the supply, marketing, finance and planning departments of gas, electricity and integrated energy companies; energy related government departments and regulatory authority staff; purchasing, planning and finance in major energy consumers; energy publications; banks, accountants, auditors and others associated with gas and electricity companies; advisors and policy makers..

PLANNING AND ECONOMICS OF REFINERY OPERATIONS

COURSE DATES:
12 - 15 October, 2004
COURSE VENUE:
London, UK
EI MEMBER:
£1900.00 (£2232.50 inc VAT)
NON-MEMBER:
£2100.00 (£2467.50 inc VAT)

This intensive, **four-day course** will enable delegates to understand the essential elements of refinery operations and investment economics, to review the various parameters which affect refinery profitability and to develop a working knowledge of the management tools used in the refining industry.

WHO SHOULD ATTEND?

- *Technical, operating and engineering personnel working in the refining industry*
- *Analysts and planners* • *Trading and commercial specialists* • *Independent consultants;*
- *Catalyst manufacturers and refining subcontractors*

INTRODUCTION TO PETROLEUM ECONOMICS

COURSE DATES:
18 - 20 October, 2004
COURSE VENUE:
London, UK
EI MEMBER:
£1400.00 (£1645.00 inc VAT)
NON-MEMBER:
£1600.00 (£1880.00 inc VAT)

This intensive **three-day course** concentrates on economic evaluation techniques applied in upstream and downstream oil and gas projects. It will discuss the fundamental variables and issues associated with petroleum project valuations and provide an appreciation of how to assess the key uncertainties involved. The course will incorporate a number of short exercises to reinforce the key techniques discussed.

WHO SHOULD ATTEND?

The course is pitched to appeal to professionals with varying levels of experience seeking insight to the broad range of economic valuation techniques required across the industry. In addition, for those employed by financial, commercial, legal, insurance, governmental, service, supply and advisory organisations, the course will also provide a valuable overview of the micro-economic issues facing oil and gas project operators .

ECONOMICS OF THE OIL SUPPLY CHAIN

COURSE DATES:
18 - 22 October, 2004
COURSE VENUE:
The Møller Centre, Cambridge, UK
EI MEMBER:
£2150.00
(£2526.25 inc VAT)

On this **five-day course**, delegates will examine the various activities of the fictional Invincible Energy Company to explore the economic forces which drive the oil supply chain. They will concentrate on the main areas of risk and opportunity from the crude oil supply terminal, through transportation, refining and trading to the refined product distribution terminal.

During their time in Invincible's refinery, delegates will learn about the quality aspects of product supply. They will study refinery process economics and the effects of upgrading.

WHO SHOULD ATTEND?

This course is the essential foundation for people entering the oil industry or for those with single-function experience looking to broaden their knowledge. It also forms the basic building block for the other trading-related courses.

TRADING OIL ON INTERNATIONAL MARKETS

25 - 29 October, 2004
COURSE VENUE:
The Møller Centre, Cambridge, UK
EI MEMBER:
£2800.00
(£3290.00 inc VAT)

During this **five-day course**, delegates will become part of Invincible's fictional trading team, taking decisions about the company's activities to maximise profits through an understanding of the economics of trading and the management of inherent price risks.

Delegates will trade live the crude oil and refined product markets worldwide, under the guidance of an expert team of lecturers, reacting to events as they happen and using real-time information from Reuters and Telerate screens and daily price information from Platts and Petroleum Argus.

Exercises are performed in syndicates, with comprehensive debriefs studying the consequences of the decisions made. The course expects a high degree of participation from delegates.

LNG - LIQUEFIED NATURAL GAS INDUSTRY

COURSE DATES:
17 - 19 November, 2004
COURSE VENUE:
London, UK
EI MEMBER:
£1400.00 (£1645.00 inc VAT)
NON-MEMBER:
£1600.00 (£1880.00 inc VAT)

This **three-day course** covers technical and commercial perspectives of all segments of the LNG gas supply chain from gas field development, liquefaction processes, shipping, re-gasification, storage, supply into a gas distribution network, embedded opportunities for LNG within existing gas markets, supply and construction contracts, project finance and economic valuation. This differs from other LNG courses in providing an integrated insight to the technologies, the markets, the economics and the finance of the industry.

