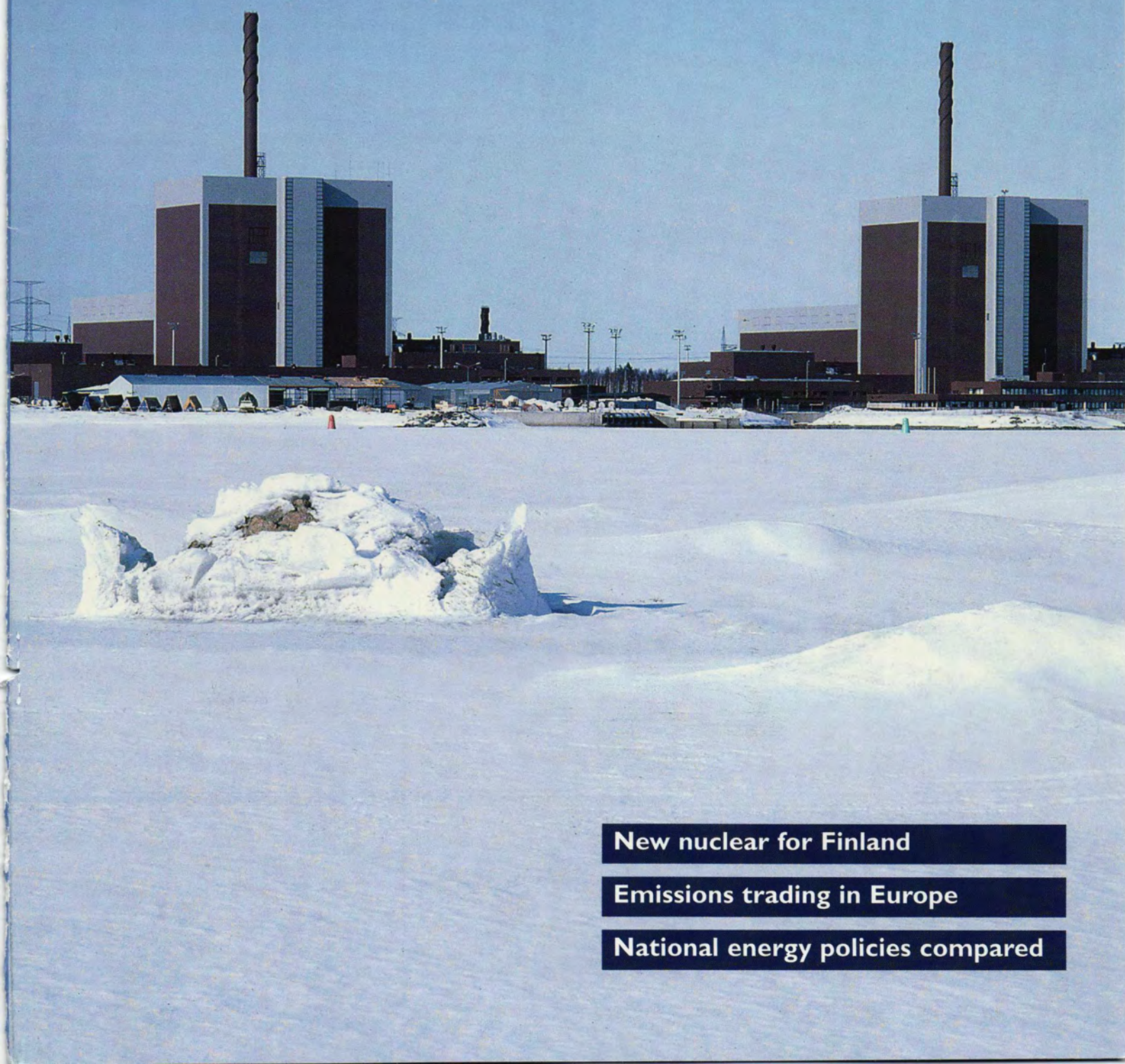


March 2004
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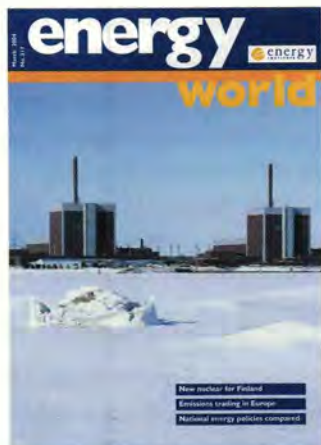
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Energy Institute
61 New Cavendish Street,
London, W1G 7AR, UK
e: info@energyinst.org.uk
www.energyinst.org.uk

Editor

Steve Hodgson
t/f: +44 (0) 129 877 601

Production

Thanet Press Ltd
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Subscriptions

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

Advertisement sales

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

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President

Euan Baird FEI

Hon Secretary

Joanna Wade

Treasurer

Eur Ing D Barber CEng FEI

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Olkiluoto nuclear power plant, western Finland. Preparatory site work has begun in order to build a fifth nuclear reactor in Finland adjacent to these two 840 MW boiling water reactors. But, with several countries gradually phasing out their nuclear fleets and without plans to replace them, what was behind the Finnish decision to invest anew, and what does it mean for the rest of Europe? See one Viewpoint on page 2.

A fifth nuclear reactor for Finland – out on a limb, or leading a trend?

Is Finland unique? Not altogether, but there are a number of factors local to Finland, which give clear pointers to the decision to build a 1680 MWe European Pressurised Water Reactor at Olkiluoto (see Energy World February 04). I shall endeavour to show that they are relevant to the rest of Europe too.

Finland's 1997 energy policy stresses availability, security, diversity of supply, price and the need to meet international environmental commitments. Finland is part of the deregulated Nordic power system, which faces shortages, especially in dry years, which have curtailed hydroelectric generation. Comparative studies of lifetime generation costs have shown that for Finland nuclear is the cheapest option, despite high initial capital costs. This price advantage will grow significantly with the introduction of the European Union's carbon emission trading system in 2005.

Finland has a very high per capita electricity consumption: some 16 MWh per head per year. This no doubt influenced the decision to build a very large reactor. The existing four reactors, much upgraded from their initial rating, now supply about one third of the nation's electricity. The rest comes from hydro, gas or renewables.

TVO's application for a new reactor was based primarily on economic criteria (lowest lifetime cost per kWh, lowest sensitivity to fuel price increases). But it also stressed considerable energy security and greenhouse-gas benefits. Perceived climate change dangers were a major reason for government support for the proposals. The main alternative way to meet predicted rising demand would have been a massive increase in the use of natural gas, imported from Russia.

The Finnish nuclear community's politically successful approach to radioactive waste disposal was a key factor. The Finnish government's guidelines for long-term nuclear waste management set in 1983, soon after the first four reactors started commercial operation, included an absolute local right of veto on the siting process. The utility has all along laid great emphasis on cultivating national and local support, and took care to achieve an outcome on waste management acceptable to all parties, including the local community, in advance of the 2003 decision on the fifth reactor.

There is one other significant factor, which is peculiar to TVO. It is a public-private partnership company, 43% government owned, and 57% private, with the owners taking their shares of the electricity it generates at cost, any unwanted portion being sold by them into the Nordic market. This means that TVO's output is effectively contracted to each owner over the life of the plant. The private owners are mostly heavy industry with a high demand for base-load power, hence the critical importance of low operating costs, and TVO's bankers' ability to

take the long-term view.

I have set out above the principal factors which have influenced the Finnish decision. Yet many of the same fundamental considerations apply elsewhere in Europe. Coal is a fuel which everyone agrees has had its day. Likewise oil. Natural gas, which has enjoyed a bonanza for the past 15 years, is reaching the end of its reign. Its own industry calculations suggest that electricity generated by gas will be much more expensive in real terms by 2010. Further, the dwindling reserves of the North Sea will mean that Europe will have to compete for supplies from distant sources such as Siberia or Algeria. Renewables, like nuclear in the 1960s, have been heavily oversold. Their hidden costs are beginning to be recognised, and their unreliability in periods of climatic uncertainty will become worse not better. (For 53 consecutive days in the hot summer of 2003 the average availability of wind generators in Denmark, which has invested heavily in them, was only 1%).

The Finns have shown the way forward on the safe deposition of nuclear wastes. As a country with a large baseload demand they have calculated that a very large reactor suits their needs best; it is also a next generation reactor, the first of its kind. Experience shows that the next in the series usually has better economics than the first. Where the Finns have led the French have declared they will follow.

Finally, the Finns are not alone. Not even in Europe. Ukraine, despite immense financial difficulties, is now completing two half-finished reactors it inherited from the Soviet Union. Romania is pressing ahead with Cernovoda-2. There are 30 reactors under construction in the rest of the world, mostly in the Far East, with many more planned there.

So whereas it may look superficially as though the Finns have adopted a maverick course, I believe that actually they are ahead of the game, and that where they have led, the rest of Europe could follow. There are already signs that the wisdom of doing so is gaining wider acceptance. In January the European Parliament approved a proposal by the Commission to grant European loans to finance the construction of new nuclear power stations in member states provided the said stations increased safety, added to facilities for spent fuel storage and involved provisions for eventual decommissioning. Coming from a body not generally known for its pro-nuclear enthusiasms, this is surely more than a straw in the wind.



Gerald Clark FEI was the Secretary General of the Uranium Institute (now the World Nuclear Association) from 1994 to 2000.

World Bank review recommends an end to funding coal mining

Management at the World Bank is considering its response to its own 'Extractive Industries Review' (EIR) which has concluded that the Bank should wind down its support for coal and petroleum extraction projects.

The Review, a two-year-long evaluation of the development impacts of the World Bank Group's support for oil, mining, and gas projects worldwide, has recommended that the Bank adopts significant reforms, including ceasing funding for coal projects worldwide and phasing out its support for oil production by 2008. The Bank-sponsored Review also recommended enhanced human rights protections, prior informed consent for project-affected peoples, and an end to support for destructive mining technologies.

President James Wolfensohn initiated the EIR in 2000, by pledging to evaluate the poverty alleviation impacts of the extractive industries.

