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The 6th EI Awards ceremony will take place on Friday 25 November at the Savoy, London, hosted by Sir Ranulph Fiennes Bt OBE, described as the 'Worlds Greatest Living Explorer' by the *Guinness Book of Records*.

The EI will present awards to the winners of nominated projects in the categories of Communication, Community Initiative, Environment, Innovation, International Platinum, Outstanding Individual Achievement, Safety and Technology. The evening begins with a welcome drinks reception in the Savoy's River Room. The Awards presentation ceremony follows a gala dinner and proves to be a truly international industry event.

Guest speaker and presenter 2005

Sir Ranulph Fiennes Bt OBE

Ranulph Fiennes was born in 1944, spent his early years in South Africa and was educated at Eton. He followed his late father's footsteps and served with the Royal Scots Greys before joining the SAS. In 1968 he joined the Army of the Sultan of Oman and in 1970 he was awarded the Sultan's Bravery Medal. Since 1969, when he led the British Expedition on the White Nile, Sir Ranulph has been at the forefront of many exploratory expeditions. Dubbed the 'World's Greatest Living Explorer' by the *Guinness Book of Records*, his expeditions around the world include Transglobe, the first surface journey made around the world's polar axis, which took three years to complete, several unsupported North Polar expeditions and the discovery in 1991 of the lost city of Ubar. In 1993 Sir Ranulph and Dr Mike Stroud entered the history books when they completed the first unsupported crossing of the Antarctic continent. For 97 days the pair fought through pain, starvation and snowblindness to achieve this, the longest unsupported polar journey in history. Later that year they were both awarded an OBE (Order of the British Empire) for 'human endeavour and charitable services'.

Despite suffering a heart by-pass operation just 4 months previously, Sir Ranulph's pioneering spirit led him to complete a punishing schedule of seven marathons, in seven days on seven continents in 2003, again with Dr Stroud. First stop was Patagonia at the southern tip of Chile, then the Falkland Islands, Sydney, Australia, on to Singapore, before returning back to this side of the continent for a 26-mile run in London, Cairo and finally, New York. Sir Ranulph Fiennes – who has certainly lived by his family's motto 'Look for a Brave Spirit' – lives on Exmoor.

To book a table at the ceremony please contact Arabella Dick, t: +44 (0)20 7467 7106, e: arabella@energyinst.org.uk

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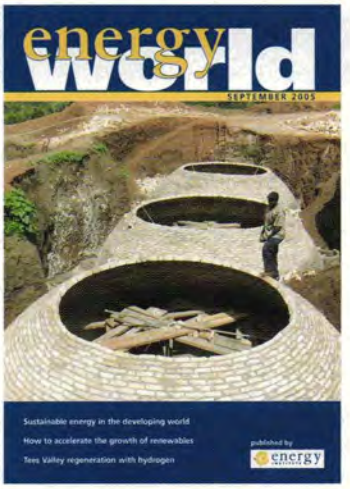
African biogas digesters – bio-waste generated in Rwandan prisons is being converted into combustible biogas and used for fuel in prison kitchens. One of several examples of small-scale sustainable energy solutions used in the developing world that won one of this year's Ashden Awards. Other projects were in India, Nepal and Honduras – all had a series of benefits beyond pure energy advantages: solving a waste problem, reducing local air pollution or improving local health and education standards.
See page 10 for the full story.



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Uncertainty prevents investment in power stations

David Porter is Chief Executive of the Association of Electricity Producers, **www.aepuk.com**

The UK's electricity generating industry faces the prospect of putting massive investment into new power stations. Once the commercial arguments have been aired, investment of this kind should be reasonably straightforward. After all, customers want electricity a lot and they expect it to do more and more for them. As an investment, power generation looks like a one way bet.

Roughly one new conventional power station each year would match the growth in demand, but new plant arrives only in fits and starts and we are approaching a 'generation gap'. Ageing power stations (coal and nuclear) are due to close in the next decade or two – some of them fairly soon – and announcements about replacements are slow in coming. Renewable energy is entering the market, but, it is only part of the answer. So, in a business where the product is so much in demand, what is holding up investment?

Some suggest that the market is simply not working. But, in the circumstances, it is probably doing what we should expect. There is enough capacity to meet demand and no immediate requirement to build a new power station. But that is not the only reason why companies may be slow to announce new power stations. The market may be driven by supply and demand, but there is more to it than that. Politics and regulation, invariably applied to the industry with the very best of intentions, can sometimes make business decisions tougher.

The UK's electricity companies want to provide power for customers – that is how they earn a living. They can see very clearly that new generating capacity will be needed very soon. They want to invest, but, they face huge uncertainty. Some of that comes from normal business risks, about which they can make judgements, albeit some, such as forecasts about fuel prices can be tricky. But, at least as tricky are the uncertainties about the regulatory impact of environmental policy. Two particular aspects of that put huge question marks in business plans – the EU Emissions Trading Scheme (EUETS) and the Large Combustion Plant Directive (LCPD). Each reaches an important threshold in January 2008.

Need to cut carbon and sulphur

The trading scheme to reduce carbon dioxide emissions completes its first phase at the end of 2007. Electricity producers entered the scheme with carbon dioxide emissions allowances based on a reduction from 'business as usual'. Those that exceed their limits have to buy allowances from others who have achieved savings. This 'cap and trade' approach, which, incidentally, my Association put on the agenda about 10 years ago, should be an efficient way of achieving carbon abatement.

Trading began in January 2005 and because, in the three years available to them, UK power producers could not build new plant or make a significant switch of fuels, they had to buy allowances in the immature European market for carbon.

Nerves were stretched by a spat, between Westminster and Brussels, about the UK allocation plan (now the subject of a legal action) which meant that UK generators did not know the limits on their emissions until well after the scheme had begun.

It is vitally important for the UK generating industry that the limits in Phase 2, which runs from 2008 to 2012, should be clarified as early as possible. Just like forecasts of the price of coal or gas, the carbon price is now a huge factor in investment and operational decisions. Sensible judgements cannot be made about it without knowledge of future limits and how the next phase of reductions in carbon dioxide will be allocated in the UK – note that, in Phase 1, the electricity industry was required to bear virtually the entire burden.

The second major cause of uncertainty is the LCPD. It takes effect in January 2008 and, for coal-fired power stations, it means either the fitting of flue gas desulphurisation (FGD) equipment or the issue of a derogation involving a restriction of running hours and eventual closure of plant. Generating companies can apply for the derogation, on the understanding that they can change their minds by the end of 2005 and opt back in to FGD in time for the 2008 implementation.

That option is crucial because the implementation of LCPD is still far from clear. In fact, even the definition of a 'plant' is unclear. In November 2004, the UK government submitted to the European Commission proposals for implementation of LCPD, which included a definition of 'plant' (namely an individual operating unit/boiler). The Commission undertook to respond by 7 June 2005, but that date passed without an answer being received. Some companies, for whom the business case is clearer, made an early commitment to major investment in FGD. For others, the decision is far from straightforward. As time passes without an EC ruling, they could well find that there is insufficient time to plan and build FGD plant. They would then be left with no option but to reduce running hours and close.

Why does this matter?

Electricity companies want to provide generating capacity to meet the requirements of the people that depend on it and the industry has done more than most in the UK to reduce carbon dioxide emissions. At present, the least problematic investments appear to be in gas-fired generation or wind energy. Some large-scale renewables still look too expensive. Coal-fired generation, although it is plentiful and responsible for a third of UK's electricity, is plagued with uncertainty. So is nuclear power.

But many of the companies that could invest are uncomfortable with being channelled into such a narrow range of options. They recognise the importance of diversity in the fuel mix and their planning horizons should allow them to take advantage of that. They will be able to do so only when the political and regulatory environment is more in tune with the industry and its markets.

New micro-generation strategy, but will the grant system work?

Industry reaction to the release of a Government consultation paper on micro-generation was mixed, with bullish statements about the growth of micro CHP among fears that a new grants programme for low carbon buildings will be neither continuous with existing programmes, nor substantial. Energy Minister Malcolm Wicks launched the consultation in a speech to the Renewable Power Association's annual conference in June, asking industry for views on the development of the micro-generation of low-carbon energy by homes, businesses and public buildings.

The DTI is developing a cross-Government strategy for the development of micro-generation, including micro-hydro, micro-wind, solar power, fuel cells, micro-CHP, and ground and air source heat pumps. Just how much can be done will depend on the costs and how they compare with other technologies, says the Department.

Wicks also outlined a grant scheme that could see a series of flagship low-carbon buildings developed over the next six years. The proposed Low Carbon Buildings Programme (LCBP) will replace the Major Demonstration Programme (MDP), which has been helping to build the embryonic UK photovoltaics industry for the last few years and is due to end in March 2006. In the new scheme, solar PV will be married up with other members of the micro-renewables family, plus energy efficiency, to deliver hybrid renewable energy projects in buildings.

RPA Chief Executive Philip Wolfe welcomed the consultation: "At a time when some may be tempted to focus on 'big solutions to big problems', the DTI is to be congratulated for drawing attention to the significant contribution that micro-renewables can make to delivering the Government's overall energy efficiency and renewable energy targets."

British Gas went further, predicting that in less than five years' time nearly 200,000 UK households will be generating their own electricity through a micro CHP replacement for domestic boilers. The company is working with Microgen, a subsidiary of BG Group, in the development of a 1 kWe micro CHP unit, based on a Stirling engine, that could cut a typical annual energy bill by around £150 a year. Industry forecasts suggest that, by 2010 the new technology will account for nearly 10% of all boiler installations, says British Gas. Currently over a million and a half new or replacement boilers are installed annually of which British Gas is responsible for over 90,000. The Microgen appliance is currently going through final development and testing and is expected to be available for sale in 2007.

Meanwhile, PV company solarcentury was disappointed, particularly by proposals for a new grant scheme. CEO Dr Jeremy Leggett said: "The spirit of the government's move is good, what worries me is the lack of specifics."

The company's complaint is that the draft document: "makes disappointing reading for PV in the context of the earlier 2001 and 2003 White Paper commitments to the sector that Government would roll out a 2002–2012 demonstration programme specifically for PV in line with our major competitors, i.e. Japan and Germany."

Leggett added: "To date, the DTI has given no indication of the likely size of the funding pot for the new programme, nor any guarantee that it will commence on 1 April 2006 to dovetail with the end of the current programme. In the absence of any indication of the scale of funding, we have to be nervous. UK plc needs to grow the PV and other micro-generation industries if we are to compete with the exploding industries in Japan, Germany, and elsewhere. Companies need more certainty than this if we are to plan our businesses and appeal to the private capital beginning to flow into low carbon technologies."

FGD and biomass for Fiddlers Ferry

Alstom has been awarded a contract by Scottish and Southern Energy (SSE) for the design and installation of two dedicated biomass co-firing systems at its Fiddler's Ferry power station near Warrington. The new systems will be installed to the existing coal-fired boilers at the power station's Units 2 and 4. When the units become operational during the first quarter of 2006, the power station will be the first dedicated biomass co-firing plant in the UK.

Fiddler's Ferry has four 500 MW coal-fired boilers, which were originally supplied and commissioned by ALSTOM during the early 1970s. Although it is already co-milling biomass on a commercial basis, the amount of biomass that can be fired in such systems is limited by existing mill performance. The ALSTOM system will significantly increase the proportion of biomass co-firing in line with the SSE strategy of generating up to 1500 GWh per year from output qualifying for co-fired Renewables Obligation Certificates.

Government consent has been given for construction of a flue gas desulphurisation plant at the same plant.

Meanwhile, Mitsui Babcock has announced NOx reduction contracts for UK coal-fired power plants worth £14 million, as the Large Combustion Plant Directive approaches. The contracts include a £9 million contract at EDF Energy's Cottam power station, plus further contracts at Drax Power Station, North Yorkshire and Didcot Power Station, Oxfordshire. The LCPD will become effective in 2008 and will control the levels of permissible NOx emissions from power stations.

Fiddlers Ferry – soon to be burning more biomass and have FGD plant fitted

Oil companies propose prototype carbon-free power station

BP, ConocoPhillips, Shell and Scottish and Southern Energy (SSE) have announced that they are to commence engineering design of the world's first industrial scale project to generate carbon-free electricity from hydrogen.

The planned £350 million project would convert natural gas to hydrogen and carbon dioxide gases, then use the hydrogen gas as fuel for a 350 MW power station, and export the carbon dioxide to a North Sea oil reservoir for increased oil recovery and ultimate storage. The project would reduce the amount of carbon dioxide emitted to the atmosphere by the power generation by over 90%. While each of the component technologies making up the project is already proven, says BP, their proposed combination in this project is a world first.

The project would be located close to Peterhead in north-east Scotland. A newly built reformer plant would convert up to 70 million cubic feet of natural gas a day into carbon dioxide and hydrogen and the hydrogen would be used as fuel for a new combined cycle gas turbine power station.

Initial engineering feasibility studies into the project have already been completed. The partners will now carry out further detailed front-end engineering design work with the aim of confirming the economic feasibility of the scheme. This work would be expected to be complete in the second half of 2006. This will allow a final investment decision to be taken next year, subject to which the project would then be expected to commence operation in 2009, says BP.