WHO SHOULD ATTEND?

Those in the LNG industry in production, liquefaction, transportation and receiving, including those reliant upon LNG supply or the financing of LNG projects; analysts, planners and commercial staff; personnel operating in the gas, electricity and related energy industries and markets, regulators, advisors and policy makers, bankers, financiers, legal advisors and risk managers.

For more information, see enclosed inserts or contact Nick Wilkinson

t: + 44 (0) 20 7467 7151 f: + 44 (0) 20 7255 1472

or visit: www.energyinst.org.uk e: nwilkinson@energyinst.org.uk

Last chance to book!

energy INSTITUTE

Towards Zero Carbon: Sustainability in Practice

Jointly organised by the Energy Institute and the Solar Energy Society (UK-ISES)

Tuesday 21 September 2004

Infolog Conference Centre, Russell Square House, 10–12 Russell Square, London WC1B 5EH, UK

Following on from last year's successful conference, held jointly by the Energy Institute (EI) and the UK Solar Energy Society (UK-ISES), the EI is pleased to announce the continuation of this discussion with a second conference entitled *Towards Zero Carbon: Sustainability in Practice*.

Previously, this conference focused on emerging technologies and looked at possible synergies that may enhance the take-up of renewables in the future. This year, the emphasis will be on existing technologies and the steps that need to be taken to increase the uptake to levels required by government targets.

With speakers providing updates on photovoltaic applications, low energy building design, solar thermal (passive and active), biofuels, wind and combined heat and power, the morning will provide the technical input to the day, examining issues such as cost, availability, practical case studies and technical constraints. In addition, the conference will examine the softer issues of implementation, most notably: public awareness and acceptance; the availability of necessary skills and knowledge; the need for innovation; and policy and planning. Without these issues being properly addressed the implementation of renewables will continue to be slow.

Drawing together individuals with vast experience of new energy systems, as well as those at the forefront of technology and policy development, this is a conference that should not be missed. It will be of interest to anyone involved in the supply, utilisation and management of energy in the UK in both private and public sectors, and to those who wish to understand how these low carbon technologies can be achieved in practice.

This conference provides a forum in which to examine cross-technology issues without partisanship, and aims to inspire delegates to tackle the major obstacles in order to develop this emerging industry.

Speakers include:

- Dr Tony Day – London South Bank University
- David Olivier – Energy Advisory Services
- Professor Sue Roaf – Oxford Brookes University
- Sam Heath – London Renewables
- William Orchard – William Orchard & Partners
- Dr Nick Banks – SEA/RENUE
- Louise Kingham – Energy Institute
- Dr Patrick Devine-Wright – De Montfort University
- Gordon Taylor – Independent Consultant

Companies already attending comprise:

ConocoPhillips
Energy Saving Trust
Impetus
Ofgem
Dow Jones
ABN Amro

www.energyinst.org.uk

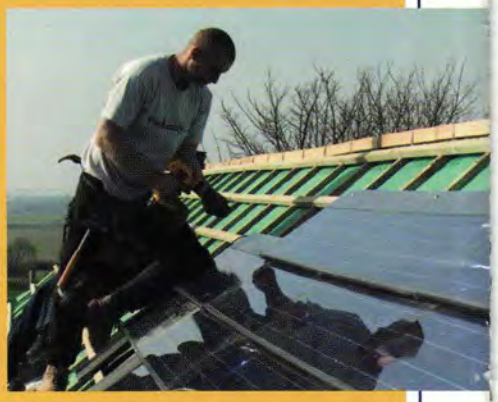
in association with

Solar Energy Society

sponsored by

CARBON TRUST
Making business sense of climate change

Tickets:
Member: £150.00 + VAT
Non-Member: £225.00 + VAT



For further details please contact Lynda Thwaite,
t: +44 (0)20 7467 7106
f: +44 (0)20 7580 2230
e: lthwaite@energyinst.org.uk