The final report: *Striking a better balance*, issued in December last year, was strongly critical of the record of the extractive industries in development, human rights, and environmental terms and called for a better balance between governments, business and civil society. It also advocating the "raising of social and environmental considerations so they are balanced with economic considerations in efforts at poverty alleviation through sustainable development".

The World Coal Institute says it supports the general thrust of the Review – that the Bank should continue to lend to the mining sector in ways that promote sustainable development – while disagreeing strongly with the specific recommendation not to fund coal mining at all.

Previously, the Bank has said that if the review determines that certain policies have detracted from its goal of poverty reduction, then it is committed to implementing changes to redress those problems.

"The review has indeed demonstrated that the Bank's support for the extractive industries and their structural adjustment programmes have substantially undercut their goal of poverty alleviation" said Keith Slack of Oxfam America. "The EIR has put forward some strong recommendations to try to address the problems, but the responsibility now shifts to the Bank. We'll all be looking to James Wolfensohn, and his staff now to implement these changes".

Global oil supply 'shortages likely after 2007'

Global oil supplies could start to have difficulty meeting growing demand after 2007, according to an analysis of existing and planned major oil recovery projects published in the January issue of *Petroleum Review* the Energy Institute's other monthly magazine.

While a flood of new production is set to hit the market over the next three years, volumes expected from anticipated new projects thereafter are likely to fall well below requirements, says the report.

There are not enough large-scale projects in the development pipeline right now to offset declining production in mature areas and meet global demand growth beyond 2007, said Chris Skrebowski, author of the report and editor of *Petroleum Review*.

Since it takes, on average, six years from first discovery for a 'mega project' to start producing oil, any new project approved today would be unlikely to come on stream until the end of the decade, Mr Skrebowski noted.

The report appears to support the theories of the London-based Oil Depletion Analysis Centre and others, that the date of the global oil production peak is only a few years away and that the effects of that peak will be felt immediately, with shortages and price hikes.

The report: *Oil field mega projects 2004*, analysed all known projects with estimated reserves of over 500 million barrels and the claimed potential to produce over 100,000 barrels of oil a day. Projects on that scale account for about 80% of the world's oil supplies. The report found that just three such projects are expected to come on stream in 2007 and three more in 2008. No new mega projects could be identified for start-up in subsequent years, although later stages of one existing project may come on stream in each of 2009 and 2010.

Ever-growing demand for oil means there is a ready market for additional supplies, so substantial new discoveries tend to go into development in a very limited time. But between a quarter and a third of the world's oil production is already in decline and it appears that giant new discoveries to replace lost capacity are becoming very scarce.

2003: second-warmest year on record

Global temperatures in 2003 were 0.56°C above the long-term (1880-2003) average, making 2003 the joint second warmest year on record, tied with 2002 – according to the US National Oceanic and Atmospheric Administration (NOAA). The warmest year on record is 1998 with an anomaly of +0.63°C.

Land temperatures in 2003 were 0.83°C above average, ranking third in the period of record, while ocean temperatures ranked as second warmest with 0.44°C above the 1880-2003 mean.

The northern hemisphere temperature averaged near record

levels in 2003 at 0.64°C above the long-term average. The southern hemisphere temperature also reflected the globally warmer conditions, with a positive anomaly near 0.45°C says NOAA.

In addition, higher temperatures and shifts in atmospheric circulation patterns in 2003 contributed to a second consecutive year of extremely low Arctic sea ice extent in September, according to the US National Snow and Ice Data Center. Northern hemisphere sea ice extent was almost as low as that observed in September 2002, the lowest since satellite monitoring began in 1978.

Twelve US states join to promote clean energy

Seventeen public funds from twelve US states have banded together to promote clean energy projects and companies by supporting a new non-profit organisation – the Clean Energy States Alliance (CESA).

CESA's members include the clean energy funds from twelve states: California, Connecticut, Illinois, Massachusetts, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island and Wisconsin. They all fund clean energy and expect to have about \$3.5 billion collectively for these efforts over the next decade.

CESA will advance new, multi-state efforts to promote solar, wind, fuel cells and other clean energy projects and investments.

"States see clean energy as a way to improve the environment but also as a powerful economic development tool," says Lewis Milford, Executive Director of CESA. "By working together rather than going it alone, these states can build even bigger clean energy markets, spur technology innovation, create more jobs in 21st century clean energy industries, and more quickly clean up the environment. They can do all that and save money by leveraging each other's funding."

Europe moves towards 2020 renewables target

A major, high-level conference on renewable energy in Europe ended in Berlin in January with the unanimous conclusion to proceed without delay towards setting a new, ambitious target for 20% of total energy to be generated from renewable sources by 2020.

Over 650 participants from 45 countries attending the Berlin conference agreed that new targets beyond 2010 are needed to provide medium and long-term investment security, and a substantial increase in the use of renewables energy is essential to achieving sustainable development at local, national, European and global levels.

Previously, the European Renewable Energy Council (EREC) – the umbrella group representing renewable industry and trade and research associations, proposed the '20% by 2020' Target. This will now be the EU input to a further renewables conference in Bonn in June.

"We demonstrated how a target value of at least 20% of energy consumption by 2020 for the EU is achievable, and we see the willingness in the EU to promote such target as a major achievement," said Prof Arthouros Zervos, President of EREC.

The Berlin Conference conclusions stress that "to increase the use of renewables forms part of the strategy of the European Union and other countries for sustainable development, climate change prevention, economic growth and social cohesion".

Meeting the 20% by 2020 targets would bring along equally important benefits, such as avoided fuel costs of more than €100 billion, carbon dioxide reductions of over 700 Mt/year (representing around 17% of 1990 emissions), saved external costs of up to €300 billion and extra employment of 2 million people, says EREC.

New oil products export terminal for Russia

The Fluor Corporation has been selected by Russia's Lukoil to build a crude oil and petroleum products export terminal on Vysotsky Island, near St Petersburg, on the Gulf of Finland. Fluor and its consortium partner, Lukoil Neftegazstroy (LNGS), have signed a lump-sum turnkey engineering, procurement and construction contract for the project, which is expected to be complete in December.

The terminal will enable Lukoil to export additional quantities of crude and oil products.

The project includes two tank farms, a marine jetty, a railroad station and dredging in the Gulf of Finland to allow for the passage of double-hulled crude and product ice-breaker tankers. The project will comply with the stringent international environmental standards set by the World Bank, the Overseas Private Investment Corporation, the Baltic Marine Environment Protection Commission and the International Maritime Organisation, says Fluor.



Norway's Smøla wind farm project is to be connected to the grid by a composite high voltage/fibre optic cable from Nexans. The project for Nexans will include the delivery and installation of a composite 145 kV three-phase AC high voltage cable and a fibre optic communication and control cable. The high voltage link will transfer an estimated 150 MW of power from 68 wind turbines located on the remote island of Smøla, off the north-western coast of Norway, to the mainland.

When completed, Smøla Wind Farm will become one of Europe's largest onshore wind farms. Each of the 68 wind turbine towers measures 70 m in height, with a blade diameter of 80 m.

US wind growth nears record in 2003

2003 was one of the best years ever for the US wind industry, says the American Wind Energy Association (AWEA), but its outlook for 2004 is considerably less optimistic.

In 2003, a total of 1,687 MW of new wind capacity was installed in the United States, just 9 MW short of the record established in 2001. There are now 6,370 MW of wind power installed throughout the country, and utility-scale wind turbines are spinning in 30 different states.

However, since the wind energy production tax credit expired at the end of last year, AWEA says that the industry is now facing a quite different outlook, with layoffs and stalled projects.

Dramatic new photographs (below, right) of Patagonian glaciers taken by a research team on-board the Greenpeace vessel Arctic Sunrise are claimed to show the extent of 'glacial retreat' this century, when compared to photographs of the same glaciers taken in 1928 (below, left).

Greenpeace says that glaciers in Patagonia are disappearing faster than anywhere else in the world, with climate change the major cause. From 1995 to 2000, the rate of ice loss from ice fields more than doubled, and the sheer volume of melt water from glaciers is causing sea levels to rise, says Greenpeace.

Glacier melt may also cause enormous problems on land in the future, as 2 billion people rely on rivers fed by Himalayan glaciers alone.

Patagonian glaciers such as the Upsala (pictured) have significantly thinned and have retreated several kilometres in recent years.

Dutch buy carbon credits from Hungarian power producer

The Dutch government is to purchase carbon credits derived from a coal-to-biomass switch project in Hungary, as part of its ongoing carbon credit procurement programme.

The US-based Evolution Markets LLC has facilitated the deal, under which the Dutch government has agreed to a purchase greenhouse gas reduction credits from Hungarian power producer Bakony Power Plant Plc. The reductions will qualify as carbon credits under the Kyoto Protocol's Joint Implementation (JI) programme.

Under the terms of the transaction, Bakony Power will sell credits representing the reduction of more than 400,000 tonnes of carbon dioxide-equivalent to the Dutch government. The credits will be generated from 2008 to 2012. The purchase was conducted through the third round of the Dutch government's Emissions Reduction Unit Procurement Tender (ERUPT) and represents the only project from Hungary accepted in this round of the tender.

Bakony Power operates the Akja Power Plant located in the mid-west of Hungary. The company will generate the reductions by switching the fuel source for a portion of its power facility from coal to biomass, thereby reducing overall greenhouse gas emissions.

"The Bakony Power project reflects the promise of carbon finance for companies in Central and Eastern Europe," said Andrew Ertel, President & CEO of Evolution Markets. "This project was facilitated by funding derived from the sale of carbon credits. We are pleased to have been able to assist Bakony in preparing this project for sale to the Dutch government, and see similar opportunities beyond ERUPT available elsewhere in Central and Eastern Europe."

The Dutch government is conducting the ERUPT process as a means to acquire carbon credits, which will reduce its overall emissions and enable the country to take steps to meet its reduction requirements under the Kyoto Protocol.