When fully operational, the project would be expected to capture and store around 1.3 million tonnes of carbon dioxide each year.

The carbon dioxide generated by the reformer would be exported through existing pipelines to the mature BP-operated Miller oilfield, 240 km offshore, where the platform would be adapted to allow for injection of the gas into the reservoir 4 km below the seabed. The Miller field is currently due to cease production in 2006/7 but the injection of carbon dioxide into the reservoir could increase the amount of oil extracted from the field, potentially allowing the production of up to 40 million additional barrels of oil and extending the life of the field by 15 to 20 years.

UK wind breaks the 1 GW barrier

The UK wind energy industry has now installed over 1000 MW of wind capacity, making it one of only eight countries in the world to have surpassed the gigawatt barrier, according to the British Wind Energy Association.

The opening of the most powerful wind farm in the UK to date, the 39-turbine, 58 MW Cefn Croes wind farm in Wales, brought the total to 1038 MW, from 1273 turbines, roughly equivalent to a full sized coal-fired power station.

Breaking the 1 GW barrier comes in a record year of growth for the UK wind industry, with 18 new wind projects, totalling around 500 MW of capacity, expected to be commissioned by year end, taking UK wind generation to over 1% of UK electricity supply. The UK wind industry is projected to meet some three quarters of the Government's target for renewables by 2010, representing an investment of £7 billion into the sector, according to the BWEA. Chief Executive Marcus Rand says that the Association anticipates a further 6 GW of new wind projects to be up and running in the UK by the end of 2010, split evenly between on and offshore developments.

Located near Devil's Bridge in Ceredigion and opened in June, the Cefn Croes wind farm features 39 of GE Energy's 1.5 MW turbines. The project is owned by wind project developer Falck Renewables Limited, a subsidiary of the Milan-based Falck Group. The farm is operated by Cambrian Wind Energy, a subsidiary of Falck Renewables, and was developed by the Renewable Development Company (RDC). Falck Renewables and RDC are jointly developing more than 500 MW of wind energy projects in England, Scotland and Wales.

Meanwhile, the decision to grant planning permission to what will be the largest onshore wind farm in the UK has been welcomed by the BWEA. The Crystal Rig extension will see a further 52 turbines totalling up to 164 MW join the existing wind farm in the Scottish Borders.

PV company solarcentury's bespoke design illuminates the Serpentine Gallery Pavilion – as dusk falls over London's Hyde Park the new Serpentine Pavilion comes to life in a wave of light. Illuminating the structure against the night sky, 248 independent power systems create a solar powered aura, which accentuates the Pavilion's novel shape whilst lighting it up inside.

Consisting of a round photovoltaic (PV) laminate, a nickel metal hydride battery, high efficiency Luxeon LED (light emitting diode) lighting and control module to govern the system, each lighting module sits inside a polycarbonate tube in the centre of the roofing panels. Each individual solar panel captures energy from the sun during the day to charge up the battery in each panel. The batteries power the LEDs, which in turn illuminate the gallery. solarcentury designed the controller to remember the time of sunset from the night before, and switches on the LEDs before dusk. Depending on how each solar panel is oriented on the roof, it will detect dusk at a slightly different time, causing an independent wave of illumination to spread across the ceiling as night falls.

Efficient, decentralised energy 'as important as renewables' – Greenpeace

Environmental campaign group Greenpeace has added a new emphasis on the merits of small-scale, 'decentralised' energy sources, including fossil fuelled CHP plant, to its vigorous campaign for the greater use of renewable energy. Launching a new report: *Decentralising Power: an energy revolution for the 21st century*, the group says that Britain's centralised model of electricity production and transmission: "wastes an astonishing two-thirds of primary energy inputs, requiring us to burn far more fuel and emit far more carbon dioxide than necessary. It is hard to imagine a more wasteful and inefficient model than that which currently services the economies of the 'developed' world."

The report sets out a series of reforms that are needed to make the sustainable energy vision a reality, including regulations to require all new buildings to double up as mini-power stations, and a ban on any new fossil-fuel power stations unless they are combined heat and power.

A decentralised system involves electricity being generated close to or at the point of use. Buildings, instead of being passive consumers of energy, would become power stations, constituent parts of local energy networks. They would have solar photovoltaic panels, solar water heaters, micro wind turbines, heat pumps for extracting energy from the earth. They might also be linked to commercial or domestic CHP systems, says Greenpeace.

The massive expansion in renewable capacity that this would represent, and the fact that, when fossil fuels were burnt the heat would be captured and used, would lead to dramatic reductions in overall carbon emissions – at least half of all emissions from the power sector, or 15% of total UK emissions, adds the group.

"Unfortunately, the debate in the UK has focussed more on whether we need a new generation of nuclear power stations," says Greenpeace, and: "Nuclear power is the epitome of centralised, outdated electricity generation. Replacing existing nuclear stations with new ones would perpetuate the centralised system, entrenching all the costs and inefficiencies that implies."

To give just one example of the potential for a decentralized energy economy, Greenpeace calculates that if half the houses in the UK were provided with domestic CHP units, which is technically feasible, then the electricity generated would replace the entire nuclear capacity we have today.

- Could CHP solve intermittency problems of fluctuating renewable energy schemes? An international consortium of European universities, research institutes and software companies has been awarded a grant under the EU's sixth Research Framework Programme to study just this. The University of Birmingham and PB Power are among the organisations to demonstrate Danish-inspired technique to integrate intermittent energy sources such as wind power into the British electricity grid.

Decentralising Power: an energy revolution for the 21st century is available at **www.greenpeace.org.uk**

Nuclear programme 'would need government assistance'

A government decision to promote investment into a new generation of nuclear power stations is unlikely to be economically viable without public assistance, according to new research from the independent economics consultancy, Oxera published in its newsletter, *Agenda*. Oxera argues that the economics of private sector investment are "far from attractive".

Oxera's analysis shows that, by 2025, a new-build nuclear programme (based on eight 1 GW reactors) would be able to generate 22% of the UK's electricity needs – around the level produced in 2003. According to Oxera's modelling, industry could expect a return on equity of around 11% from such a programme.

Derek Holt, Director of Oxera, comments: "These figures don't indicate there would be enough of an incentive for industry to finance a new nuclear programme. Recent analysis for the DTI on the cost of onshore wind farms assumes a required equity return of 18%. So, even taking a more conservative view of a 15% required return, our projected rates of return fall short of what most would consider a worthwhile investment."

Nevertheless, it seems highly unlikely that such a programme would place lenders at risk. According to the report, prices would have to fall by 33% in real terms for the project to default on its debts.

Government capital grants and debt guarantees are two of the support options considered by Oxera in its analysis of what could make investment in a nuclear new-build programme viable. According to the report, a construction programme of this scale could be financed with £3 billion of equity capital. Cumulative capital grants of £1.6 billion for the fleet of eight reactors would boost the rates of return to 17.5%. Similarly, a programme of £3.2 billion of debt guarantees could result in up to 14.5% returns, and up to 16.5% if the guarantees are doubled.

London launches its own Climate Change Agency

London's Mayor Ken Livingstone has fulfilled one of his manifesto commitments, to establish the London Climate Change Agency for the city. The new Agency is receiving substantial support from the Mayor's business arm, the London Development Agency (LDA) and UK and global companies, including founding supporters: BP, HSBC, Lafarge, Legal & General, Sir Robert McAlpine, and Johnson Matthey. Support is also coming from the Corporation of London, the Carbon Trust, the Energy Saving Trust and the Rockerfeller Brothers Fund.

The Mayor's Energy Strategy commits London to reducing its emissions of carbon dioxide by 20%, relative to the 1990 level, by 2010 and the Agency will be a key driving force in accelerating reductions in emissions.

The Mayor wants the new Agency to establish itself as a municipal company – in partnership with private sector firms – which will design, finance, build and operate low and zero-carbon capacity. This will be a combination of combined cooling, heat and power, energy efficiency, renewables and other innovative technology in new developments and retrofit projects. The Agency, under Allan Jones, who has pioneered this approach in Woking will seek to catalyse markets for renewable energy in London.

The Energy White Paper – steady progress towards objectives

Several important steps forward were taken within the UK's energy strategy over the past 12 months, according to the Government's Energy White Paper Annual Report. The regular publication of such a report was an important aspect of the launch of the White Paper in 2003.

Among the achievements were:

- the signing of a treaty with Norway that will facilitate future developments along the North Sea maritime boundary, including the Langeled pipeline which will provide up to a fifth of the UK's future gas needs;
- the introduction of the EU Emission Trading Scheme giving energy generators and industry a financial incentive to reduce damaging carbon emissions at least cost;
- the creation of a single British electricity market and grid, opening up new markets for generators in Scotland and bringing a downward pressure on prices for Scottish consumers;
- the establishment of the Nuclear Decommissioning Authority to manage the nuclear legacy for future generations; and
- the extension of the Renewables Obligation to 2015, providing long term confidence for investment in renewable energy.

Trade and Industry Secretary Alan Johnson said: "We're living through a period of enormous transformation in the energy sector. There are still big challenges ahead, but today's report shows we've made very good progress over the past year on the objectives set out in the 2003 Energy White Paper. The signing of the Treaty with Norway clears the way for the construction of the Langeled pipeline and will be of particular importance as we manage the shift to being a net importer of energy."

Meanwhile, *UK Energy Sector Indicators*, published alongside the annual report, showed strong growth for renewable energy in 2004. The percentage of electricity generated from renewables grew at a record rate and reached 3.1% of UK electricity supply (see also page 21). The energy ratio, which measures the amount of energy consumed per unit of GDP, and therefore the overall efficiency of energy use in the UK, continued to fall at the trend rate of 2% a year, said DTI and DEFRA in a joint statement, adding that the UK also continued to have the most competitive gas and electricity markets within both the EU and the G7 group of countries.

Also published was the first annual report to Parliament on the security of gas and electricity supplies, which set out the Government and Ofgem's understanding of this year's winter outlook, based on National Grid Transco's analysis. This winter the gas market is likely to be tighter than in recent winters. Under normal weather conditions, however, there are sufficient gas supplies and electricity generation capacity to meet demand and, even in the severest of winters – of the kind seen only twice a century – NGT's analysis shows that the market can maintain supplies by a combination of actions to reduce demand for gas. Under all credible scenarios the energy market can deliver supplies to domestic consumers, summarized the DTI/DEFRA.

The second Energy White Paper annual report is available at **www.dti.gov.uk/**

Maximising UK oil and gas recovery 'is a vital national goal'

The UK will become increasingly reliant on oil and gas to meet its primary energy needs over the next 10 to 15 years, despite efforts to promote energy from renewable sources, says the UK Offshore Operators Association (UKOOA) on the publication of its annual economic report. Maximising the (now declining) recovery of the nation's indigenous reserves will help to cushion the UK from the full impact of energy price volatility, and bring many other direct benefits, adds the Association.

UKOOA's report: *Energising Future Generations*, points to remaining UK reserves of up to 28 billion barrels of oil and gas, offering substantial development opportunities in the future – provided the industry remains internationally competitive and can sustain investment at current levels. The industry spent over £8 billion in 2004, and expects investment to increase this year. Current investment would halve the rate of production decline to around 6–7% per annum over the next five years, says UKOOA, but challenges remain if the industry is to continue to slow the rate of decline over the longer term.

"The UK's reliance on oil and, in particular, gas as primary sources of energy is increasing," said UKOOA chief executive Malcolm Webb. "If we don't produce oil and gas ourselves then we will have to import it. If the UK had to import all its oil and gas, in 2005 alone our import bill would be around £30 billion higher, increasing the current UK trade deficit by almost 75%, and UK tax revenues from oil and gas would be about £10 billion lower because imported oil and gas pays no UK Corporation or Petroleum Revenue tax. It makes sense, therefore, from the economic as well as the security of supply viewpoint to do all we can to maximise the recovery of our own oil and gas reserves."

If the UK oil and gas industry can sustain investment at the current rate then we could still be producing 65% of our total oil requirements and a quarter of our gas requirements in 2020, added Webb.

The UK can remain self-sufficient in oil until around 2009/2010, says UKOOA. While the country became a net gas importer again in 2004 after a decade of self-sufficiency, UK gas production today still meets well over 90% of domestic demand and should still supply 60% of demand in 2010.

Meanwhile, the first North Sea oil fields to be developed since a new UK Norway Agreement was signed in April to fast track developments across national boundaries, have been announced by UK Energy Minister Malcolm Wicks. The UK and Norwegian Governments have approved plans for the development of two fields, Enoch and Blane, operated by Paladin Resources plc. Both are expected to begin production by the end of 2006, initially producing an estimated total of 26,000 barrels a day. The Enoch field was originally discovered in 1985 and the Blane field in 1989. Both have been undeveloped for a number of years, mainly because of the perceived trans-boundary complications and the difficulty of reaching commercial agreement between UK and Norwegian partners.

Energising Future Generations is available at **www.oilandgas.org.uk**

Utilities managers 'work too hard'

Many managers in the utilities sector refuse to stop working, despite calls to end the UK's long-hours culture, according to a survey by the Chartered Management Institute (CMI). Most employees admit to working during their annual leave, and almost one-third fail to take their full holiday entitlement.