Energy Institute.
Registered Charity No. 1097899
61 New Cavendish Street, London W1G 7AR, UK

Benefits of Membership

INFORMATION SERVICES

- Free monthly magazine and discounts on other magazines, technical journals and other publications
- Free use of one of the largest energy related library and information services in the UK, including online database and research resources

CAREER DEVELOPMENT

- Membership of a Branch both nationally and internationally and Special Interest Groups of your choice
- Frequent networking opportunities through an extensive programme of events – including annual dinners and industry awards, local Branch activities and Discussion Groups
- Provision of expert advice on training, including reduced rates to Energy Institute training courses
- Discounted rates to many Energy Institute conferences, seminars and other events
- Access to free advice and support to develop yourself and your career, including access to online career information
- Exclusive information from the 'members only' section of our website

BUSINESS SERVICES

- Access to central London meeting rooms and conference facilities at discounted rates
- Preferential rates for car hire, health insurance products (UK) and hotel accommodation

Joining as an Affiliate member offers immediate benefits but it can also be the first step on the route to a professional grade of membership.

The professional grades of membership are as follows:
FELLOW; MEMBER; ASSOCIATE MEMBER; TECHNICIAN MEMBER

When you transfer to one of these grades of membership you will receive the following additional benefits:

- Use of designatory letters after your name, such as, MEI for Member, Associate Member and Technician Member of the Energy Institute
- Enhanced professional recognition status
- Engineering Council (UK) registration for engineers, including the use of the designatory title: Chartered Petroleum Engineer or Chartered Energy Engineer
- Professional development services to enhance your career

For further information and guidance on applying for a professional grade of membership please contact:

Membership Officer
Energy Institute
61 New Cavendish Street
London W1G 7AR, UK

t: +44 (0)20 7467 7100
f: +44 (0)20 7255 1472
e: **membership@energyinst.org.uk**

MEMBER GET MEMBER APPLICATION FORM
FOR AFFILIATE MEMBERSHIP

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..... Job title:.....
..... Business address:.....
.....
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Postcode: ..... Postcode: .....
t: ..... t:.....
f: ..... f:.....
e: ..... e:.....

Please indicate which address you would like correspondence sent to: ❑ Home ❑ Business

ABOUT YOUR PROFESSIONAL QUALIFICATIONS

Professional body Grade of membership Date of award
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.....
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To receive information about professional grades of membership, please tick here ❑

Proposed by: ..... Membership No: .....

DECLARATION

I, the undersigned, agree that in the event of my admission to the Energy Institute, I will be governed by its Charter and Byelaws, as they are now or as they may hereafter be altered. I will not, through my actions, knowingly bring the Energy Institute into disrepute. I will signify in writing to the Professional Affairs Directorate if I wish to resign my membership, then after payment of any monies that may be due by me to the Energy Institute at that time, I will be free from this obligation. I testify that the statements I have made on this application form are accurate.

Print name: ..... Signature: .....Date:.....

DATA PROTECTION ACT

The EI will hold your personal data on its computer database. This information may be accessed, retrieved and used by the EI and its associates for normal administrative purposes. If you are based outside the European Economic Area (the 'EEA'), information about you may be transferred outside the EEA. The EI may also periodically send you information on membership, training courses, events, conferences and publications in which you may be interested. If you do not wish to receive such information, please tick this box ❑

The EI would also like to share your personal information with carefully selected third parties in order to provide you with information on other events and benefits that may be of interest to you. Your data may be managed by a third party in the capacity of a list processor only and the data owner will at all times be the EI. If you are happy for your details to be used in this way, please tick this box ❑

PAYMENT METHOD

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Credit card payment (tick) ❑ Amex ❑ Visa ❑ Mastercard ❑ Diners Club

Start date (mm/yy): ☐☐☐☐ Card expiry date: ☐☐☐☐

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If you do not have a bank account in the UK, please pay £72.00 by sterling bank draft drawn on a UK bank account.

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