Renewables could generate thousands of jobs

Britain's renewable energy industry currently sustains around 8,000 jobs and, by 2020, this could rise to between 17,000 and 35,000 jobs, according to a new report from the DTI's Renewables Advisory Board.

The *Renewables Supply Chain Gap Analysis* assesses the current status of the renewables industry in the UK in some detail, and its future potential. It says that renewable energy plant with a generating capacity of around 1,300 MW is in place in the UK now, with a further 330 MW under construction. Of today's capacity, nearly half is based on onshore wind turbines and a similar proportion on landfill gas and energy-from-waste. In addition, more 8,000 MW of capacity is under development – the great majority of this being onshore and offshore wind.

In the foreword to the report, jointly signed by the Lewis Macdonald – Deputy Minister for Enterprise and Lifelong Learning at the Scottish Executive – Energy Minister Stephen Timms said: "The development of renewable energy is an important part of our efforts

to tackle climate change. But it also offers a huge opportunity to enhance our manufacturing capacity and provide new employment, particularly in the remoter areas."

The 'Gap' report also suggests that investments totalling between £15 billion and £19 billion, depending on the technology mix, will be required to meet the Government's 'aspiration' to see 20% of UK electricity generated from renewable sources.

Mr Timms added: "The report will provide us all – industry and the public sector alike – with information about what steps must be taken for the UK to become a major player in renewable energy technology manufacture and supply. As the report makes clear, there are a number of challenges that need to be faced and obstacles that need to be overcome. But as it also makes clear, the potential rewards of doing so are immense."

The Renewables Supply Chain Gap Analysis is available at: www.dti.gov.uk/energy/renewables/publications

NOx reduction plant for Ratcliffe; FGD approved for Rugeley

Environmental improvements to several of Britain's largest coal-fired power stations continue, with announcements of new NOx reduction equipment planned for Powergen's Ratcliffe-on-Soar power station and flue gas desulphurisation plant to be fitted to Rugeley Power Ltd's coal-fired power station at Rugeley in Staffordshire.

Alstom has won the order from Powergen UK to install a major new NOx reduction system on Unit 1 at Ratcliffe-on-Soar, located near Nottingham. It will be the first commercial installation of a 'boosted overfire air' system in the UK, says Alstom. The system will enable Powergen to achieve NOx emission levels commensurate with those required under the European Union's forthcoming Large Combustion Plant Directive (LCPD), due for implementation on 1 January 2008.

Ratcliffe-on-Soar power station has four 500 MW coal-fired boilers, which were originally supplied by Babcock and commissioned during the late 1960s and early 1970s.

Meanwhile, Energy Minister Stephen Timms has approved a proposal from Rugeley Power Ltd, a subsidiary of International Power, to fit a flue gas desulphurisation (FGD) plant at its 1000 MW coal-fired power station at Rugeley.

The new plant will have a dual role. The flue gas desulphurisation plant will be designed and operated as a chemical absorption process. Injection of a limestone slurry will remove over 90% of the sulphur dioxide from the combustion gases and also produce gypsum, which is heavily used in the building trade.

Planning permission has been granted subject to 47 conditions agreed with Staffordshire County Council.

Total opens consultation on concrete platform decommissioning

Total E&P UK has begun what it calls a 'wide-ranging stakeholder consultation process' on the proposed decommissioning of one of its North Sea platforms, a process expected to take several years to complete.

The massive – nearly 400,000 tonnes – 'Manifold Compression Platform' (MCP-01) is a concrete gravity structure installed in 1976 and first used to control pressure in the Frigg gas pipeline. It has also been used as a compression facility for gas from Frigg for onward transportation to the St Fergus gas terminal, and now acts as a 'normally-manned' interconnection station for other gas fields in the area.

Total operates the platform on behalf of itself and 12 partner companies. The platform has never been used for drilling, so there are no drill cuttings to dispose of, and was never used for the storage of oil.

Located in 94 m of water some 170 km northeast of Aberdeen, the platform had not been due for decommissioning until around 2024, once the pipelines were no longer in use. But recent studies have led Total to believe that it may not be able to maintain acceptable safety standards on an unmanned platform which would then be 50 years old at the time of decommissioning.

Instead, prior to starting decommissioning, working pipelines running through the platform will be bypassed during 2005/05.

Meanwhile, concern has been expressed that high costs associated with the decommissioning of North Sea infrastructure could pose a threat to the future of asset deals in the North Sea, particularly as smaller, independent companies are starting to take a larger role there.

Speaking at a conference on the future of the sector in Aberdeen, Derek Leith, Oil and Gas taxation leader at Ernst & Young said, "With the estimated cumulative costs of decommissioning already touching £9

billion and rising at approximately half a billion pounds a year, this is a seriously expensive problem."

As the major oil players pull out of the North Sea and the future of the region lies increasingly with the smaller independent exploration and production companies, the vast sums required for decommissioning become more of a critical issue.

Leith explained, "Whereas major oil companies have the credit ratings to avoid any impact on their ability to borrow, less established players are not in such a favourable position." The existing rules do not allow companies tax relief on the financial provisions made for decommissioning until the process actually starts – potentially decades later.

Leith continued, "We believe that this legislation, which was drawn up over twenty years ago when the prospects for the development of the North Sea and the players in it were very different, needs to be re-examined. Let's not have a reason to deter investment just at the time when it is most needed."

Visit www.uk.total.co for further details of the MCP-01 decommissioning project



The giant MCP-01 platform is due to be decommissioned over the next few years

Carbon Trust takes a slice of fuel cell company Ceres Power

The Carbon Trust has invested £1 million for shares in fuel cell developer Ceres Power Ltd, as part of its drive to promote a low-carbon economy. The investment will help advance the much broader emerging hydrogen industry in the UK, says the Trust.

Ceres Power won a Carbon Trust Innovation Award recently (see *Energy World* January 04).

Ceres is developing fuel cell products for distributed power generation, with the potential for widespread commercial applications such as the domestic boiler market in the UK. Other potential markets include auxiliary power units for transportation applications and generators for secure power supply. The company has successfully completed a private equity round of approximately £5 million, a fifth of which has come from the Carbon Trust.

Based in Crawley, Ceres Power was founded in 2001 as a spin-out from Imperial College London. The company is focussing on the commercial exploitation of a revolutionary fuel cell invented by the founders at the College over the course of more than ten years. The Ceres Power fuel cell employs a unique steel-supported design rather than traditional approaches based on ceramic or plastic. This robust, low-cost core technology is ideally suited for the consumer applications the company is targeting.

Peter Bance, CEO of Ceres Power Limited said, "Our technology can help to answer some of the world's growing energy concerns. By offering products with the potential to dramatically reduce fuel consumption, improve electricity security and help slash carbon dioxide emissions, our interests are very well aligned with those of consumers, utilities and government."

The Ceres fuel cell can operate on hydrogen and existing hydrocarbon fuels, such as natural gas and liquid petroleum gas, while ensuring that carbon dioxide emissions are minimised.

- The Carbon Trust has awarded Thames Water a £50,000 grant for the company to look at ways of reducing its greenhouse gas emissions. Thames, which already generates over 10% of its electricity needs from its own by-products, will study the scope for installing hydropower, wind turbine and solar power technology at its operating sites.

Scottish hydrogen era to begin in Shetland

Scotland-based fuel cell company siGEN has signed a contract worth nearly £200,000 with the Unst Partnership for the installation of a renewable energy, hydrogen production and fuel cell project in Shetland.

The Unst Partnership, established to tackle jobs loss and depopulation from the UK's most northerly island, in turn developed the PURE

(Promoting Unst Renewable Energy) project originally devised by a local engineer.

The project will install two wind turbines, an electrolyser, hydrogen storage facilities and a 5 kW fuel cell system into the Hagdale Business Park on Unst in Shetland. The project has secured financial support from the European Redevelopment Fund, Highlands and Island

Enterprise and Shetland Islands Council. The project will be the first hydrogen project in Scotland, says siGEN.

The PURE project will eventually demonstrate how imported hydrocarbons could be progressively displaced by locally produced hydrogen from local renewable energy sources.



Greening the shopping experience – the Oasis Food Court at Sheffield's Meadowhall Shopping Centre is one of the latest ventures to sign-up for renewables-based electricity from npower major business accounts. Management at the shopping centre (pictured with npower staff) have signed a one-year contract for 16 GWh of green electricity.

Shopping and leisure centres, together with financial organisations, have joined local authorities – traditionally the pioneers here – as major buyers of green electricity, says the company. Indeed npower reports several new clients from these sectors, including:

- The Belfry Shopping Centre in Redhill (3-year contract for 1.5 GWh);
- Centre Parcs (1-year contract for 2.4 GWh);
- Alliance and Leicester (1-year contract for 40 GWh);
- Credit Suisse First Boston (18 GWh);
- Wolverhampton City Council (5 GWh); and
- Brighton and Hove City Council (2-year contract for 29 GWh).

Electricity from renewable sources is usually purchased as a percentage of total power requirements, says npower. Alliance and Leicester has opted to have eight of its half-hourly metered sites across the country – consuming around 70% of its total needs – powered with green electricity. The company adds that it has been able to negotiate the deal at no extra cost to the 'brown' alternatives which had been offered.

Supplier satisfaction ratings 'rose in 2003'

Industrial and commercial sector energy customers may not be very impressed with the quality of customer service provided by their power and gas suppliers, but research from independent market analysts Datamonitor suggests that satisfaction levels increased during 2003. Datamonitor also suggests that these customer service improvements, especially apparent in the cases of Powergen, EDF Energy and Elf, will positively influence customer-switching behaviour.

Of the 400 above 1 GWh electricity customers and 170 above 1 mcm gas customers interviewed by Datamonitor in 2003, 39% and 32%, respectively, switched supplier at their last contract renewal date. Not only has poor customer service been responsible for their leaving their provider, on the other hand, having a good customer service reputation also helps suppliers win new customers, says the company.