The CMI questioned almost 6,000 managers and found that the number of people with more than five weeks holiday entitlement continues to grow (from 56% in 2003 to 66%, this year). However, in the utilities sector, managers are fearful about the impact of their absence and more than half (64%) said that they contact their organisation by choice during their holiday, due to work overload. A majority (55%) said they would also respond to requests from their employer whilst on holiday.

The survey also shows that managers put in extra hours to make up for the time they lose by going on holiday. Even when they finally go on holiday, managers in the utilities sector find it difficult to relax. Almost half (41%) regularly check their work emails and the same proportion also monitor voicemail. In an effort to keep in touch with colleagues 45% take away their work mobile phones, 23% take their laptops and 18% regularly visit internet cafes.

Meanwhile, organisations in the utilities sector are struggling to hold on to their employees, despite the frequency and value of bonus payments, according to the 2005 *National Management Salary Survey*, also by the CMI, which also shows that benefits packages have improved as companies battle to attract staff.

The survey reveals that 94% of executives in the utilities sector received a bonus in the year to January 2005. But, in spite of the high number of people given bonus payments, 45% of companies are reporting retention problems – the worst reported figure for 15 years.

The findings also show that the average total earnings for managers in the utilities sector are £59,500, putting the sector second in the UK 'earnings league table'.

Manchester launches nuclear institute

The University of Manchester is to launch a new nuclear teaching and research centre, the Dalton Nuclear Institute, just a century after Ernest Rutherford embarked on his research at the same university leading to the eventual splitting of the atom. The Institute will be the largest of its kind in the UK with plans for more than 100 academics, research staff and students.

"By 2015, if people want to do nuclear research they will have the choice to go to two or three leading universities in the world and Manchester will be one of them," says Professor Richard Clegg, who has come from industry, as the Director of Science at British Nuclear Fuels (BNFL), to be appointed Director of the Institute.

The Institute will be based within the University's Faculty of Engineering and Physical Sciences but will also draw on expertise from faculties like medicine and humanities. It will consist of seven major research groups and will underpin the training and education of the UK's future graduates for the nuclear sector.

The Institute will boast some of the UK's most advanced university based nuclear research facilities, including the recently refurbished and re-equipped Centre for Radiochemistry Research supported by Nexia Solutions and the Nuclear Decommissioning Authority (NDA). Through forming partnerships with industry, the Institute will also gain access to specialist facilities broadening the types of research it can undertake, says the University.

Dalton's research will encompass electricity generation, fuel cycles, waste treatment and disposal, decommissioning, policy and regulation. It will also tie its research into advancing areas such as nuclear medicine and fusion.

Manchester University, where Rutherford led research into splitting the atom

Industry beats carbon reduction targets

British industry last year cut the amount of carbon dioxide it releases into the atmosphere by 14.4 million tonnes, more than double the target set by government, according to Government department DEFRA. Major energy-intensive manufacturers and companies reduced their 2004 emissions by 8.9 million tonnes more than the minimum they had signed up to under Climate Change Agreements (CCAs).

CCAs are ten-year energy efficiency agreements which give companies an 80% discount on their climate change levy if they meet targets.

Results released by DEFRA show that 98% of sites (over 10,000) met targets and have had climate change levy discounts renewed. The largest absolute cuts were achieved by the steel, aluminium, cement and chemicals sectors and these, together with the paper and food and drink sectors, also made the biggest improvements in energy efficiency.

Meanwhile, the Government has launched a consultation on its proposals for the second phase of the EU Emissions Trading Scheme to run from 2008. Comments are sought on allocation of carbon allowances, on the use of auctioning, benchmarks, the treatment of CHP plants and new entrant and closure rules. It also asks for comments on issues related to the use of project credits and treatment of small installations.

US Energy Act provides incentives for energy efficiency

US President Bush finally signed the Energy Policy Act of 2005 into law in August, setting in motion a process that will yield new tax incentives for consumers and businesses that pursue energy efficiency, according to the US Department of Energy's *EERE Network News*. "Energy conservation is more than a private virtue; it's a public virtue," said President Bush. "And with this bill I sign today, America is taking the side of consumers who make the choice to conserve."

The wide-ranging Act creates a total tax credit of up to $500 each for energy efficiency improvements to homes, including credits of up to $200 for installing new exterior windows; up to $300 for installing a highly efficient central air conditioner, heat pump, or water heater; up to $150 for installing a highly efficient furnace or boiler; and credits for 10% of the cost of insulation, energy-efficient doors, and cool reflective roofs. The credits will be available in 2006 and 2007. The DOE also anticipates possible consumer savings as a result of new tax credits for contractors who build energy efficient homes, and for manufacturers who make energy efficient appliances. New energy efficient commercial buildings will also earn a tax deduction, adds the DOE.

Buying hybrid electric vehicles and vehicles with cleaner burning diesel engines, known as advanced lean-burn engines, could earn a tax credit of up to $3,400. The credit is largest for the vehicles that save the most fuel, but the credit will phase out shortly after a vehicle manufacturer sells 60,000 eligible cars, says the DOE. Tax credits of up to $4,000 are also available for alternative fuel cars.

Businesses can earn the same tax credits, as well as credits of up to $12,000 for buying large hybrid vehicles, such as buses, and up to $32,000 for the purchase of large alternative fuel vehicles. And although fuel cell vehicles are not yet on the market, the act also establishes tax credits for these vehicles.

The Act also contains federal tax credits for solar thermal systems installed in homes, extends tax credits for electricity generated from renewables to the end of 2007, and obliges the federal government to buy at least 7.5% of its electricity needs from renewable sources by 2013. Finally, the Act sets minimum efficiency standards for a wide range of products and appliances.

International project management company AMEC and its partners in the AMEC-Tekfen-Azfen (ATA) consortium have been celebrating as the Azerbaijan International Oil Company's (AIOC) Compression, Water Injection and Power (CWP) topsides set sail for its new home after 18 months of construction at the ATA facility, Baku.

Built by the consortium at its 17-hectare integration complex at Bibi- Heybat, near Baku, the 14,500 tonne CWP platform will provide vital support to three oil production platforms, part of the Azeri-Chirag-Gunashli development operated by BP on behalf of AIOC in the Azerbaijan sector of the Caspian Sea. The platform will be connected by a bridge link to the Central Azeri drilling and quarters platform, for which it will meet all the gas and water injection requirements for oil and gas production. It will also provide electrical power, via subsea power cables, to the two production platforms in West and East Azeri. The platform houses 10 Rolls Royce RB211 gas turbine compressors: four for gas injection, four for water injection and two to provide electricity.

France to host fusion research reactor

An international project to build an experimental fusion reactor has taken a critical step forward as the project participants chose a site in Cadarache, France, for the project. Called ITER, the fusion reactor is meant to be the mid-way step between research experiments and the first commercial fusion reactor, reports the US Department of Energy (DOE).

ITER will use a reactor design called a tokomak, in which magnetic fields contain a hot plasma that re-creates conditions within the sun. The $5 billion facility will be capable of producing 500 MW of thermal energy from fusion power for periods of at least 400 seconds. ITER is designed to maintain a controlled plasma in which fusion is occurring and may even be able to achieve a self-sustaining fusion reaction.

ITER is an international project involving the US (represented by DOE), The People's Republic of China, the European Union (represented by Euratom), Japan, the Republic of Korea, and the Russian Federation. It is technically ready to start construction, and the first plasma operation is expected in 2016.

Decentralised energy 'already bigger than nuclear'

Smaller-scale and decentralised power plants already generate more power than nuclear plants around the world, and are growing, in comparison to a failing nuclear industry – according to the US-based Rocky Mountain Institute (RMI).

Researchers have "doused the hype" about a nuclear revival, says RMI, in "an icy bath of real-world data" which documents that, worldwide, decentralised, low- or no-carbon sources of electricity cogeneration and renewables, all claimed by nuclear advocates to be too small and too slow to help much with climate change, are already bigger than nuclear power and growing in overall capacity.

The analysis appears in RMI's summer 2005 newsletter (available at **www.rmi.org**), and documents the global growth of two kinds of decentralised electricity generation: cogeneration and renewable sources. In 2004 alone, these small-scale sources added nearly six times as much net generating capacity and nearly three times as much electricity production as nuclear power did. By the end of 2004, the decentralised competitors' global installed capacity totaled roughly 411 GW – 12% more than global nuclear plants' 366 GW, and produced about 92% as much electricity, says RMI.

Thus, the article notes, these so-called 'minor' alternative sources often claimed to be unimportant, uncompetitive, and far in the future, actually overtook nuclear's global capacity in 2003, rivalled its 2004 and will match its 2005 electricity output, and should exceed its 2010 output by 43%.

2005 may be the third-warmest

This year, 2005 is shaping up to be the third-warmest year on record in terms of average global temperatures, according to the US National Climatic Data Center (NCDC), which released its mid-year summary of US and global average temperatures in July.

NCDC says that the average global temperature for the first six months of the year was 0.6°C above the long-term average; 1998, the warmest year on record, was 0.1°C higher again. June was also the second warmest on record and July was shaping up to be a warm one in much of the US. Utilities across the country have been hitting new record power demands in the heat; in California, the power grid operator declared a 'stage two' electrical emergency for southern California on two days in July.

Asia-Pacific Partnership for Clean Development

Australia, the US, India, South Korea, Japan and China have announced the 'Asia-Pacific Partnership for Clean Development and Climate' pact – a technology-based initiative providing mechanisms to limit emissions of carbon dioxide in those countries. Although seen in some quarters as an alternative to the Kyoto Protocol, the technology transfer partnership does not contain any targets or timetables for reducing greenhouse gas emissions. However, it should help to give companies from the US and Australia – neither of which ratified Kyoto – access to Asian markets for energy efficiency products.

However, the initiative has been widely criticized for its implicit assumption that technological advances on their own can address the effects of global warming. The lack of enforcement mechanisms and its non-binding format is another indication of the low level significance attached to the countries signing up to this initiative, argues Tim Lunel of Britain's National Energy Foundation.

The announcement of the Asia-Pacific Partnership followed just days after the closing of the G8 summit in July, which was widely reported to have failed in its efforts to invigorate international efforts to tackle climate change. However, according the UK Carbon Trust's Michael Grubb, the 'dialogue on climate change, clean energy and sustainable development' created in the G8 Communique has "transformed the global prospects for tackling global climate and energy issues."

Grubb suggests that the G8 has established a 3-year negotiating track to reach core political agreement on the form of commitments to then be adopted under the UN after Kyoto's first round expires in 2012. Time will tell.

A new CHP biogas plant featuring GE Energy's Jenbacher gas engine systems has been commissioned in Northern Germany. One of Germany's largest biogas energy plants in terms of total output, the new facility will utilise corn and rye as biomass to power three cogeneration systems that will together generate 4.2 MW of electricity and 4.3 MW of thermal energy.

The plant's electricity will be fed into the regional grid, qualifying for fixed feed-in tariffs based on the German Renewable Energy Law. The thermal energy will be used to support a local process which produces yeast for use in the feed and food industry. Owned by biogas developer Protein & Energie Soltau GmbH (ProEn), the plant is located about 100 km south of Hamburg, near the city of Soltau.

New power plants for South Africa

For the first time in 15 years two new power plants are now to be built in South Africa to meet the country's increasing electricity demand. Siemens Power Generation (PG) will supply seven SGT5-2000E gas turbines for these plants to the South African utility ESKOM.

In the Atlantis industrial park, located 20 km north of Cape Town, four power plant units each rated at 150 MW will be built. The plant in Mossel Bay, some 400 km east of Cape Town on South Africa's southern seaboard, will comprise three units each also rated at 150 MW. Siemens will supply a total of seven gas turbines for these plants including the ancillary systems and the associated transformers.

Around half of South Africa's installed capacity of 40,000 MW was built in the 1980s. The power demand has in recent years increased on average by between 4 and 6% per annum. ESKOM is anticipating capacity bottlenecks in the short term, particularly in the peak-load sector. More and more households are being connected to the grid and peak-load demand is thus increasing further.

More than a green luxury – Ashden Awards for renewable energy projects in developing countries

The annual Ashden Awards reward outstanding, inspirational and innovative local sustainable energy schemes that protect the environment, tackle climate change and make real improvements to people's quality of life. The Awards are designed to encourage wider take-up of local energy solutions worldwide – proving to the public and policy makers alike that such schemes offer viable, practical ways of tackling poverty, resource shortages and climate change.

As communities in the developing world face an increasingly difficult battle against deforestation, soil erosion and pollution, the case for renewable energy – especially in areas that have no electricity supplies – becomes ever stronger. The Awards therefore recognise that, for such communities, renewable energy is not a green luxury: it is often their best hope of breaking out of poverty, giving their children an education, and improving their health and wellbeing. And, crucially, it can do so while reducing local environmental impacts and tackling climate change.

The Awards are designed both to celebrate existing achievements, and to provide funding for expansion, replication or dissemination. Here, we publish details of the six winners in the developing country category. Further details at www.ashdenawards.org

Biogas from dung replaces fuel wood in Nepal

Nepal's majestic mountain scenery has long been scarred by deforestation. The bare hillsides which result are more than just a visual blight for tourists and trekkers: they condemn families to an ever more exhausting – and expensive – search for wood to fuel their cooking stoves. In recent years, though, something of a green tide has turned in the hills of Nepal.

Strictly-enforced new conservation laws, coupled with the resolve of local forest users' groups, has, in some areas at least, seen the slow recovery of forests. But one of the surest ways to cement that recovery is to wean people off wood fuel altogether. Which is where biogas comes in. The principle is simplicity itself. Take a cow, any cow. Preferably two or more. Collect its dung and, instead of spreading it on the fields, mix it with water and sluice it into a small round cement tank, sunk just below the surface of the backyard. Over time, the dung ferments away to give off methane, which, thanks to a couple of pipes and a tap, provides clean, efficient cooking gas for the home. Meanwhile, the residue of the dung, now nicely dried out, makes excellent fertiliser.

Result? Easy-to-cook meals on smokeless stoves, making for cleaner kitchens and cleaner lungs, too – and a lot less drudgery for the householder.

Biogas isn't unique to Nepal – it's been

introduced in dozens of countries across the world – but it's succeeded here as nowhere else. And a lot of that is thanks to the Biogas Sector Partnership, a small Kathmandu-based NGO which has installed an astonishing total of 124,000 biogas plants in households across Nepal – with more being added literally every day. BSP has achieved this phenomenal success rate by subcontracting the day-to-day construction, installation, training and repair work to over 50 independent companies, who are also responsible for the financial administration of each scheme.

Biogas doesn't come cheap: a new system, complete with installation by qualified workmen, along with training for the householders, comes to around 24,000 rupees (about £300) – although with assistance from the Dutch aid agency, DGIS, householders only have to come up with around two-thirds of this. That's a lot for a rural farmer, but thanks to micro-finance-style loans, the money can be paid back over time. And, crucially, the cost can be set against the very considerable savings households achieve by not having to buy or collect firewood. When those are taken into account, the biogas plant pays for itself in around 18 months to two years.

Any home with cattle can benefit from biogas – as long as it isn't too cold. There are around two million households in Nepal which fall into this category, so that means there's plenty of scope for the project to expand. One potential problem, though, is the lack of water during the dry season. Unless enough water is mixed in with the dung, the biogas plant won't work properly. Ashden prize money should enable BSP to implement its ingeniously simple solution: construct a second tank to store the heavy summer rains. This 'rainwater harvesting' provides more than enough water to ensure the biogas can be run to full capacity all year round. It adds around a third to the cost, but by enabling householders to have year-round gas, it soon pays for itself.

Cost-effective solar electricity for India's rural poor

Entrepreneur Harish Hande is a fine example of a man who's learnt to practice what he once preached. As a PhD student in the US in the early 1990s, he became convinced of the potential of solar photovoltaic power to help the rural poor – and persuaded his supervisor to let him switch his PhD to financing mechanisms for solar home systems. He came back to India to write it up, living in an off-grid house lit by solar, and immediately set about forming a business, SELCO Solar Light Private Ltd, to fulfill that potential.

For westerners accustomed to seeing solar PV as something of a green luxury, it might be surprising to hear that it's affordable for India's rural poor. But that says more about the relative costs of daily energy than the absolute cost of solar: if you're reliant on kerosene and batteries, then solar is almost always going to be a cheaper, more reliable – and healthier – alternative.

SELCO's customers vary from poor householders, to street vendors, to religious communities: the Sisters of the Bethany Order use SELCO lights in their houses across India, as do large numbers of Hindu shrines, who prefer not to use mains electricity, on the grounds that it might be generated by hydro power which could have used impure water.

SELCO's most recent initiative has been its '3000 Solar Home Lighting Project', successfully selling solar home systems (SHS) to 3,000 poor households in Belthangadi District, in the state of Karnataka – reaching around 15,000 people.

A typical SHS consists of a 35 W panel, four compact fluorescent lights, and a battery, for charging appliances like a TV, radio, tape player or a fan. The panel sits on the rooftop, or is attached to a free standing pole. It charges the battery during the day, in order to provide at least four hours of light and power each evening.

SELCO is an Indian business through and through. The solar modules and batteries are sourced from Indian manufacturers, and the charge controllers and lamps are manufactured by a sister company which produces exclusively for SELCO (sister being an apt word: it has an entirely female workforce). Spent batteries and CFLs are collected and sent back to the manufacturers for recycling.

SELCO's success owes a lot to its network of local agents, who get to know their customers, win their trust, and find out their needs. The after-sales service involves follow up visits every three months during the one-year warranty period, making sure the system is working properly, and that the customer knows how to use and look after it. The fact that many of SELCO's customers have yet to replace a battery even after five years or more is proof of a robust system being used as intended.

One of SELCO's major preoccupations is persuading banks that, when it comes to loans for solar, the poor are eminently credit-worthy. It works closely with local self-help groups, which already have some experience in this field, but some of its most persuasive arguments can be couched in language the banks readily understand: money. Or to be more precise, savings. Take the case of one street vendor. Repayments on his solar system were set at 200 rupees (£2.50) per month. Any doubts as to whether he could afford this were soon dispelled when it emerged he would save exactly twice that in kerosene costs.

With just under half of India's households without grid electricity, and with the mains supply so unreliable, there's no shortage of new customers for SELCO as it expands. But, with prize money from an Ashden Award, Harish also hopes to move into selling affordable improved cooking stoves, which use less firewood than the traditional open variety on which most of his customers still depend.

Self-generated biogas provides fuel for prisons in Rwanda

Travel west from the Rwandan capital, across the peaceful patchwork of this tiny country's hills and valleys, and you'll see little sign of the horrendous genocide which ripped this land apart a mere decade ago. One exception is the large, fortress-like brick buildings rising here and there from the hilltops, many of them newly-built: they're prisons, home to the 120,000 genocide suspects currently awaiting trial.

With each housing up to 10,000 inmates in tight confines, that means a lot of meals to cook, a lot of fuel to cook them on, and a lot of sewage to treat as a result. Around 50,000 litres in each prison, each day, to be precise. And in a country as poor, and as densely-populated, as Rwanda, that's a real challenge. Firewood for cookstoves is scarce and expensive, and overflowing, stinking septic tanks a huge threat to the health of surrounding communities – not to mention the prisoners themselves.

Two big problems, with one solution –

biogas. If you can capture the methane from the raw sewage to use as cooking gas, while treating the residue to the point where it can be safely used as fertiliser on crops to feed the prisoners, you're killing two birds with one stone.

That's the challenge taken up by the Kigali Institute of Science and Technology (KIST), and in particular, by one of its leading lights: Ainea Kimaro, a Tanzanian engineer whose unlikely passion for building better biogas digesters is matched only by his inventiveness in adapting them for the scale required by the prisons.

Ainea's biogas plants are giants, up to 1,000 m^3. They take the form of several vast tanks, like a series of giant brick beehives, constructed in a pit which is covered on completion: their precise construction belies the fact that they're largely built by the prisoners themselves – albeit under the expert guidance of trained masons, as well as Ainea himself. The men are captive labour, for sure, but they're paid a wage for the work, and many also receive basic training in the building and engineering skills which it needs.

Five of the country's largest prisons – two at Gitarama, and one each at Butare, Kigali and Cyangugu – now boast biogas plants, either in operation or under construction, and their effect has been dramatic. Cyangugu is typical. Perched on a hilltop high above Lake Kivu, on the border with Congo, its poorly-treated sewage had posed a major threat to nearby farmland, and to the fishing communities dependent on clean lake water for their catch. Meanwhile, the prison governor was spending a cool £25,000 per year on firewood – a vast amount for cash-strapped Rwanda. With biogas now fuelling five of the nine vast boilers in the prison kitchen, that bill has been cut by over half. That would give a payback period for the biogas of seven years in terms of firewood alone – and that's not allowing for all the associated benefits it brings in terms of sewage treatment, illness reduction, and free fertiliser.

Biogas doesn't sound the most pleasant of energy sources – either in sight or smell. But for anyone who's not seen one in operation, the result can be surprisingly attractive. All the guts of the system are tucked safely out of sight underground. The gas produced burns with a clean, blue smokeless flame – in contrast to the wood which it's replacing. And the residue makes excellent, odour-free compost.

It's not just prisons which have large concentrations of raw material; schools, too, are a prime site for biogas. One, at Kamonye, already generates enough from its pupils' waste to give cooking gas for three hours a day, and KIST is now looking at ways to build biogas for other schools, as well as prisons, too.

Meanwhile, the Ashden prize money will fund research into ways of using porous volcanic rock – which in the form of field boulders, present a nuisance to farmers in the north of the country – to help treat the wastewater. And Kimaro is experimenting with water hyacinth (safely contained so it doesn't wreak havoc by spreading into water courses), as a way of boosting waste digestion.

Solar lanterns replace kerosene in India

After a dozen years working in the large-scale solar photovoltaic power sector, DT Barki was increasingly keen to get the benefits of clean solar lighting to India's poor – replacing the smoky, expensive kerosene lanterns on which so many of India's villagers still rely, despite the health and fire risks they carry.

So he set up Noble Energy Solar Technologies (NEST) in 1998, with the aim of doing just that. The key, as Barki saw it, was to produce simple solar lanterns: portable enough so that one could serve a whole family, and robust enough to withstand uses as varied as children poring over their studies, farmers milking buffalo, or stallholders lighting their wares in the market. But they had to come at a price the poorest could afford.

The solution was the 'Aishwarya' lantern. Virtually all the parts for the light are made in India, so this is a home-grown operation in every sense.

NEST's headquarters near Hyderabad is the hub of a network of around 50 dealers, mostly men in their 20s and 30s, but a few women as well, who fan out far and wide into remote tribal villages such as Pulidevbanda and Laxigadda. One young dealer estimates that he covers at least 500 km on his motorbike each week. The dealers in turn use a web of sub-dealers, who deal with the customers directly at village level.

Each Aishwarya retails at around 1,400 rupees (about £17), but most customers take up NEST's relatively generous micro-credit offer, whereby they pay R100 per month over 16 months – a rate that all but the most desperately poor can afford. At that price, the lanterns provide a cheaper source of light than the more hazardous – and less effective – kerosene alternatives. For someone who's used to the smoky, grimy flicker of a kerosene lantern, the clean, constant white brightness of a solar lamp is a revelation.

Many of the customers live in remote villages which are either off-grid, or where the mains electricity supply is intermittent at best. For them, the Aishwarya is not just a health benefit, but an economic lifeline. Women running tailoring businesses are able to extend their working hours, so boosting their output and profits. Traders running market stalls can stay open longer. And the village children can study through the evenings for the qualifications which can help lift their whole family out of poverty.

With total sales of over 45,000 lamps to date, and confirmed orders of 50,000 for 2005-06 alone, NEST would seem to prove the theory that it is possible to make profits out of the poor without exploiting them. Barki is proud of running a highly professional business, which has recently received the prestigious ISO9000 accreditation. Meanwhile, the company is also experimenting with solar streetlights.

Prize money from the Ashden Trust should enable NEST to expand their network of dealers, and gear up to increase production, too. They're starting to build partnerships with larger farmers, who will supply lamps to their workers, deducting the installment payments from their weekly wages, and with head teachers, who Barki hopes will promote a new solar desk lamp in schools.

And the business is going global: NEST has just received two orders for a total of one million lanterns for South Africa, and is also negotiating to export Aishwaryas to Central America.

Crop waste briquettes fuel 'combined cookstoves' in India

How do you best cook lunch for India's schoolkids? How can farmers turn a nuisance into a profit? And how can you revitalise a struggling industry and turn it into a leader of climate-friendly business? The answer lies in a long metal contraption, with an electric motor driving fans at one end, a fiery furnace underneath, and huge cooking pots steaming away on the top, bubbling with dhal, vegetables or chai.

It's called a sanja chulha – literally, 'combined cookstove', and it's specially designed to run on 'briquettes' made

from crop waste left over from the harvest, such as mustard or pulse stalks, rice husks, or even sawdust. It's an excellent alternative to the wood or LPG which are normally used in such communal stoves.

It's cheaper and just as good, if not better, at providing a steady source of heat. It is also less polluting and less of a threat to India's dwindling forests – or the world's climate. The device is also substituting more or less carbon-neutral, locally-sourced, sustainable energy for imported, finite fossil fuel. Since India has vast supplies of suitable crop waste, and tens of thousands of institutions which need large-scale cooking stoves of the sanja chulha type, the scale-up potential is enormous.

The stove has been developed by Ramesh Nibhoria, a one-man bundle of energy, enthusiasm and engineering know-how, who together with his brother and a small team of enthusiastic staff, is building up from scratch a business, Nishant Bioenergy, which he hopes will roll out this success story across India.

The beauty of Ramesh's brainchild is the way it makes use of a waste agricultural product of no economic value to farmers, and turns it into a cash income for them.