In the power market, 21% of customers who switched chose their new supplier partly for non-price reasons, while in the gas sector the figure was 22%. Following price, the most common reason for choosing a supplier was its reputation for good overall customer service. This rebuts the traditional belief that all corporate energy buyers make purchasing decisions exclusively on a price basis.

Bill accuracy and clarity also feature highly in the decision-making process, says Datamonitor.

Meanwhile, back in the domestic arena, Ofgem has revealed the results of a mystery shopping study examining the quality of energy efficiency advice provided to customers by suppliers. Ofgem's verdict is that the last two years "have seen real improvements in the quality of energy efficiency advice being provided to customers, [but] suppliers still need to build on this improvement, especially in the work of their general call centres."

Ofgem Managing Director of Customers and Supply, John Neilson, said: "Call centres are usually customers' first point of contact with their energy supplier. We challenge the companies to train their staff so they are more alert to identifying customers in need of help."

GE turbines, compressors for Buzzard project

GE Energy is to supply gas turbine-generator sets and centrifugal compressor packages to EnCana (UK) Ltd for its Buzzard Field Development Project. The offshore oil field, located in the North Sea approximately 100 km northeast of Aberdeen, will be one of the most significant UK oil producers for the next two decades (see *Energy World* February 04).

The contract covers the supply of three aeroderivative, PGT 25+ gas turbines and waste heat recovery units. The gas turbines, each rated at approximately 30 MW, will use both natural gas and liquid fuel. In addition, GE will provide five electric motor-driven, centrifugal compressor packages for gas lift and gas export services. The power output of these units ranges from 2 to 6 MW.

The gas turbines will be manufactured at GE Energy's facilities in Florence, Italy, while the compressors will be manufactured at the company's facilities in Le Creusot, France.

The compressors are scheduled for shipment to the project site in the fourth quarter of this year and the gas turbines in the first quarter of 2005.

More support for community heating

Eight community heating projects in England, Scotland and Wales have received a total of more than £6 million in new grants under the Government's Community Energy programme. Some £22 million has already been allocated under the same programme.

The eight schemes should together deliver a carbon emission reduction of almost 4,000 tonnes a year.

The awards include over £2.6 million to Edinburgh University for the refurbishment of a steam network and the addition of CHP to a scheme which connects 19 teaching and research buildings on the campus. Aberdeen University will receive over £1.7 million to install a CHP/community heating network to serve three halls of residence and 28 academic buildings.

Also in Scotland, Midlothian Council, whose scheme will involve the first extraction of minewater heat on a large scale in Scotland, will receive £560,000 for the installation of a CHP network to feed 500 new homes and an office block.

£14,000 will go to Buckinghamshire County Council to heat its Environmental Education Centre using saw mill waste, and Walsall Metropolitan Borough Council will get £500,000 to heat flats and a primary school in one of England's most deprived wards. Grants will also go to the Family Housing Association (£35,000) and Southampton University (£30,000).

Ofgem to practice what it preaches from 2005

Energy regulator Ofgem has decided to subject itself to its own five year price control regime – like those it imposes on monopoly pipes and wires businesses – from April 2005.

Chief Executive Alistair Buchanan announced the move following a radical overhaul of the organisation's structure and activities which resulted from a root-and-branch review he began shortly after joining the organisation last October.

He also announced that Ofgem will be cutting its overall budget by 6% during 2004-2005 – as well as establishing a new corporate structure.

The regulator has been criticised for running an operation rivalling the old government Department of Energy in both staffing and budget. Ofgem's budget in each of the last three years (2000-03) was £36 million; its budget for 2004-05 is £34 million and staffing levels will remain broadly the same.

The new corporate structure splits the organisation into five divisions:

- corporate strategy, accommodating Europe and the environment;
- corporate affairs;
- markets, overseeing work on competitive wholesale, retail and metering markets;
- networks, bringing together transmission and distribution; and
- operations.



A remote holiday cottage in Scotland, 20 miles south of Inverness, with no utilities and no population centres for miles, is being powered by a wind turbine with the aid of batteries from Exide Technologies.

Installed by Genasys, the Exide A600 batteries will store the power generated by a 3.5 kW Bornay wind generator. A trace inverter is then used to supply the AC current to run the lighting and domestic appliances.

A600 batteries utilise 'dryfit' technology and were chosen for their performance in harsh conditions. Space requirements are minimised and they are both maintenance-free and 30% more efficient than conventional batteries, says Exide. The batteries have a design life of up to 18 years, are completely rechargeable and can be stored for up to 2 years without a recharge.

Peter McGrath, Engineering Manager of Network Power, part of the Exide Technologies Group said, "Cold conditions can dramatically affect the performance of a battery. The A600 batteries will ensure that this cottage will continue to have power 'on-tap', even if the occupants are stranded due to blizzards or other severe weather conditions – not an unlikely prospect in such a remote area."

"This new structure is designed to meet two challenges for the organisation in 2004-2005 – the commitment to cut our budget by 6% while delivering on our new strategic themes," said Buchanan.

"We will also be undertaking a major audit of our costs with a view to living under an RPI-x price control regime for five years from April 2005. This is the same discipline that we impose on monopoly pipes and wires companies. It will serve to focus our attention on improving constantly the way we work, and maintaining year-on-year downward pressure on our costs."

He added that Ofgem's new structure demonstrates further its commitment to 'better regulation' – and the RPI-x review will satisfy Better Regulation Task Force requirements that organisations such as Ofgem undertake regulatory impact assessments of their activities. It also allows Ofgem to focus on prioritising its workload more effectively.

The EU ETS – hot air or h

From 1 January 2005 the European Union's mandatory Emissions Trading Scheme (EU-ETS) will restrict the amount of carbon dioxide that power plants and other prescribed industrial emitters can release to the atmosphere. Some commentators view this as a step change in industrial and environmental policy which will help to usher in the 'low carbon economy'.

The EU's intervention derives from an international commitment to address global warming via restriction of the emission of greenhouse gases. Here, Luke Bennett first outlines the key requirements of the EU-ETS and how it is to be implemented into the UK, then considers the likely impact upon the UK power generation sector.

By Luke Bennett, Nabarro
Nathanson

Climate change is now accepted by governments world-wide as happening and caused, at least in part, by human activities via the emission of greenhouse gases. Accordingly, legislation is being implemented across the world to reduce greenhouse gas emissions. Climate change is by its very nature a global problem that requires co-ordinated international action in order to be tackled.

The 1997 Kyoto Protocol sets the international framework for such action – although the rejection of the protocol's action plan by the United States and the wavering of Russia continues to place a question mark over the long term viability of the Kyoto settlement and its complex mechanisms for balancing the burden of action to arrest global warming between the developed and developing world.

However, at present the Kyoto Protocol sets the only international framework that there is (or is likely to be) and the European Union (and the UK Government) remains firmly committed to it.

UK initiatives

The UK Government has already taken its own unilateral steps towards encouraging emissions reduction. The (voluntary) UK Emissions Trading Scheme was launched in April 2002 and incentivises its participants to achieve subscribed greenhouse gas emissions by 2006. Furthermore, the UK Government's Climate Change Levy (introduced in April 2001) aims to raise the price of fossil fuel-derived energy supplies over those from renewable technologies with a lower global warming impact.

The UK Government has a commitment under the Kyoto Protocol to cut emissions of carbon dioxide and five other greenhouse gases by 12.5% of 1990 levels by 2008–12. However it has itself also adopted a more challenging domestic target: cutting carbon dioxide emissions by 20% between 1990 and 2010. In last year's Energy White Paper (Our energy future – creating a low carbon economy) the UK Government went even further and set an aspiration to reduce carbon dioxide emission levels by 60% by 2050.

It is the Government's own view that delivering such commitments would require a fundamental change in the economy.

The EU-ETS – in a nutshell

From 1 January 2005 the EU-ETS will apply to designated facilities within the following industrial sectors:

- power generation (combustion processes with 20 MW or greater thermal input);
- iron and steel manufacturing;
- cement, glass and brick production;
- paper and pulp industries; and
- oil refineries.

For the first phase of the EU-ETS (that running until 2008) Member States can only apply the scheme to the above facilities. After that date the scope of the EU-ETS may widen to encompass a broader range of installations and economic sectors.

Installations covered by the EU-ETS will see their ability to lawfully emit carbon dioxide restricted by law.

Operators in these sectors will have to render compliance with these restrictions by:

- investing in carbon dioxide emissions reduction equipment for their plant;
- purchasing additional carbon dioxide emissions allowances on an 'open market'; or
- reducing production in circumstances where exceedance of an annual emissions limit might otherwise arise.

The EU-ETS – the detail

As is the nature of EU Directives, the EU-ETS Directive merely sets a framework for the scheme. The missing detail is to be provided in the form of European Commission guidance to Member States – and in the specific implementation measures to be devised by each Member State.

Since the EU ETS Directive was finalised last summer, officials in DEFRA and the European Commission have been rushing to pull together the necessary detail to ensure that the EU-ETS can be implemented in accordance with the Directive's punishing (many would say unrealistic) timescale.

The last nine months have seen DEFRA issuing research papers and consultation papers upon the options for implementation in the UK. The Greenhouse Gas Emissions Trading Scheme Regulations have been formulated and operators of prescribed industrial plants were required to have applied for EU ETS permits by 31 January 2004.

ot water?

The UK Government has published a proposed National Allocation Plan setting out the amount of carbon dioxide which each plant will be permitted to emit. This Plan must now be approved by the European Commission. Once this approval is given operators will know for sure how much carbon dioxide they will be permitted to emit in 2005 and subsequent calendar years.

A big unknown is how much 'spare' carbon dioxide this allocation will produce – and therefore how much carbon dioxide will be available for purchase in the emissions trading systems. Drawing up the Plan has required DEFRA to take strategic decisions about several matters.

- Which of the regulated sectors is best placed to readily adjust to a low carbon ceiling?
- Which of the regulated sectors needs more leeway?
- What is the assessment of future industrial growth in the economy and what carbon allowance needs to be held in reserve to facilitate future growth?
- How much of the UK's national permitted carbon dioxide can be allocated to the regulated industrial sectors – and how much needs to be allocated to transport and other emission sources not yet covered by the EU-ETS?