The process is simplicity itself. Say you're a farmer growing mustard in Harayana or Punjab – Ramesh's home territory. Once you've harvested the valuable grains, you're left with a huge pile of chaff. It's useless as it is, and you're accustomed to simply burning it in the open fields, to get the ground clear in time to sow your pre-monsoon maize. A sweeter alternative is to sell it on to contractors, who load it into a trailer and take it to one of Punjab's numerous briquetting plants. Here it's compressed into chubby little cylindrical briquettes, via something that looks like an enormous sausage machine, and then sold on to schools, hospitals and anyone who wants an easy-to-use source of fuel.

So for the farmers, selling their chaff to the briquetting plants frees them from firing the waste in the fields, and earns them around 500 rupees (£6) per acre, which gives about one tonne of waste.

For the schools, the sanja chulha has several advantages. First, it's cheaper: the average school saves around 40-50% of its fuel bill by switching from LPG to briquettes. This proportion is likely to increase, as subsidies on LPG are being phased out. Even now, it means the capital costs of the stove are recouped in just 14 months. Second, it provides more constant, controllable heat, over a wider base of the pan than the LPG gas burner.

The schools which are using the sanja chulha are part of the Navodyaya Vidyalaya Samiti scheme: a network of around 500 government-funded boarding schools which specialise in giving gifted children from poor rural villages a quality education. With a contract to supply all of India's Navodyaya Vidyalaya Samiti schools, the prize money would enable Nishant Bioenergy to gear up for major expansion.

Beyond the schools, there are other institutions which are suitable for the sanja chulha, including army camps, prisons, plantations and temples feeding pilgrims and visitors. Ramesh claims that the stove could also be adapted for small-scale industrial use in sectors such as bakeries, soap-making, textile dyeing.

Advanced cooking stoves improve air quality in Honduras

The kitchen stove is at the heart of most Honduran homes – and for many women, a key source of income too, thanks to the home-made tortilla industry. But while the open stove with its flickering flames may look cosy and romantic, it has a devastating effect on the health of the women and children who gather around it – and on the country's fast diminishing forests.

It's this dilemma which is being addressed by an imaginative new scheme developed by Stuart Conway of American NGO Trees, Water, People, and which is being implemented on the ground by the Honduran Association for Development (ADHESA). It's called, simply, the Micro-Enterprise Stove Project.

Working with community and church leaders, TWP and ADHESA have developed relatively cheap, highly-efficient new 'Justa' stoves, which use between 50% and 75% less firewood than the traditional variety, and produce far less smoke and toxic gases, thanks to a simple but effective chimney, which takes virtually all the cooking fumes clean out of the kitchen.

That means healthier families – and wealthier ones, too. Households who have the traditional stove typically spend around a quarter of their daily income on firewood, so a stove which uses less wood means more cash stays in the pocket. But they're not only saving money, they're earning more, too – at least those with tortilla businesses are. The new stove cuts cooking time by over two-thirds, and thanks to the increased output, that means a tortilla maker can earn around $2 per day more.

Using less wood, and burning it more efficiently, also means less carbon emitted into the atmosphere.

Respiratory and other infections from smoky stoves have been shown by extensive UN studies to kill several million each year – mainly women and small children – and cause debilitating illness for tens of millions more. The project has been able to prove the new stove's health benefits by using special monitoring equipment, worn by householders, to carry out 'before and after' measurements of air quality in and outside the home.

Measuring its impact on the forests is a less exact science, but ADHESA's observations reckon that, where a critical mass of new stoves have been installed, the effects are clearly visible. In Suyapa, where 500 stoves are in place, the trucks selling firewood are calling far less often.

ADHESA is a small organization, with just eight staff, but over the last six years it has installed 3,000 stoves, most of them largely financed by TWP. Its success is partly due to the sheer commitment Conway, along with the ADHESA team on the ground, led by Ignacio Osorto. But it also owes a lot to the strong links it's established with local church and community leaders.

Working with such people, who are part and parcel of the community and committed to its welfare, helps ensure that the project really meets local needs, rather than simply providing 'top down' aid. As well as giving valuable input to stove design, they also help ADHESA decide which households will benefit most from the stove. Typically, the first stoves in any community go to the poorest families, to single parents, and to women who depend on tortilla-making for the bulk of their income.

The Justa stove costs around $50 to manufacture and install. At the moment, the users don't contribute cash, but do help out with labour in building the stove and its base, and providing some of the basic materials.

However, TWP and ADHESA between them cannot supply the 700,000 Honduran homes which still use open stoves with the improved version. But rather than despairing, they're seeing that as an opportunity for a new kind of business. They're developing a series of new, small and affordable stoves, which can be manufactured locally and sold to householders for anything from a few dollars upwards. They're training local people to build and sell the stoves, providing micro-credit in the form of low-cost loans to ensure that even relatively poor households can afford them.

The energy endgame – how to accelerate the growth of renewables

Philip Wolfe *heads the Renewable Power Association, but would like to see government support measures for green heat energy and transport fuels as well as those already in place to support renewable electricity production. Here, in a wide-ranging debunking of myths about the limitations of renewable energy, he proposes a philosophy of support designed to achieve meaningful environment objectives, rather than the rather less powerful measures already in place.*

Let's begin at the end. Imagine you have been selected for the first trip of a new time machine. You travel into the future to meet your great grandchildren. And, what a relief – the earth is still there and still habitable. But when they take you on a tour, the surface of their planet has been denuded and is pock-marked with mines and excavations. Huge waste storage dumps are dotted over the landscape, fenced around with wide exclusion zones.

This can't be right! Surely by then mankind will have realised that sustainability is a prerequisite to long-term existence. There is literally no future for a society based on depleting resources faster than they are replaced or creating waste, which we are unable to deal with.

Mindsets

I shall take as my starting point the assumption that sustainability is not a luxury; it is an imperative. We have the intelligence to realise this, so why have we been borrowing from our children and grandchildren? I believe the answer is disappointingly simple – we couldn't think of a better way of providing the resources that our way of life demands today. While we had several hundred years of resources still in the ground perhaps this negligence was understandable.

In this context it is fortunate that climate change has come along. It makes us realise that we cannot afford to rape our planet of its assets at the speed we might wish. We may in theory have over 200 years of coal left in the ground, but if we use it up over this period, we will have made our planet uninhabitable.

Here in the energy sector the endgame is straightforward and self-evident. Renewable power is sustainable. It is does not deplete natural resources and is free from pollution or waste. Our great grandchildren will actually live in a world that is entirely powered by renewables. The earth's natural resources will be valued highly and used very sparingly. It was a misnomer ever to refer to solar and wind power as 'alternative energy'. Renewables should be seen as the mainstay energy resource; other sources as alternative 'stop-gaps'.

Myths

If renewable energy is so obviously the answer, why aren't we doing it? There are lots of myths to 'explain' why not.

- The problem is huge and global. Any contribution that I/my family/my community/my country might make would be insignificant.
- Renewables are only a small part of the energy mix. They can't make the necessary contribution without compromising energy security.
- Renewables are too expensive.
- Renewables are intermittent.
- It's too difficult. We can't think of appropriate policy measures.

Let's take these one at a time.

Myth – the problem is too big

Climate change helps us see the issues. But it is too remote and abstract to make us focus on finding solutions. One of the difficulties is globalisation. Not that it's here – the problem is that it's not. We are only just learning to work together internationally on trade – cooperation on truly global issues such as climate change is way beyond us. It has taken eight years to adopt the Kyoto Protocol; a mechanism most scientists now accept is far too weak to solve the problem.

A major change in our approach to energy, particularly one that requires investment in the short term, needs international action. Otherwise individual states will fear a loss of national competitiveness.

Thinking more positively, this poses an opportunity as much as a threat. If a change to renewable technologies is eventually inevitable, there will be a competitive advantage for the early movers in the sector. Clearly countries like Germany, Austria, Japan and Denmark are seeing it this way, and creating world-leading industries in wind, solar and biomass technology.

As the cradle of civilization and most densely populated continent on the globe, Europe can and should take the lead.

Myth – renewables can't deliver

Is there enough resource out there? Of course there is. Most renewable energy is originally solar power and enough of that falls on the earth in 32 minutes to provide all our power for a whole year.

What about cloudy Britain? A DTI study showed that solar panels on the suitable roofs and facades of existing buildings could meet our whole annual electricity demand. Wind power could do it alone, too – so could wave power. Biomass could meet half. A judicious combination of several renewables is what we actually need, but the amount of energy available is no issue at all.

What about deployment rates? Again Europe has shown the way here. Countries like Denmark, Germany and now Spain have built renewables from a negligible base to providing a significant part of the energy mix within a decade. In fact because renewable sources tend to be smaller than traditional stations, their ability to deploy fast is better than nuclear or coal plant, for example. They also have higher acceptability to the public so well planned projects usually face less opposition.

Security of supply? A diverse mix of renewables not only mitigates intermittency (see below), it does wonders for security of supply. Traditional power production tends to depend on a few large-scale installations. Problems with any one station, or the fuel supply to one or more stations, could bring the whole network down. Renewables are not only smaller and more numerous; many are also located in the distribution network close to the energy user. This provides inherently higher reliability.

Myth – it's too expensive

Part of the problem, in my opinion, is that a pure consumer society is unable to distinguish between cost and value. A barrel of oil or a kilogram of uranium costs nothing at all. There may be costs in extracting it, but those who do so make no payment for the commodity itself. The net result of this approach is that our economic systems fundamentally underprice natural resources.

Let me illustrate by asking, 'How much is energy worth?' If you had a house in the middle of nowhere and depended on candles for light and a log fire for heat, what proportion of your income would you be prepared to pay for a modern electricity and gas supply? Five percent of net income? Ten? You pay a lot less than that at the moment. Do you even know – or is it, in the infamous 20th century quote, 'too cheap to meter'?

Traditional energy is especially distorted, because it's present price not only excludes any resource cost, it also omits a host of additional factors inherent in its production. Your electricity bill doesn't fully cover the damage done by carbon dioxide and other emissions, nor the costs of storage of nuclear waste and decommissioning of atomic power stations (estimated at £50 billion in the UK alone). While these so-called externalities are excluded, renewables are actually competing at a disadvantage against less benign forms of energy.

Renewables face a further disadvantage because most are at an earlier stage of development. They are still on the 'learning curve' without the benefit of the billions of dollars, which have been ploughed into other energy technologies. They have received markedly less support than the other prospectively sustainable energy source, fusion, which has had billions of pounds. Yet fusion has yet to deliver a single watt-hour of power, and is still thought to be decades away.

Given economies of scale, I anticipate that most viable forms of renewable power generation will be capable of installation at about £500 to £1,500 per kilowatt of capacity. Reasonable assumptions on load factors, plant lifetimes, discount rates and (where relevant) fuel costs equate this to an energy cost of the order of 3 to 5 p/kWh. Remember this is a fully built-up cost including waste and clean-up requirements (because in most cases there are none).

I believe that is a cost we should be prepared to pay as a society. Our elected leaders should be building that expectation.

Renewables are intermittent

Not all of them. Nonetheless we in the renewables industry need to be honest about this issue, as those in fossil and nuclear power should be about sustainability. Substantial dependence on any one intermittent renewable is no more viable than the present over-reliance on depletive and

waste producing sources. The solutions to intermittency are tangible and sequential.

Firstly, it is not a problem at low levels of renewables penetration up to perhaps 15%. The reserve in the rest of the system can compensate for any variability. In Denmark they've found ways of managing with 40% of their electricity supply from wind and CHP.

At intermediate levels of penetration a balanced portfolio of renewables mitigates the problem. Wave activity tends to lag behind periods of high winds. The wind blows more in the winter; the sun shines more in the summer. Tidal power is intermittent but wholly predictable. And there are important non-intermittent renewables, such as biomass energy, which can make a significant contribution.

Finally in the longer term a high penetration of renewables will need to be coupled with demand-side measures and storage. Fridges, pumps, heaters can be switched on and off to match the availability of power. When excess power is available, renewables can be used to generate hydrogen, for example, to be used as a fuel at times of lower power availability.

Myth – it's too difficult to come up with policies to convert to renewables

All the logic and fine intentions are worthless without the resolve and inventiveness to deliver the major change needed. This dichotomy is illustrated in the last Government White Paper. The rationale for the adoption of renewables was spelt out plainly. But the White Paper, and the Energy Act which followed it, were bereft of the policy measures to make it happen.

A coherent policy portfolio for sustainable energy

Targets directly related to the outcomes we want (targeting a fixed percentage from renewables doesn't do enough if demand rises unabated):

- a date (pre 2010) by when energy demand growth will be matched by new renewables capacity;
- a date by when demand growth plus retirement of non-renewable generation will be matched by new renewables capacity (2025?); and
- the political will to follow through on them.

Coherent, stable, long-term mechanisms to support renewable electricity, heat and transport fuels. If we're sticking with the RO (which though not perfect is starting to deliver), introduce heat and fuel obligations, which are consistent with it.

Compatible, stable, long-term measures to address sectors that the main obligations do not reach. Incentives for:

- Base-load renewables especially biomass;
- Building-integrated and micro-renewables; and
- Emerging technologies such as wave, tidal and offshore wind energy.

A cabinet-level minister with responsibility for all aspects of sustainable energy (perhaps even the whole climate change agenda), and for starters an energy minister who lasts more than a few months.

Improved public communication to promote understanding of the need for renewable energy installations and realistic expectations of future energy pricing.

Regulatory measures to rapidly increase energy sustainability in our building stock, including positive planning, smart metering, mandatory energy efficiency and renewables in building regulations.

Strategic planning of traditional plant retirements (related to the targets established above).

Fiscal measures to incentivise all energy efficiency and renewables, including concessionary VAT and fuel duty rates, enhanced capital allowances.

Holistic approaches to related policy areas, e.g. recovered bio-energy linked to the waste strategy, energy crops linked to agriculture.

A strategic national approach to infrastructure issues such as grid connection of renewable generation and active distribution networks to accommodate distributed generation.

In summary: look at the endgame; be proactive in getting there.

Wind, solar and marine energy – support should be extended to renewable heat and transport fuels

Some Governments have been more positive, or at least more hands on, with feed-in tariffs for renewable electricity and specific programmes to convert their housing stock to renewables. Our Government has invented the rather complex Renewables Obligation and is now sitting back to 'see how it delivers'. This is wholly inadequate. For a start the RO is misnamed – it is a Renewable Electricity Obligation and shouldn't act as a cover for the fact that there are no policies to support renewable heat or transport fuels (which together account for two thirds of carbon emissions). Even more importantly the incentives for energy efficiency are patchy and weak, yielding no discernible change to the rate of energy consumption.

I believe that Government should take a far more active lead – see box. It is not reasonable to expect industry to carry the burden of a change of this magnitude, especially where they have so much investment in the 'old' technology.

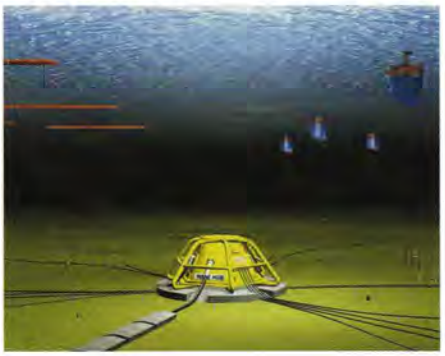
Solutions

If you accept my definition of the endgame, then surely policy can be reduced to the basic question: 'When and how are we going to get to a 100% sustainable energy mix?' This focus enables us to evolve less complex policy approaches.

Here's my suggestion for electricity, bearing in mind that:

- consumption is currently growing at about 1.5% per annum; and
- the contribution of renewables to UK electricity is growing at about 0.5% per annum and accelerating.

First we should aim for new renewable output to match the growth in consumption. Energy efficiency measures, which really bite, and faster renewables deployment should allow the two figures to converge (perhaps at around 1%) within five years. This should be made a firm target it's much more relevant than aiming for an arbitrary percentage of largely uncontrolled electricity consumption.



The second target should be for new renewable capacity to replace traditional plant retirements. Substantial coal plant decommissioning is expected next decade and nuclear stations are also scheduled for closure within the next 20 years. I propose that this programme is properly coordinated, with lives extended where it is safe and economic to do so. At the same time firm plans should be put in place to ramp up new renewable capacity and to make energy efficiency effective so their combined effect matches the rate of traditional capacity loss. Again a target should be set for achieving this.

Certainly power prices and Government spending will rise during the transition – but not massively. I think that is a price worth paying. Consider it as interest on what we've borrowed from our children in terms of resource depletion.

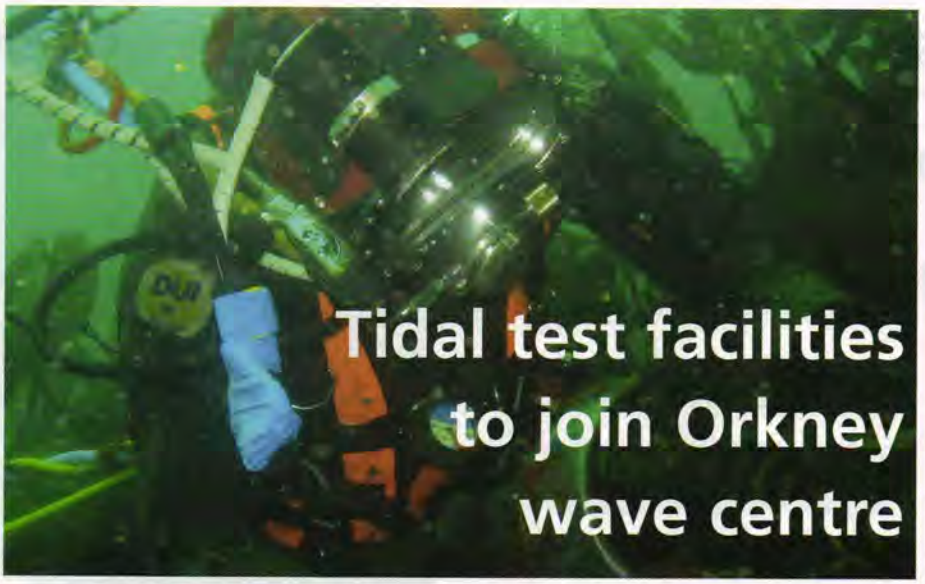
Equally importantly this plan will concentrate all our efforts on the new sustainable technologies. This will give economies of scale and industrial advances. That in turn provides new worldwide opportunities for British companies in technologies, which everyone will have to adopt sooner or later.

Philip Wolfe is the Chief Executive of the Renewable Power Association, **www.r-p-a.org.uk**

RPA events

The Renewable Power Association is to establish a renewable transport fuels group with an inaugural meeting to be held in London on 8 September. The British Association of Bio-fuels and Oils (BABFO), which has been successful in putting renewable transport fuels on the map, has now decided that it is in the best interests of its members to transfer, says the RPA.

Meanwhile, the second RPA Biogas conference titled: *Energy from bio-waste* is to take place on 21 September at the Manchester Conference Centre.



Tidal test facilities to join Orkney wave centre

The European Marine Energy Centre (EMEC) in Orkney is the world's first purpose built wave energy test facility. The construction of this multi-berth, grid connected facility for the testing of wave energy converters was completed in October 2003 and operational activities are now well underway. The first device was connected for test in 2004 and has successfully generated electrical power into the UK grid, writes EMEC's Andrew Mill.

The original concept was for a combined wave and tidal facility to be built in close proximity, however, tidal technology was slower in progressing and the construction of tidal test facilities was delayed. In the last few years the development of tidal devices has accelerated and now test facilities are required to ensure full scale devices can be put through their paces. EMEC has responded by planning to develop tidal test facilities on a par with those available for wave.

Wave test facilities

The facility comprises four test berths located in 50 m of water, each connected to a shore line substation by submarine cable rated 2.3 MW at 11 kV. The cables also include fibre optic data cores to enable recovery of data and to provide real time control of the device. In addition to the 11 kV switchgear for grid connection, the substation houses data systems and other infrastructure. An extensive SCADA system is provided.

While EMEC was commissioning its wave facility at Billia Croo on Orkney, Ocean Power Delivery was installing mooring systems and umbilical cable connection for its wave device, Pelamis. In the following spring a full survey of these systems showed their ability to withstand the wave regime encountered off the Orkney coast. During this period a number of navigation and berth marker buoys located in the test berth area were damaged by the seas. The umbilical cable was recovered and tested to ensure electrical integrity had not been compromised. All was well and work began preparing for the arrival of Pelamis later in the summer.

The electrical testing of the 11 kV submarine cables introduced some interesting challenges for EMEC. In normal circumstances cables are isolated and earthed and control given to the engineers working on the equipment through the use of padlocks. The engineers carrying out work or testing retain the key to ensure no inadvertent making live of the system can occur. In EMEC's case this is not possible with work and testing taking place off shore and the point of isolation being onshore. Procedures have been developed to enable this type of activity to be conducted in a safe manner.

By mid summer OPD had successfully carried out a series of sea trials of the device and moved Pelamis to Orkney ready for open sea testing. Again, a number of elements of EMEC's integrated management system were put into practise for the first time covering health and safety, environmental as well as quality procedures.

In August, OPD installed Pelamis onto its test berth moorings, connected the umbilical cable and powered up the device. After a brief commissioning period Pelamis began its historic first supply of power to the grid. First indications have been good with the data confirming its ability to generate stably into the grid under differing wave conditions.

A second wave device has also been installed and is currently under test by EMEC. In 2004, EMEC was contacted by Finnish developers working on a different concept of energy capture. The device was in an early stage of development but its modular design meant that testing in the open sea was possible. Following an extensive period of development EMEC agreed to the installation of the wave-to-mechanical energy conversion equipment being installed. This required development of the wave facility to enable deployment in shallow water, requiring further consenting work for the facility and extension to the SCADA system to enable data capture from the device via VHF communications. The device was mounted on the seabed by a team of divers and the wave energy is converted through mechanical motion to a hydraulic system.

The device's hydraulic power is determined by measurement of flow and pressure. This data is retrieved through the SCADA system. Over one month of testing has been completed and plans are in place to continue testing into the autumn when higher energy waves can be captured. Following successful mechanical and hydraulic testing the project team expects to develop the hydraulic to electrical system so that full scale grid connected testing can begin.

Tidal test facilities

If survivability is the main challenge for wave, then access is the main challenge for tidal devices. EMEC carried out an extensive search for a site which met the broad range of developer's requirements: tidal stream in excess of 3 m/s, water depth from 25 to 50 m, sheltered from severe waves and good boat access. The site selected in the Orkney Islands meets all of these and has the added advantage of close proximity to a grid connection.

To raise the funding for construction of the facility EMEC had to demonstrate the market demand for such a facility. Signing up three developers committed to taking the berths convinced the funders of the serious interest and this has been further strengthened by further four developers showing interest in the facility.

The project sees four 11 kV submarine cables being installed during the summer of 2005, connecting berths in water depths from 30 m to 55 m to a shore-based substation. With similar facilities to the wave test facility, EMEC will be in a position to start testing devices installed early in 2006.

In parallel to its infrastructure development, EMEC is leading the development of standards against which performance can be tested. The large investment in such facilities reflects the current confidence in marine renewables ability to make a major contribution to carbon dioxide reduction. While marine devices are much less developed than other renewables, the marine resource is extensive and offers the UK a substantial prize in terms of jobs, export opportunities as well as a reliable long term energy source.

Andrew Mill is Managing Director, EMEC Ltd, **www.emec.org.uk**

Renewables and hydrogen projects lead Tees Valley regeneration

Established two years ago by the local borough council, regeneration agency Renew Tees Valley Limited already has an impressive list of new renewable energy projects either up and running or in the planning stage. And the region's familiarity with handling hydrogen may well lead to a few more. RTV's Dermot Roddy *reports.*

It is now well known that clean coal specialist, Progressive Energy is looking at two sites to the south of the River Tees for a $1.5 billion, 800 MW integrated gasification combined cycle (IGCC) power station. This would be a first for the UK, and probably Europe, in that it will be capable from the outset of capturing carbon dioxide which will be piped offshore for enhanced oil recovery in the North Sea oilfields.

This is not the first time that the Tees Valley has attracted attention in recent months, but the size and scope of the project gave the story that extra mileage. In the Tees Valley, we welcome the attention; taken together with other projects that are coming to fruition or bubbling nicely away in the background, it adds credibility to our claim that we have now emerged as a world centre for renewable energy technology.

Certainly, we can point to a diversity of technologies that is unique in Europe. Take some other recent Tees Valley developments.

Local green energy initiatives

SembCorp Utilities UK recently gave the green light for the construction of a £60 million, 30 MW wood-burning power station at its existing 197 MW power station at Wilton, near Redcar, in the south east of the Tees Valley. Partially situated within the existing power station buildings but with its own purpose-built feedstock handling and boiler plant, the proposed plant has few restrictions on the type of woody biomass it can handle. Work will start building up fuel stocks in 2006, ready for production to commence in mid-2007.

Meanwhile, on the north bank of the Tees, the locally-based Biofuels Corporation is constructing the UK's first large continuous flow biodiesel plant. When commissioned later this year, the plant – which uses technology licensed from Energea of Austria – will have the capacity to produce some 284m litres per year of pure biodiesel from vegetable crops such as palm, oilseed rape and soya.

Back on the south bank, the formation of an energy services company (or ESCo) is the last remaining obstacle to the commissioning of the UK's largest private-wire CHP system. This will initially provide 6 MW of electricity and most of the heating requirements of a 200-acre mixed housing, leisure, education and business development at Middlehaven, a £500 million redevelopment of the oldest area of the town of Middlesbrough. The overall development project is being managed by Tees Valley Regeneration on behalf of the owners, English Partnerships and the Regional Development Agency (One Northeast). The ESCo is based on the model developed for Woking Council by Thameswey, which is a consultant on the project.

The prime energy source for the site will be advanced gas engines, fuelled by a mixture of natural gas (piped ashore at Teesmouth) and hydrogen (75,000 tonnes of which is produced locally).

Meanwhile, the launch of a 'WindSupply' programme to recruit local engineering companies, identify their skill sets and help them diversify into the wind turbine supply sector has strengthened efforts to attract a major wind turbine manufacturer to the Tees Valley. Some 60 companies attended the programme's first workshop in June.

Industrial infrastructure in the Tees Valley

Industrial heritage

There are two common factors in this flow of positive renewable energy developments in the Tees Valley.