These are all major decisions and it is not surprising that DEFRA has been lobbied hard by trade associations, each with their own partisan views on allocation and prioritisation issues.

There has been little time for Member States to model the effect of the allocation decisions that they have taken. Given the significance of these structural decisions it is not surprising that a number of the EU Member States (for example Spain) pressed for a re-think on the Directive and its requirements when the National Plan formulation process brought home the potential scale of the economic impact. But such last minute wavering has been dismissed by the EU.

Impact upon existing UK schemes

As matters currently stand it appears that energy users who are currently signed up to the UK-ETS and/or Climate Change Negotiated Agreements (CCNAs) may be exempt from the EU-ETS requirements prior to the 2nd phase of the EU scheme (that commencing in 2008). However this is far from guaranteed – the EU-ETS Directive

envisages Member States being entitled to provide in their national implementation rules for delayed implementation of the scheme if an operator can demonstrate that existing commitments/arrangements will indeed secure the level of emissions reductions that the EU-ETS seeks. Growing doubts over the effectiveness of the CCNAs and the UK-ETS to deliver significant emissions reduction have raised concerns that the opt-out facility may fail to be secured for the UK when the European Commission reviews the proposed UK National Allocation Plan.

The likely impact upon the UK energy market

The implementation of the EU ETS will see a major shift in UK energy-environment policy. To date the UK's own (voluntary) emissions trading scheme has excluded the power sector and instead sought to incentivise a reduction in carbon dioxide and other greenhouse gas emissions via the indirect emitters (i.e. the commercial and industrial consumers of fossil fuel energy). This has also been the effect of the Climate Change Levy – a tax on fossil fuel energy which has encouraged intensive energy consumers to either contract for renewables-derived electricity and/or to enter into energy efficiency commitments under Climate Change Negotiated Agreements in return for an 80% rebate on the Levy.

This has meant that the power generators have been largely excluded from direct involvement in UK initiatives to date – although the Non Fossil Fuels Levy, and more recently the Renewables Obligation, have sought to encourage generators and suppliers to diversify away from fossil fuel based technologies towards a greater take up of renewables.

The EU-ETS will see the spotlight fall directly upon the power generators themselves. It remains to be seen how generators will react to the prospect (from 2005) of being 'carbon-constrained' both as a result of having to:

- purchase Renewables Obligation Certificates (and contribute towards the NFFO levy) to support the continuing UK renewables incentivisation regime; and
- either invest in measures to reduce carbon dioxide emissions to meet the EU-ETS allocations or buy EU-ETS permits to address exceedances (or alternatively reduce production).



Paper mills qualify as 'designated facilities' within the first phase of the European scheme

UK National Allocation Plan

On the 19 January 2004 the UK Government unveiled its draft National Allocation Plan (NAP). Whilst the NAP is a draft for consultation and must be approved by the European Commission before it can take effect it sheds important light upon how the Government intends to allocate the burden of carbon dioxide emissions control across the qualifying economic sectors – and in particular how the energy sector has been singled out for special effort.

- A target of 16.3% carbon dioxide emissions reduction has been set for the first phase of the scheme (to 2008). This is more ambitious than the UK's Kyoto obligation but short of the 20% domestic target. The aim is to move to the full 20% target in the post 2008 phase.
- The Government is proposing to allocate carbon dioxide allowances on the basis of 'projected future need' and also to reflect the existing commitments of manufacturing industry under the UK ETS CCNAs. This means that the greatest burden for creating additional carbon dioxide emissions reduction is being allocated to the power generation sector (the target set is for the power sector to achieve 5.5 MtCO₂ reductions by 2010).
- The Government is proposing to incentivise CHP schemes by providing a generous carbon dioxide allocation to that sector.
- The individual site level allocations of carbon dioxide set out in the NAP are derived from the installation's average share of carbon dioxide emissions over the period 1998 to 2002. However the Government has been keen to stress that the allocations are indicative only – they could be significantly revised to reflect ongoing reworking of emissions and energy data. All participants in the EU-ETS will be required to re-submit their baseline data for verification.
- Subject to EU clearance, the Government intends to offer Climate Change Levy discounts to compensate CCNA parties who elect to transfer into the EU-ETS scheme for its first phase.

The draft NAP is open to consultation until 12 March. Details are available via www.defra.gov.uk/environment/climatechange/trading/eu/index.htm

Luke Bennett is with Nabarro Nathanson's Energy Group. Contact the Group at: www.nabarro.com

It is clear that fossil fuel-based generators will end up paying more in the name of addressing global warming. These costs will be passed on to energy consumers in the form of increased energy costs payable by industry who in turn will also be paying the cost of meeting their own carbon constraints under the EU-ETS, at least from 2008. Add to this Climate Change Levy as a tax on top.

The first phase of the EU-ETS will bite widely across the electricity generation industry. The first phase's application to generators will encompass all combustion installations with a thermal input greater than 20 MW, this ranges from power stations through to small boilers (potentially including own-generators and institutional generators like universities and hospitals).

Draft guidance has been issued by DEFRA on the definition of 'installations'. Whilst it is clear that multiple small boilers or other qualifying plant at a single location must be aggregated, other

aspects of the definition remain unclear.

Depending upon the final form of this guidance the number of UK installations (locations) to be subject to the EU-ETS in its first phase could significantly exceed the 1,000 sites currently estimated to be subject to it.

The impact on CHP

It remains to be seen whether the UK Government will seek to protect CHP when implementing EU ETS. The EU ETS is aimed at reducing emissions at source – and gives no credit for the increased efficiency that installation of a CHP Plant may represent. It appears that DEFRA may be minded to offer some form of protection – but its options are limited to favourable allocation of allowances within the National Allocation Plan.

How the energy sector will react

Power plants covered by the EU ETS are having to take long term investment decisions in an uncertain climate. The extent to which marginal coal and oil-fired plants will be rendered uneconomic by the restrictions imposed upon future carbon dioxide emissions depends upon how favourably the energy sector is treated in the allocation of emissions allowances.

Existing fossil fuel power stations already face the requirement for major upgrading over the next five years under the EU's Large Combustion Plants Directive (which will introduce a 'cap and trade' for sulphur dioxide and oxides of nitrogen and particulate emissions from power plants constructed before 1987 by 2008). Keeping marginal coal and oil-fired stations in useable condition will require commitment to expensive capital investment to retro-fit emissions abatement equipment.

Forecasters predict that the low carbon future which the EU-ETS will usher in will generate an increase in energy prices (although there is no agreement as to how big the impact will be). Certainly the investments required in order to manage carbon dioxide (and SO_x and NO_x) will have to be paid for by someone: either generators or consumers.

If the UK Government retains its existing policy measures (the UK ETS and the Climate Change Levy) then customers will be 'paying twice'. How this interplay is to be resolved remains to be seen.

National energy policies – an international balancing act

It's not only the UK which has a national policy to balance security of energy supply with diversity of source, cost-effectiveness and environmental

objectives. The Paris-based International Energy Agency regularly publishes its own commentaries on the efforts of member countries to achieve that

balance. Here we reproduce summaries of the IEA's most recent assessments of two major but very different economies – those of Italy and Japan.

Japan – good progress on security and environment; more focus needed on economic efficiency

Energy security issues are more critical for Japan than for most IEA countries due to its geographical location and limited domestic energy resources. Consequently, Japan is making great efforts to ensure security of supply. Oil stocks well exceed the 90-day obligation, while flexibility tools such as supply diversity and possibilities for fuel-switching, are used for natural gas. Policies to promote nuclear power and renewable energies further contribute to diversification. Despite this effort, however, growing dependency on imported oil from the Middle East is still a concern. Other energy security challenges also exist. The disruption in gas supply from Arun in Indonesia showed a potential security threat as the share of gas is increasing in the fuel mix. The outage of TEPCO nuclear plants which began in September 2002 is another example. Lastly, increasing summer peak demand for electricity makes it difficult to match supply and demand in the summer season.

Nuclear power

Nuclear energy is expected to play a vital role in achieving energy security and climate change mitigation in Japan. The Government's current long-term energy supply and demand outlook projects a 30% increase in nuclear power generation by 2010. But this target has become more difficult to reach due to safety-related incidents and significant plant outages in recent years. The first challenge is to restore public confidence. Secondly, since the load factor of Japanese nuclear power plants is on average lower than in other IEA countries, the statutory and other outage periods should be shortened and their frequency reduced without compromising the level of safety. A third challenge is to ensure the role of nuclear power in liberalised electricity markets, a subject that has not been addressed in the recent debate on further market reform in the electricity sector.

Climate change mitigation

Japan ratified the Kyoto Protocol in June 2002, with an undertaking to achieve a 6% greenhouse gas emission reduction during the first commitment period. But Japan's energy-related carbon dioxide emissions actually rose by 11% between 1990 and 2001. Although Japan's carbon dioxide emissions per capita and per unit of GDP are lower than the IEA average, rising greenhouse gas emissions are one of the most important energy policy challenges in Japan. The path towards the target has been laid down in the Government's 'New Guideline for Measures to Prevent Global Warming' published in March 2002.

Japan has developed an impressive range of policies to address rising carbon dioxide emissions from energy use: energy efficiency standards over a range of equipment, voluntary building codes, labelling, growing support for renewable energy and conservation policies, as well as subsidies to encourage fuel switching. But, noting the rapid increase of energy demand in household and passenger transport sectors, some could be strengthened. Energy efficiency labelling could be extended to a wider range of appliances for example; building energy performance standards could be made mandatory for new buildings and extended to the refurbishment of existing buildings. It is questionable whether the aim of the Keidanren's Voluntary Action Plan for stabilising industry's emissions by 2010 will be met if industrial output recovers from the current recession. Since the marginal cost of domestic emission reductions is increasing, industry's participation in the Kyoto flexibility mechanisms would be welcome, as this may reduce the cost of climate change mitigation.