The first factor is an industrial heritage that has left the area with a rich resource of chemical engineering skills and knowledge that can easily be adapted to the emerging technologies. In fact, some of the technologies that are new to the renewable energy sector are established practice to colleagues in the chemical industry.

Complementing these skills is a second legacy – an equally adaptable industrial infrastructure. Around 60 years ago, salt deposits deep under the Tees Valley were dissolved for chlorine production, creating caverns capable of storing up to 1,000 tonnes of hydrogen. A 30 km network of large diameter pipes is in place to transfer this around the Tees Valley to hydrogen fuelled facilities such as Middlehaven. For good measure, today's Tees Valley chemical industry produces 75,000 tonnes of hydrogen a year, and has the capacity to double production. Plans are in place to augment this with hydrogen from coal gasification with capture and storage, from wind energy via electrolysis and from biomass gasification.

Renew Tees Valley

The second common factor is my own organisation, Renew Tees Valley (RTV). We were set up just over two years ago by Redcar & Cleveland Borough Council to lead the effort to build on these existing advantages and maximise opportunities in the renewable energy and recycling sectors.

RTV receives its core funding from the Regional Development Agency (One Northeast) via the Tees Valley Partnership. It has been established as a company limited by guarantee, with a powerful board

of directors whose interests and activities span the whole sector. It employs a small team of specialists, with detailed local knowledge.

The hard times brought upon the Tees Valley by the haemorrhaging of employment in its steel, shipbuilding and chemical industries created a rare sense of shared purpose where economic development is concerned. RTV works closely with the Tees Valley's five local authorities and North East regional government and has access to additional strategic academic, technical and business expertise from a wide range of organisations.

At the highest level, RTV's role involves investigating new renewable energy and recycling technologies to develop a knowledge resource that potential investors can tap into. It also has access to funding for technical and commercial viability studies – for example, it co-funded the feasibility study that assessed the availability of biomass for SembCorp Utilities' wood-burning power station.

As a project develops, RTV can use its regional contacts to facilitate partnership activity that helps to reduce development time and costs, and the organisation is prepared to use its influence to champion projects, secure additional funding or other forms of external support and generally help overcome obstacles.

When, as in the case of the biofuels plant and the SembCorp Utilities power station, a project is underway, the role of RTV shifts to helping develop supply chain opportunities. This may involve supporting business start ups, raising awareness of opportunities through seminars, helping existing businesses adapt skills often developed for the area's traditional steel and chemical industries or even sponsoring training.

It may also involve capitalising on further opportunities to attract inward investors to the Tees Valley. Plans are well advanced to establish the UK's largest wood recycling facility alongside the wood burning power station.

The Tees Valley has, therefore, already made real progress in a comparatively short time towards the realisation of its ambition to become a world centre for renewable energy technology. The coal gasification project will be another major milestone.

Carbon capture and storage

The timescale is to submit planning application later this year, with construction starting in 2007 and generation in 2009. The plant will consume 2 million tonnes of coal/petcoke feedstock a year to generate 800 MW of power or 40 tonnes per hour of hydrogen. A unique Tees Valley feature is that this hydrogen can be fed into the existing hydrogen system. Some 5 million tonnes of carbon dioxide per year could be captured and used for enhanced oil recovery that will extend the life of North Sea oilfields by up to 20 years. The oil wells would then be capped to ensure permanent storage of the carbon dioxide.

Plans to oversize the pipeline so that it can handle carbon dioxide captured from other big point sources in the Tees Valley are well advanced, with the most promising sources identified and quantified.

From the outset, the main risks to the project were always seen as arising from the enhanced oil recovery. Specifically, the levels of petroleum tax on tertiary oil and the possible inappropriate use of the international OSPAR convention on dumping at sea to block the project.

This risk is being mitigated through discussions with the UK and Norwegian treasuries and by positioning the project as Europe's first demonstration of large-scale carbon capture and storage within a bid by the DUNAMIS consortium for 1.5 million of European funding under the Quickstart Hypogen Framework Programme. Some €4.5 million was secured under Framework Programme 6 earlier this year to work up the bid.

There have been other positive developments this year. In March 2005, the Chancellor signalled fiscal support for carbon capture and storage in his 2005 Budget Statement. In June, the DTI report: *A strategy for developing carbon abatement technologies for fossil fuel use* provided additional strong support, not to mention the allocation of £40 million in funding for project demonstration.

The report confirms that the injection of pipeline-delivered carbon dioxide for enhanced oil recovery is not prohibited under either the London or OSPAR treaties.

I am also currently working to establish a mechanism that will enable the Chinese to adopt similar technology for their massive power station build. The potential to address what is recognised as a major environmental threat emphasises the importance of accelerating the Teesside project.

Dermot Roddy is the CEO of Renew Tees Valley, **www.renewteesvalley.co.uk**

Developing a combined wind/solar system

RTV's specialist technical and marketing knowledge is also available to support smaller businesses develop innovative ideas in the renewable energy sector into viable products. A typical example is the service for the design/supply/installation of customised combined wind and solar energy systems, linked to battery storage to guarantee continuity of supply, that has been developed by three Tees Valley electrical engineers.

The availability of market information and financial assistance at a crucial development stage, helped their company, AAG Swepco, to create a prototype for testing and presentations. Working in collaboration with a leading supplier of CCTV technology, they went on to launch what they believe to be the first wind and solar powered CCTV system.

Currently they source the components of their systems from the most appropriate of a portfolio of international suppliers but they already have plans to design and build their own turbine in the Tees Valley. They have also commenced an R&D programme to seek solutions to what they see as gaps in the state of the art.

Prototype combined solar/wind energy system

2004: UK became an importer of coal as well as gas; carbon emissions rose again

The latest edition of the DTI's annual Digest of UK Energy Statistics *(sometimes known as DUKES) provides a wealth of data for 2004. Some of the headline information, together with data on energy consumption from another DTI source: Energy Consumption in the UK, is reproduced below.*

The picture seems to be: energy imports rose above (falling) indigenous production for the first time, carbon emissions rose, and (not detailed in these statistics) prices rocketed. Not good progress towards goals of security, sustainability and affordability. Renewables and CHP were both up, though.

Main trends in energy in 2004

Overall, there was a decrease in indigenous energy production of 8.5% and an increase in primary energy consumption of 1% in the UK during 2004. As a result, overall primary fuel consumption was not met by indigenous production and the UK became a net importer of fuel for the first time since 1992. The UK was a net importer of coal and gas but remained a net exporter of oil.

Increased energy consumption and lower nuclear output meant that, provisionally, emissions of carbon dioxide rose by 1.5% in 2004. A lower gas-coal price differential decreased the commercial attractiveness of coal for electricity generation, and increased the amount of electricity generated from gas. Gas accounted for 40% of electricity generation.

Refinery output increased by 6% and petroleum product exports increased by 30%. 2004 was a better year for CHP. Since last year, CHP capacity has increased by 829 MWe (17%).

Electricity generated from renewable sources in the UK in 2004 represented 3.6% of total UK electricity generation, up from 2.7% in 2003.

Energy production and trade

Primary energy production in the UK in 2004, at 238.5 million tonnes of oil equivalent, was 8.5% lower than in 2003.

Natural gas production fell 6.5% in 2004. This is the fourth consecutive year that natural gas production has fallen since its peak in 2000. The UK was a net importer of gas in 2004, the first time since 1996. Crude oil production in 2004 fell by 10%, and now accounts for 44% of indigenous energy production.

Coal production was down 11.5% in 2004 compared to 2003. Imports of coal rose by 13% to a new record of 36 million tonnes, constituting 59% of coal supply for the UK.

Energy consumption

UK energy consumption in 2004 increased by 1%. Overall gas consumption rose by 1.5%. Gas demand for electricity generation rose by 5%, taking gas' share of the UK's supply of electricity to 40%. Total oil consumption in the UK rose by 3% in 2004 to 81 million tonnes of oil equivalent. The majority of this, 70%, was consumed in the transport sector.

Coal consumption fell by 2.5% in 2004. There was a 3.8% decrease in consumption by major power producers (consumers of 81% of total coal demand).

Energy consumption by final users (ie after conversion to secondary fuels, such as electricity or road transport fuels) at 173 million tonnes of oil equivalent, rose by 1.6% in 2004. Consumption increased in the transport, domestic, service sectors and non-energy uses, while it decreased in the industry sector.

Electricity generation and supply

Total electricity demand in the UK in 2004 was 402 TWh, an increase of 1% on 2003. However, indigenous electricity supply fell by just under 1% and net imports of electricity rose to 7.5 TWh: gross imports almost doubled from the unusually low levels of 2003 and exports fell by 22.5%, but this fall needs to be put in the context of a quadruple rise in 2003. The industrial sector was the largest electricity consumer in 2004 (117 TWh), although the domestic sector was a close second (115.5 TWh). Consumption in the industrial sector grew by 2.5% and in the domestic sector consumption growth remained flat in 2004.

Total electrical capacity of 'good quality' CHP plants in the UK in 2004 was 5606 MWe, an increase of 829 MWe from 2003. There were 24 new schemes but six ceased to operate. Electrical output from CHP rose by 10%, 3% higher than the previous record in 2000.

In 2004 the proportion of UK electricity generated from renewables was 3.6%. Hydro power recovered after a dry year in 2003 and there was growth in wind power and biofuels. On the basis of the policy measurement of the contribution of renewables eligible under the Renewables Obligation to UK electricity sales, 2004 showed continued growth with the percentage increasing from 1.8% in 2002 to 2.2% in 2003 and 3.1% in 2004. Installed generating capacity of renewable sources rose by 9% in 2004, mainly as a result of a 26% increase in wind capacity and an 11% increase in the capacity of sites fuelled by biofuels and wastes.

Energy consumption in the UK

The overall increase in energy consumption between 1990 and 2004 was 13.8 million tonnes of oil equivalent. The changes in the main sectors, between 1990 and 2004 were: industry: –12%; domestic: +19.5%; transport: +18%; and services and agriculture: +8%.

Growth in energy consumption in the transport sector is slowing. By 2004, transport energy consumption had nearly doubled since 1970, but only 18% of that increase had taken place since 1990. The largest increase between 1990 and 2004 occurred in the air transport sector, where consumption rose by 79% to meet growing demand for international air travel.

Domestic energy consumption increased by 19.5% between 1990 and 2004. During this period the number of households increased by 9.5%, the population by 3% and household disposable income by 47%. Space heating accounted for about three-fifths of all energy consumed in the domestic sector and it is estimated that over the last thirty years, if savings from insulation and heating efficiency improvements had not been made, then energy consumption for space heating would be twice current levels.

In the service sector, energy consumption in the private sector increased by 22% between 1990 and 2004, but fell by 4% in the public sector. At the same time, output, measured as the contribution made to the UK economy, increased by 67% in the private sector and by 29% in the public sector.

The Digest is available both in hard copy from the Stationery Office and free on the Internet at **www.dti.gov.uk/energy/inform/dukes/**. Energy Consumption in the UK is available on the Internet at **www.dti.gov.uk/energy/inform/energy_consumption/**

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EI Autumn Lunch 2005

Guest of Honour and Speaker:
***Joan MacNaughton*, Director-General, Energy Department, DTI**
Monday 17 October 2005, The Berkeley, Wilton Place, Knightsbridge, London, SW1X 7RL

The EI Autumn Lunch is a prestigious and established date in the energy events calendar, providing a unique opportunity to hear a respected figure speak on contemporary global issues affecting our industry.

Joan MacNaughton, Director General, Energy, Department of Trade & Industry (DTI), joined the Home Office in 1972 with a degree in Physics from Warwick University. She has had a wide range of policy and managerial jobs in her Civil Service career – managing large-scale organisational change in several different sectors. She has been Principal Private Secretary to three Cabinet Ministers, and has also spent time in the private sector. Since January 2002 she has been DG, Energy, DTI, responsible for Oil & Gas, Nuclear Industries, Coal Policy, and the Engineering Inspectorate. In early 2003, she oversaw the publication of the Government's Energy White Paper, which defines a long-term strategic vision for energy policy combining the UK's environmental, security of supply, competitiveness and social goals. Overall aims of the Group include working with others to promote competitive energy markets, while achieving safe, secure and sustainable energy supplies.

In Spring 2004 she was elected as Chair of the International Energy Agency Governing Board. The IEA, based in Paris, is an autonomous agency linked with the Organisation for Economic Co-operation and Development (OECD). It was formed in the wake of the 1973/74 oil crises with energy security as its core activity and includes key consuming countries such as the US and Japan.

To apply for tickets, please complete this form in BLOCK CAPITALS and return it to the address below, together with payment in full.
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t: + 44 (0) 20 7467 7116, f: + 44 (0) 20 7580 2230, e: jwarner@energyinst.org.uk

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☐ Credit Card (Visa, Mastercard, Eurocard, Diners Club, Amex ONLY)

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The security that comes from energy efficiency

Mike Harris, *Vice-President, Energy Services, Johnson Controls Inc,* *looks at the way energy efficiency and management are viewed by business and public sector organisations in the US.*

When President George Bush stood up to speak at this year's Energy Efficiency Forum in Washington DC, he used the occasion to press the case for new energy legislation. However, contrary to publicity on both sides of the Atlantic, the much-debated Energy Bill is not just about opening up new mining areas, particularly in the Alaskan Refuge. The first chapter focuses on energy efficiency, the second on the development of renewable energy sources such as solar, wind and biomass. The proposals outline a future where security of supply means reducing import dependency – and a major part of this future lies in more efficient use of energy and better management of resources.