Economic efficiency

One challenge for policymakers is meeting objectives in a cost-effective way. Japanese energy policy includes a complex web of financial and fiscal

Major developments in Japan's energy policy in recent years include energy market reform, ratification of the Kyoto Protocol and the implementation of an enhanced policy package to achieve the Kyoto target. But while energy security and environmental issues have been well addressed in Japan, more needs to be done to improve economic efficiency, notably in the energy markets and the cost-effectiveness of government policies.

incentives to encourage certain energy supplies and end-use technologies. But it is not clear how well these mechanisms are working individually or collectively. Japan should develop a comprehensive map of all the various incentives and disincentives: financial, tax, regulatory, R&D, etc, to determine their cost-effectiveness and rationalise these policy options for maximum impact and leverage.

Despite some recent falls, energy prices in Japan are still among the highest amongst IEA Member countries. To remedy this, the Government has launched market reform, with the process most advanced in the oil sector, which has been fully liberalised. The industry is still in the middle of restructuring however and the utilisation ration of refining capacity remains very low and the number of filling stations high.

Natural gas market liberalisation started in 1995 and 40% of the market is now open. If measured in terms of the market share held by new entrants, little competition has emerged. The Government has recognised the need for further action to fully capture the benefits of market reform and announced new measures, such as the introduction of regulated third-party access (TPA) to the pipelines and promotion of negotiated TPA to the LNG terminals. While useful, their effectiveness must be closely monitored and corrective measures introduced promptly if competition does not develop. Expansion of the domestic gas network is

essential to achieve wider use of natural gas. It would also enhance security of supply and competition.

In March 2000, the Government opened 30% of the electricity market to competition and established regulated TPA to the networks. Some prices have fallen, but this seems to be mainly due to utilities' passing onto customers cost savings arising from low interest rates on capital expenditure. Competitive pricing as a result of market liberalisation may also have had some impact. Since new entrants find it difficult to enter the market and little competition seems to have developed between the incumbents, the Government has announced measures, such as evaluating TPA tariffs. While this is commendable, the proposal does little to address the fact that the incumbents are large and powerful companies with significant market power when compared to new entrants. Given the slow entry rate of new players, greater competition between the incumbents is essential. The effectiveness of the planned unbundling arrangements, the new 'neutral transmission organisation' and the regulatory institutions should be ensured. If competition fails to develop, stronger measures such as establishing an independent national transmission system operator should not be precluded. The weak interconnection between most supply regions must be strengthened to facilitate competition and ensure energy security.

Italy – good progress in energy market reform; danger in reducing energy diversification

Italy's remarkable progress in electricity and natural gas market reform will help it to develop a more efficient and secure energy sector. The recent improvements resulting in meeting the 90-day oil stock obligation are a positive step in the country's efforts to guarantee permanent compliance.

The Italian gas market is now fully open to competition and the electricity market is following suit. The Government has reduced its stakes in ENEL and Eni, while new market institutions, such as a transmission system operator, are now operational. Italy ratified the Kyoto Protocol in June 2002 and launched a national action plan to mitigate climate change in December 2002.

But the country faces a number of challenges: securing a reliable and less expensive electricity supply, preserving national energy policy goals under decentralisation, securing effective competition, diversifying energy sources and mitigating climate change. Encouraging the regional authorities to develop regional energy plans consistent with the national energy strategy is required. Confronting simultaneously those multiple challenges will require a strong attention to energy policy in the years to come.

The blackouts that occurred recently in several OECD countries have highlighted the vulnerability of national electricity supplies to national and regional infrastructure failures, and the need for adequate investments and effective coordination, particularly of system operation, to efficiently prevent and manage such disruptions. Perhaps more general lessons could also be drawn about the need for effective coordination of other regulatory activities that affect the development of energy markets. Italy has the opportunity to play an active role in the debate on such co-ordination, which could provide a useful input for other countries facing similar challenges.

Preserving national energy policy goals

To secure supply and achieve greater competition, timely investments in energy production, transportation and interconnection

are essential. Under the devolution of powers to local authorities, Italy suffers from a high level of local resistance to new projects such as oil and gas exploration and the construction of new electricity generating plants. This has tightened energy supplies and led to temporary electricity disconnections, even before the September 2003 blackout. In 2002, the Government introduced fast track procedures to streamline the decision-making process. The recent framework law on energy further addresses this problem. The IEA welcomes this step but notes that it is essential that the national Government, together with the Regional Authorities, retain the ability to give on time, the necessary clearances for the energy investment needed to achieve the national energy strategy.

Local communities should be fully informed of the national energy situation and its challenges, so that their decisions fully reflect national as well as local interests. This is becoming particularly important in view of the investments that could become necessary in the electricity transmission sector to reinforce the reliability of the electricity system on a national scale.

Securing competition in gas and electricity

While the Italian gas market is now fully open from a legal viewpoint, the incumbent company Eni remains in a dominant position by default. New entrants face some obstacles and access to external supply is not easy for small companies. The partial saturation of the existing import pipelines creates an additional entry barrier. Only competitors with the capacity to establish their own import facilities (LNG terminals) will be able to compete on an equal basis with Eni.

Italy has continued to liberalise its electricity market. ENEL has been partially privatised. The Government introduced an ambitious measure to cap the incumbent's market share to less than 50%, forcing the company to divest part of its generation. This has enabled the entry of a number of new market participants. The electricity market has been liberalised up to 70% in several phases, with full liberalisation planned for 2007. Transmission networks have been legally unbundled and a Transmission System Operator established. To facilitate competition in the wholesale electricity market, a Market Operator has been also created. Reforms have been implemented quite rapidly compared with other IEA countries. Italy is considered to be one of the European countries where the most rigorous conditions for network unbundling prevail. Reforms have enabled the market to develop, and the obligation for the incumbent company to divest part of its generation capacity certainly helped. There is still a risk, however, that the incumbent could take advantage of its dominant position. ENEL retains a large portfolio of power plants able to satisfy peak requirements and is therefore able to influence prices.

The Government and the regulatory authority must be vigilant in ensuring that newcomers to the gas and electricity markets compete on a fair and equal basis with the incumbents. The independence of the energy sector regulator should be confirmed.

Avoiding over-dependency on natural gas

Italy's energy mix is shifting from oil towards gas, but the country is

highly dependent on external sources for these two fuels. This creates concern about security of supply and increased price volatility. There are limited options for energy diversification, partly due to the lack of a nuclear option. The Government and ENEL envisage an increased role for coal in the electricity sector. However, this could make it challenging to balance between energy security and climate change mitigation.

The Government will need to keep all options open to ensure diversification of energy sources, as well as their supply sources. Although Italy is among the few European Countries that have started a market mechanism to stimulate renewable sources of energy, further increase in the use of cost-effective renewables is indispensable.

Achieving Italy's Kyoto target

Meeting its climate change mitigation goal is a challenging task for Italy. Despite the target to reduce GHG emissions by 6.5% between 1990 and 2008-12, energy-related carbon dioxide emissions have been growing and were already 6.5% above the 1990 level in 2000. While Italy's carbon intensity, measured as carbon dioxide emissions per unit of GDP, is relatively low, this can be attributed to high energy prices, low energy-intensive industry structure and a mild climate. This advantage may be eroded by lower prices due to market liberalisation and a growing demand for energy in the transport sector.

To reduce emissions, the Government is considering the possibility to transform the existing carbon tax into a tax on actual emissions. The Government also approved the 'Revised guidelines for national policies and measures regarding the reduction of greenhouse gas emissions' in December 2002, identifying specific policies already decided and exploiting flexible mechanisms as foreseen by the Kyoto protocol. It established a Technical Committee for Greenhouse Gas Emissions (CTE) to monitor progress and to identify and evaluate additional measures. A number of mitigation measures, either domestic or based on the use of the Kyoto flexible mechanisms, remain to be defined, however, if Italy wants to achieve this goal. It is also a challenge to define the role of coal in the electricity sector, to strike a balance between climate change mitigation and the energy security need for more diversification. More investment in cleaner coal technologies would be necessary. The Government's projection to stabilise energy demand in the transport sector between 2005 and 2020 also seems to be over optimistic.

The IEA recommends that the Government should implement the action plan with least cost measures, without delay and with adequate monitoring. Every available policy tool must be mobilised to meet the Kyoto target, including the tax on carbon dioxide emissions and external projects carried out under the flexibility mechanisms of the Kyoto Protocol.

Energy Policies of IEA Countries – 2003 Review may be ordered from IEA Books, fax: + 33 1 40.57.65.59, e-mail: books@iea.org, website: www.iea.org/books

The need to accelerate ef

UK energy efficiency must improve very rapidly between now and 2050 if the Government's Energy White Paper ambition of putting the UK on a path towards a 60% reduction in carbon dioxide emissions by 2050 is to be realised.

The scale of the task can be better appreciated in light of information in a new BRE report, which documents progress over the past thirty years on improving energy efficiency in the largest energy use sector – housing, which in 2001 used 30% of delivered energy. *The Domestic Energy Fact File 2003* presents detailed information on energy use trends and energy efficiency in the housing stock. It provides the basic demand-side data needed for informed speculation on what might happen in the future.

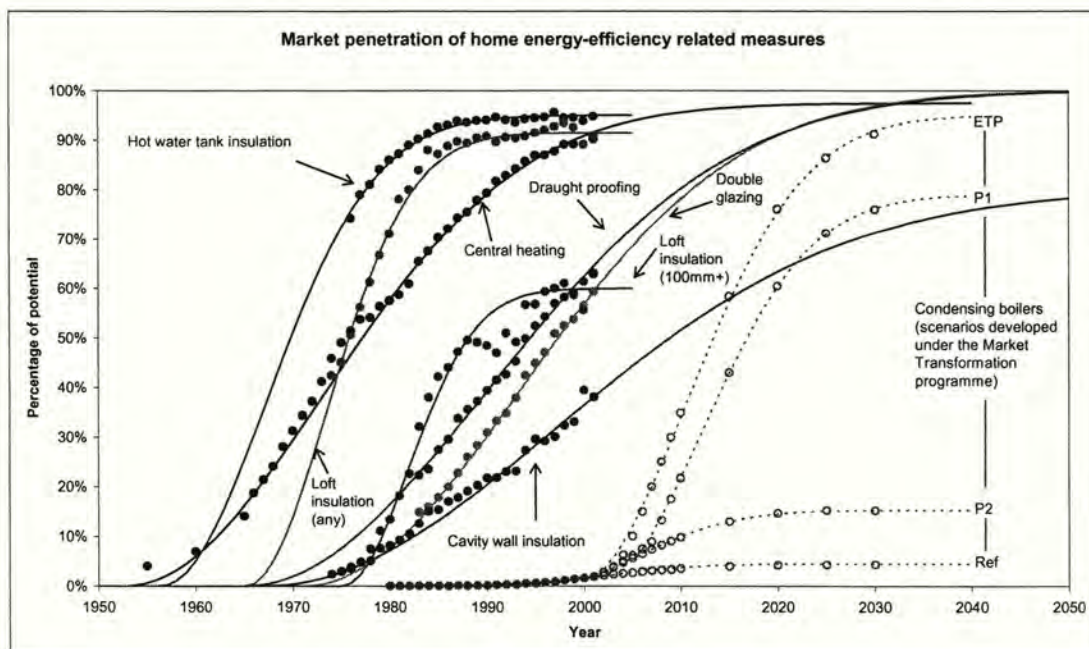
The report shows how the energy use of the housing stock has been constrained by improvements in energy efficiency. Despite almost a tripling of the proportion of homes with central heating (31% in 1970, 90% in 2001), and a consequent rise in average internal temperature of about 6°C, the energy use of the average home has not really changed between 1970 and 2001 (83.5 GJ/year in 1970 and 80.8 GJ/year in 2001). This means that the energy use of the stock has risen broadly in line with the increasing number of homes. In fact, there was a 31% increase in housing stock energy use and a 36% increase in the number of households between 1970 and 2001.

However, the report also presents an analysis indicating that, if energy efficiency had not improved, the increase in housing stock energy use over this period could have been as much as 143%. If that had happened, carbon dioxide

emissions from the housing stock would have risen by about 42%, rather than fallen by 23% as they actually have done (note that changes to the fuel mix, as well as improvements in electricity generation, between 1970 and 2001 explain why carbon dioxide emissions have fallen but energy use has increased).

It is clear from the above that energy efficiency improvements in the housing stock have been remarkably successful. In a sense, however, we have only been running to stand still. Energy use has not actually been reduced. In the future we will need to achieve real reductions in the energy use of the housing stock. This is perhaps not as difficult as the evidence of the last thirty years suggests. Most homes are now centrally heated and must be close to achieving the desired comfort levels of the occupants. Thus, future energy efficiency measures are more likely to achieve their true potential, instead of being partly lost through increased comfort.

Nevertheless, energy efficiency will need to improve rapidly and the rate of uptake of insulation measures in the existing stock will be crucial to achieving the Government's targets. The scale of the task is well-illustrated by one chart in particular from the *Fact File*, reproduced below. This summarises the data on a wide range of individual energy efficiency measures, and shows how their uptake has closely followed the s-curve behaviour characteristic of most markets. It shows that even for the measures with the fastest



Efficiency improvements

uptake rates, some of which have been subsidised by Government, it has taken about thirty years to go from zero ownership to saturation. So any new energy efficiency technologies being introduced now are likely to take at least as long to achieve full uptake, and will need careful monitoring to check on actual progress.

As the chart shows, however, some measures can be expected to take much longer. For example, based on current trends, the very important measure of cavity wall insulation is unlikely to reach saturation until around 2050. This rate of uptake must be accelerated if the emissions reduction target is to be met.

The type of information shown in this chart has in fact previously been used to construct detailed scenarios for the future energy use and carbon dioxide emissions of the housing stock (the s-curves being taken to describe the business as usual, or reference, scenario).

This work showed that an alternative

'efficiency' scenario, in which energy efficiency improvements were introduced at the fastest rates that seemed feasible, could produce savings relative to the reference scenario that would meet the domestic sector targets outlined in the Government's Climate Change Programme for 2010. However, it also showed that planned funding for energy efficiency activity fell short of being able to deliver these savings by a factor of about two. Moreover, it also indicated that even in the Efficiency scenario carbon dioxide emissions from the housing stock would probably begin to rise again after 2010.

These sobering findings highlight the importance of introducing new energy efficiency measures and renewable energy technologies, as well as the need to accelerate the uptake of the more traditional energy efficiency measures. The prospects for achieving a 60% reduction to carbon dioxide emissions by 2050 depend crucially on these challenges being met.

Domestic Energy Fact File 2003 is available from the BRE Bookshop, visit: www.brebooks.com

Improving 'hard to treat' homes

Owners of many 'difficult' property owners can now cut the cost of energy bills thanks to a new initiative from the Energy Saving Trust's Energy Efficiency Best Practice in Housing Programme. 'Hard to treat' homes are properties which do not have typical energy efficiency solutions readily available to them. These homes often cause owners problems when it comes to introducing better insulation or cheaper heating as they have solid walls, no accessible loft space to insulate or no access to a low cost fuel such as oil or gas.

The EST Best Practice programme has therefore launched this new initiative to help landlords and property owners find energy efficient measures that can be introduced into their 'hard to treat' properties. A new website gives advice on what kinds of measures could be considered, including hot water tank insulation, extractor fans, internal insulation and double glazing.

Older, solid walled homes, which are more prone to moisture, suffer from related problems such as condensation and rising damp. These can in turn cause:

- damp conditions, made worse by inadequate heating, resulting in mould growth on cold surfaces and an increased risk of dry rot and attack from wood boring insects - leading to high long-term maintenance costs;
- furnishings and possessions can suffer damage from mould or insect attack - requiring more frequent replacement and increasing financial pressures for those in fuel poverty; and
- cold, damp living conditions can have an adverse effect on occupants' health - the 1996 English House Condition Survey data showed a clear link between poor Standard Assessment Procedure (SAP) ratings and a range of conditions including chest problems, joint problems, eczema and anxiety and depression.

Visit the website: www.est.co.uk/bestpractice/hardtoreat/ or call the hotline: 0845 120 7799.



Hard to treat homes come in all shapes and sizes

Integrating energy service

A new EU Directive on 'energy end-use efficiency and energy services' is due to have its first reading in the European Parliament in April. Here, Andrew Warren looks at how Britain's Energy Efficiency Commitment – through which UK electricity suppliers deliver energy savings – has helped to shape the first drafts. We also reproduce from the current text a summary of similar measures in place in other countries.

A decade ago, UK electricity companies first began helping their customers install energy efficiency measures in their homes. Originally mandated by the industry regulator, the arrangement in due course spread to gas companies. And was eventually enshrined in law as part of the Utilities Act 2000.

The scheme is called the Energy Efficiency Commitment (EEC). And it is fundamentally a simple concept. It requires each company holding a licence to provide gas or electricity for British homes to install sufficient numbers of energy saving measures as to deliver an agreed amount of kilowatt hour savings each year.

In the three initial years of the EEC (2002 to 2005), it is delivering a total of 62 TWh savings. Thus cutting residential sector fuel consumption by 1%.

There is no question that the scheme is a great success. Of the seven companies charged with operating it, several are confident that they will realise the required reductions ahead of time, and frequently at a lower cost to themselves than they had originally feared.

Environmentalists like the scheme because it follows the polluter pays principle. Governments like it because it delivers carbon savings at no cost to them. And the companies who hold the Commitment like it because it enables them to position themselves rather differently within the marketplace: no longer just purveyors of a basic commodity (kWh), but instead working with their customers to provide the services they want (light, heat) more efficiently than before.

Already talks are well underway to expand the Commitment. It is due to double in size, so that in the ensuing three years (2006 to 2008) it will deliver 120 TWh of savings. And beyond that, it should grow further.

Last February's Energy White Paper talked about the EEC alone delivering a million tonnes of carbon saving by 2010. And then expanding it to deliver a further 3 million tonnes by 2020. Plus expanding it to cover some businesses too.

Others beyond the English Channel have observed what has been happening in the UK. They have been impressed. So much so that when, just before Christmas, the European Commission issued its new draft directive, on 'Energy End-Use Efficiency and Energy Services', it specifically singled out the UK programme as an exemplar to follow.

As the draft directive points out, one of the great virtues of our system is that whilst the EEC is a legal obligation, it is up to suppliers to decide how they meet the cost of delivering their EEC target. It goes on to make the critical point that "the current design of the EEC is to try to get suppliers to integrate energy efficiency into their business."

That encapsulates the whole idea. It is now freely acknowledged that energy market liberalisation has led to date to an exclusive concentration upon price, rather than value-added services. That is a zero sum game. Trying to differentiate an energy company within a marketplace purely on the basis of providing the cheapest deal, particularly with a near-invisible product, is a big, big problem. Particularly if what you are selling is held to be the main culprit for the world's biggest environmental problem, climate change.

How much better to be perceived as the customers' friend, as the company that helps get the most value out of the pollution it purveys. How much better too to become not just a national, but now with the rest of Europe taking it up, an international champion of delivering better services, but with less pollution.

With the draft directive trailing the development of a market in 'white certificates' – effectively, vouchers covering the Commitment – there is no way that delivering energy efficiency services will be able to be portrayed as an 'obligation' in future.

Turn the provision of energy service commitments into a genuinely tradable market obligation between the 'purveyors of pollution'. And watch how the whole market alters. That is the potential which the new EC Directive offers.