The US Department of Energy (DOE) projects total primary energy consumption in the US to rise by almost 50% by 2025. DOE figures show that energy intensity has been dropping steadily over the last 35 years and is projected to go on falling as more efficient technologies are adopted – see Figure 1. However, energy use per capita is still rising, pushing up overall US energy demand. It should be noted though that these projections do not assume any new measures or regulations to increase energy efficiency.

Yet while the Government is concerned primarily with security of supply and the impact of high prices on the economy, US business is more focussed on staying competitive. The Energy Efficiency Forum is an annual event held in Washington DC. As co-sponsors of this conference, the gathering gives us as an organisation the opportunity to meet with customers and discuss the importance of this issue. What we find is that their concerns fall into four areas.

First, there is the absolute rise in energy prices; crude oil and gasoline prices have risen over 50% in less than a year. A complicating factor is that the market is very volatile with prices changing on a daily basis: there is therefore a commercial risk associated with energy purchasing and management. The current oil price of around $60 a barrel is partly due to concerns about security and future availability: it is not purely an issue about current stock levels. In the past, energy was a small but apparently uncontrollable part of operating costs. Today, it is no longer a small component and, increasingly, both private and public sector organisations are realising that it can – and must – be controlled.

Second, there is the environmental aspect. The US has some very stringent anti-pollution legislation and regulations, and business is also very mindful of the impact of its activities on the local communities of which it is part. The performance of major items such as boiler plant and air conditioning systems are under continuing scrutiny.

Productivity is also a major issue, particularly for the public sector: state and local government, as well as other institutions such as school boards. Better energy efficiency and lower fuel bills free up funds for job creation and service delivery.

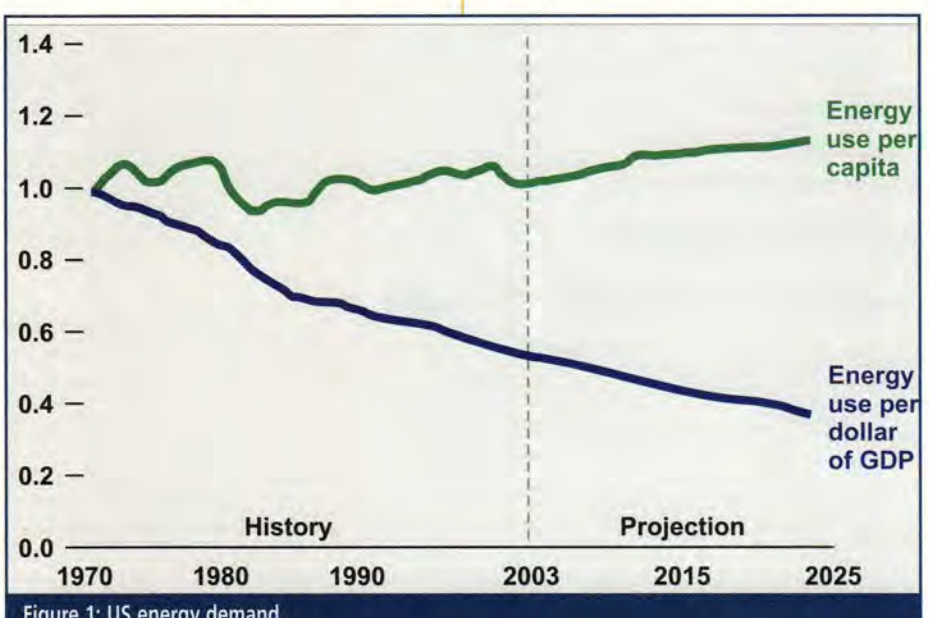


Figure 1: US energy demand

Conservation and efficiency

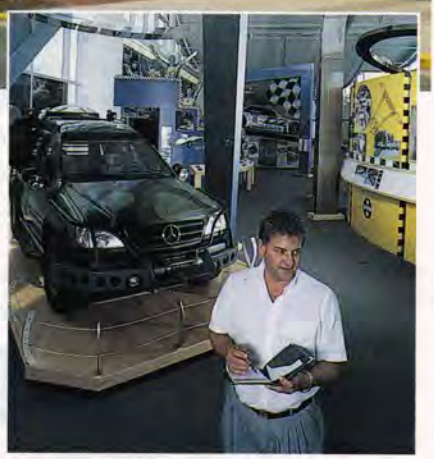
While cutting energy consumption remains the goal, there has been a shift over the last two decades away from the term 'energy conservation' to 'energy efficiency'. The former has a negative connotation, giving something up or going without something we are used to. Energy efficiency on the other hand implies doing more with less, maintaining or even improving performance. This has implications for the way the energy services industry works in the US. For example, 20 years ago business premises would have a light switch in every room. Today, many of them have been fitted with occupancy sensors instead, which automatically switch the lighting off when no-one is there. We in the energy management sector have been able to give business the tools to save energy – even if individuals sometimes forget!

As another example of how technology is improving efficiency automatically, look at building automation systems. These used to be static: they were set up for a specific set of building operating conditions and alterations had to be accommodated by adjusting individual set points. Today, though, with much more flexibility in business working patterns and more advanced control technologies, they have become dynamic – optimising energy usage in premises automatically, taking account of changing occupancy patterns and business practices.

Public and private sectors

Although both public and private sectors are keen to improve energy efficiency – albeit for different reasons as explained earlier – they tend to approach the management of their facilities in different ways. This is largely for historical reasons.

Local and state government, as well as other public institutions like school boards, are constrained in the way they can use public monies. Traditionally, they purchased their own equipment and would then look to energy management companies like Johnson Controls to improve the efficiency of the facility's operation. Capital and operating expenditure were strictly separate. So if a school wanted a new central chilled water plant, historically it would have needed to find the funds from one year's budget. Public



Above: The District Court of Maryland, Centerville, is one of more than 188 government facilities operated under performance contracts. Right: At the Mercedes-Benz plant in Alabama, employees record energy data and are able to make manual adjustments to the environmental settings.

bodies were constrained in their ability to enter into multi-year debt arrangements.

Most states have now relaxed this constraint; public bodies can enter long term contracts provided they are self-funding over a 10 or 15 year period. So now, in the public sector, we have the procurement vehicle called 'performance contracting'.

Performance contracting

Under these arrangements, the public body agrees to a contract in which a certain volumetric reduction in energy consumption is guaranteed (it has to be volumetric and not financial because it is not possible to guarantee prices over that period of time). That fulfils the requirement for absolute savings under the relevant state laws.

For the State of Maryland, performance contracting has enabled them to reach targets set by the state legislature. In the early 1990s, all state agencies were mandated to cut energy consumption by 15% by 1996, and 25% by 2001. More recently, the State Governor added additional energy efficiency goals. Maryland's Secretary of the Environment, Rick Pecora, has publicly acknowledged that performance contracting, in this case with Johnson Controls, was "a natural consequence of these government mandates." By 2002, eight Johnson Controls performance contracts, ranging from six to 15 years, had been finalised, covering 118 state government facilities. The contracts include construction, replacement of electrical, mechanical, plumbing and HVAC equipment, lighting retrofits, water conservation, the installation of energy management systems and the provision of training. The contracts commit the parties to the achievement of electricity savings amounting to nearly 339,000 MWh, and some 650,000 tonnes less carbon dioxide emissions, between 1994 and 2010.

The private sector

Performance contracting is not widely used in the private sector, though. There are two elements: businesses do not need to secure capital investment in this way and in many cases they do not need to buy a guarantee of savings over a given period - instead they build it into their costings in the form of commercial risk.

The private sector needs to buy in energy management services for different reasons. Business is focussed on cost reduction to improve competitiveness. In the past, this has sometimes resulted in the paring down of non-core staff positions – including energy and facilities management. Taking these skills out of the equation resulted in energy-using equipment and the buildings themselves not being given the appropriate level of management and maintenance. Today, with energy now a significant element of operational costs, corporations are looking for someone to provide those skills once again, in order to improve efficiency. And the requirements can be very detailed and challenging for an outside service provider.

When Daimler-Benz decided to site its first US manufacturing facility in Tuscaloosa County, Alabama, the new Mercedes-Benz US International Inc plant was to be a state of the art production facility, costing nearly $400 million and producing 80,000 cars a year. The demands on the environmental controls were precise. This part of the US has high atmospheric humidity levels and temperatures, while the manufacturing plant requires accurate temperature control to guarantee the durability of paint finishes for example. In the paint shop, four coats of finish are applied to each of the 270 vehicles produced in an average day. However, the shop shuts down if temperatures fluctuate more than five degrees from the established set point of 74°F (23°C).

Such fine-tuned control of the internal environment clearly requires significant expertise in environmental management. On a typical summer's day, five of the six chillers in the plant can be working close to 100% capacity. The sixth is kept as back-up for use on the very hottest days. The chillers are connected via a Johnson Controls Metasys building automation system to a thermal storage facility. The chillers charge the cooling tanks with cold water at 42°F (6°C) during periods of low cooling demand in the plant – typically late at night and in the early morning hours. During peak cooling periods, the Metasys system controls the storage tank operation to provide approximately 1,800 tonnes of additional cooling capacity. This reduces the amount of grid power that Mercedes-Benz US International Inc needs to buy in to drive the chillers.

This innovative integration of technologies to reduce peak energy demand and overall consumption requires specialist knowledge of energy management techniques, building operations and the energy commodity market. However, although a key component of the total production process, energy management is still a non-core specialism for corporations like Daimler-Benz. They would rather bring in the skills they need to achieve the optimal outcome.

Risk and security

Minimising economic risk, ensuring reasonably priced energy and increasing security of supplies is the common aim of both government and business, whether at the national or corporate level. It is clear that the best way of reducing emissions and costs is not to use the energy in the first place. Energy efficiency technologies are therefore, in a real sense, the ones with lowest emissions!

Many corporations and government bodies are expressing increased interest and take-up of renewable energy technologies – home-grown, low carbon alternatives. Better energy efficiency and energy management is the door to increased profitability, better social interactions with local stakeholders and reduced environmental impact. In fact, it is the way many American organisations are introducing their workforce to the idea of sustainability.

Johnson Controls is a global provider of facility and energy management services. Contact the company at **www.jci.com**

Situations vacant

HEATING DEGREE DAYS

to 15.5°C base temperature

Region	May 2005	Jun 2005	Jul 2005
1 Thames Valley	104	29	14
2 South East England	130	48	21
3 South Coast	119	55	32
4 South West England	132	45	15
5 Severn Valley	119	34	17
6 Midlands	133	44	27
7 West Pennines	154	69	38
8 North West England	148	58	50
9 Borders	169	81	55
10 North East England	152	66	38
11 East Pennines	139	55	28
12 East Anglia	144	61	30
13 West Scotland	180	67	50
14 East Scotland	186	74	54
15 North East Scotland	195	96	63
16 Wales	155	57	31
17 Northern Ireland	172	61	40
18 North West Scotland	215	112	83

EI Breakfast Briefing

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Building a low carbon future – 7 September 2005

Tom Delay, Chief Executive of the Carbon Trust

The Carbon Trust is an independent company funded by Government. Its role is to help the UK move to a low carbon economy by helping business and the public sector reduce carbon emissions and capture the commercial opportunities of low carbon. Tom Delay, Chief Executive of the Carbon Trust, will give an insight into:

- What a low carbon future means
- How to make the business case internally and externally
- Opportunities to work with the Carbon Trust

Venue: Energy Institute, 61 New Cavendish Street, London WIG 7AR
Time: 07.30: Registration and breakfast
08.00: Speech
Price: Members: £15.00 (£17.63 inc VAT)
Non-members: £20.00 (£23.50 inc VAT)

For more information please contact: Arabella Dick t: +44 (0)20 7467 7106 f: +44 (0)20 7580 2230 e: arabella@energyinst.org.uk www.energyinst.org.uk

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Oil Depletion – Facing the challenges

Wednesday 2 November 2005
Energy Institute, 61 New Cavendish Street, London W1G 7AR

Tickets:
Member:
£90.00 (£105.75 inc VAT)
Non-Member:
£130.00 + VAT (£152.75 inc VAT)

For more information please contact:
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f: +44(0)20 7580 2230
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Council Chamber:	22 people, boardroom style
Waterhouse Room:	12 people, boardroom style
Lecture Theatre:	120 people lecture style
	100 people with catering
	40 people, boardroom style
Committee rooms I&II:	10 people
Meeting room:	8 people

Audio-visual equipment is also available for hire.

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Left: the Energy Institute hallway; top middle: the Council Chamber, boardroom style; top right: the Lecture Theatre, banqueting style.

For more information on bookings and room layout please contact:

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How to increase sales with interest-free loans.

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For further details of eligibility criteria refer to www.thecarbontrust.co.uk/loans.
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Making business sense of climate change