Contact Andrew Warren at email:
andrew@ukace.org

The full text of the Directive – COM.2003(739) – can be seen at the EuroAce website: www.euroace.org

By Andrew Warren,
Association for the
Conservation of Energy
(ACE)

es into supplies

Energy services, energy efficiency programmes around Europe

Extracted from Annexe A of the proposal of the new Directive on Energy End-Use Efficiency and Energy Services

In **Italy**, energy end-use efficiency is being promoted in several ways, including through tariff structures set forth by the regulators for electricity. Firstly, total revenues from certain customer classes are no longer 100% proportional to energy units sold, but partially dependent on the number of customers. Secondly, the costs of energy efficiency programmes incurred by utilities may be recovered through a small increase in the tariff.

Sweden also has a new system where electricity distribution tariffs are evaluated with the help of a model which, among other things, takes into account the length of the grid, the value of the installations, and the need for new investment.

Since 1992, distribution companies in **Denmark** have been obliged to grant energy counselling free of charge to customers within industry and trade as well as to household customers, e.g. through free energy efficiency audits for industry and trade, programmes promoting compact fluorescent lamps, rebate programmes for selected technologies, etc. These companies are allowed to collect the costs for these activities via the tariff. For the year 2001, the savings through directly measurable energy efficiency measures by the electricity grid companies are calculated to be equal to 0.5% of total consumption (33 TWh/a), while the energy companies' investments (0.06 euro cent/sold kWh) are about 1% of the price per kWh net of taxes. For customers the average payback time is 4 years for the initiatives and the net value in the lifetime of the savings is calculated at approximately €32 million.

The energy efficiency activities of Danish distribution companies during the period 2002-2004 will be approximately €26 million, which is equal to approximately 0.08 euro cent per kWh.

Between 1991 and 1997, some €600 million was spent in **the Netherlands** on energy services and programmes related to electricity and gas. This was through rebates for high frequency lighting ballasts, variable speed drives, compact fluorescent lamps, Class A refrigerators, and condensing boilers. These programmes were based on negotiated agreements and funds created by a charge on energy of around 1.4 euro cents/kWh.

In **Germany**, 80 utilities, under an agreement with support from the state government of North Rhine-Westphalia, increased the number of compact fluorescent lamps in use in the domestic sector by 1.4 million, saving 550 GWh at costs of 1.6 euro cents/kWh saved. Germany has adopted a new act on energy savings, which clearly addresses the demand side. This new regulation aims to reduce carbon dioxide emissions by 10 million tonnes by 2005. Energy efficiency in new buildings will be increased by 30% compared to the present standard.

The **UK** has a programme called The Energy Efficiency Commitment (EEC), which currently has a target of 62 TWh savings over a period of three years. The EEC is a legal obligation on gas and electricity suppliers to reach an energy saving target. It is up to suppliers to decide how they meet the cost of delivering their EEC target. The current design of the EEC is to try to get suppliers to integrate energy efficiency into their businesses.

Luxembourg has set up a bonus scheme for the rational use of energy and renewable energies. Bonuses are paid for investments in all types of residential buildings.

In various projects in **Hungary** local authorities co-operating with energy services companies (ESCOs) have succeeded in achieving much better energy efficiency in municipal buildings. Savings in heating costs of up to 70% have been reported.

After a law was passed in 1995 in **Slovakia**, which allowed energy performance contracts to be signed, municipalities have been using this concept to improve energy performance of district heating installations. Energy savings are estimated to pay back the investments in six years.

In **Slovenia** several initiatives have been taken in the past years to improve energy efficiency in residential buildings and households. These include a grant subsidy scheme for loft insulation, draughtproofing and boiler adjustments, as well as activities of an Energy Advisory Network (ENSNET). The objective of ENSNET is to raise energy awareness and its activities are expected to contribute to the goal of a 2% per year energy efficiency improvement.

In **Norway**, the annual revenue cap for electricity distribution and transmission companies is set by the regulator. The revenue cap is based on historical costs related to their network activity and is adjusted, inter alia, to their efficiency. Energy savings resulting from initiatives taken in 2002 in governmental programmes within industry, buildings, technology introduction and training and education accounted for 450 GWh saved energy. The amount invested was approximately €4.6 million, approximately 1 euro cent/kWh.

Getting to grips with energy

Publication of the Government's Energy White Paper and European Directives on the energy performance of buildings and carbon trading herald the start of central government moves to apply ever-increasing financial pressure to penalise energy wastage and reward best practice in energy management, writes Dalkia's Andrew Sparrow. And contracting energy efficiency out to a specialist provider may be the best option for many small to medium sized companies.

By Andrew Sparrow,
Company Energy
Manager, Dalkia

The question is not so much whether or when to save energy, but how to set about it. But clear answers seem very elusive, not least because of the complexities of government initiatives, legislation and the plethora of tariff structures which have resulted from commercial deregulation of electricity supplies.

Finding the right answer is a bit like navigating in fog. To chart a safe passage you need to know your course and speed and where the rocks are (which keep on moving). Taking the analogy a little further, it's probably safer to rely on professional expertise and the best technology.

The impact of deregulation

Competition between the energy suppliers certainly opened-up opportunities for lower-cost gas and electricity, but only for those who had the time and determination to shop around. However those days have gone. Gas and electricity prices are on the up and are set to increase drastically. But careful negotiation can still achieve savings.

Expertise is also essential for evaluating the complicated deals inevitably offered. Comparison between different proposals is challenging, because tariff structures are the only way that energy suppliers can set up scope for negotiations and draw customers step-by-step into a committed position.

What is really needed for effective tariff management is to convert the process of negotiating supply contracts from a supplier-driven to a customer-driven process. There's more to it than just beating down the tariff rates for a given 'volume' of energy. Consumption rates need to be addressed too, and that demands a clear understanding of the technical issues involved.

This engineering component is extremely important, and it's a key factor which differentiates professional energy management from basic 'rate broking'. Analysing demand patterns, seeing where the peaks are and what equipment creates them, gives engineers the starting point for a detailed cost/benefit evaluation of alternative modes of control, such as cascade motor starting or re-phased start-ups of air-conditioning plant, for example. This process equips the professional energy manager

both to reduce overall consumption and to negotiate significant tariff improvements.

For many commercial enterprises, it has to be recognised that the Climate Change Levy has yet to make a major impact, but for property professionals responsible for providing serviced accommodation, energy bills are now an even more significant element of their operating costs.

The immediate and long-term prospects are that in real terms, energy prices will inexorably rise. Over and above climate change initiative increases, fossil fuel is a limited resource, whilst our global environment is telling us clearly that consumption cannot rise indefinitely without dire consequences.

Carbon trading

First proposed under the Kyoto Protocol, emissions trading is a flexible mechanism for achieving reductions in greenhouse emissions. The UK Emissions Trading Scheme was amongst the first to be established anywhere in the world, with 34 organisations participating in what amounts to a £215 million incentive scheme aimed at saving more than 4 million tonnes CO₂ equivalent over five years.

The scheme was intended for large energy users and energy services companies (ESCOs) and as such was beyond the scope of most companies. Again, specialist expertise is a vital factor, and as the only ESCO in the UK Emissions Trading Scheme, Dalkia is in the unique position of enabling 130 customers to share the financial benefits of scheme membership.

This voluntary scheme, which started in April 2002, is the forerunner for a mandatory scheme set to start in January 2005, The European Union Emissions Trading Scheme (EU-ETS), so expertise being acquired now will be a valuable asset in the future.

The EU-ETS will affect larger users of energy and, most importantly, electricity generators. With generator margins at an all-time low, the increased cost of generation will have to be passed on to the end user (see also pages 10-12).

Energy management – defining your strategy

Most companies do not have the time, expertise or resources to tackle the developing

Energy management

complexities of the energy market and secure the rewards of better energy management. Nor do they want to create 'white elephant' departments where expertise is translated into costs rather than cash savings.

Far better, for many businesses in the commercial sector, is to delegate these responsibilities to a service provider who will work in partnership to first define the energy management strategy, then manage implementation and day-to-day operations to secure real benefits – progressing steadily towards what Dalkia terms 'total energy & environment management'.

In our experience, companies often prefer to take things in progressive stages – the simplest approach being to secure utilities supplies at least cost. At its most basic, this is simply an energy broking process where negotiators sell-on supplies which they have secured at special rates. This does not provide real value. What is more important is to have not only purchasing power,

but a full understanding of clients' usage patterns and the skills and software in place to be able to 'benchmark' requirements, monitor consumption and validate bills – all of which can achieve significant cost reductions, albeit without cutting consumption.

The best way to reduce absolute energy costs is not just to reduce the rate paid for energy but to reduce energy consumption whilst meeting all indoor environmental and operational needs. In this way, financial savings are delivered whatever the state of the commodity markets supply rates, high or low. What this means in effect is the introduction of energy management best practice – training and guiding the customers' in-house M&E maintenance team, advising on opportunities for energy saving and managing the introduction of fully-costed energy saving schemes on the customers behalf.

Contact Dalkia via the website:
www.dalkia.co.uk



Energy efficiency expertise tends to be concentrated around the plant room and control panels

Getting results

Dalkia Total Energy & Environment Management has delivered an £11,000 annual saving at the Swindon Head Office of Arval PHH – a leading operator in corporate vehicle leasing and fuel card management services.

An early step was to re-programme the already-installed building energy management system – realigning software settings to suit the use-pattern of the building. This was followed-up by a reconfiguration of the hot and cold loops, connecting them to sense the temperature of the extract air, rather than the outside ambient.

Each of the eight gas-fired boilers at Arval PHH was then completely stripped down in turn and rebuilt to bring them back to 'as-new' performance after 10 years of servicing-only attention – restoring their thermal efficiency and enhancing the asset value of the building as a whole.

New Dalkia software now automatically adjusts the boiler set-points in response to demand for primary hot water, whilst operation of the dilution fans on the boilers was re-programmed to match boiler demand instead of running 24 hours per day.

Central lighting controllers, which had not been previously used, are now fully commissioned and linked to the BEMS. Specially programmed in separate zones to link-in with occupancy patterns, and with a hourly sweep to turn off lights left on out of working hours, the lighting now uses considerably less electrical power.



Routes to develop wind fa

Onshore wind farms tend to be sited on farm land, many are in Wales. But how do Welsh farmers view wind power, and what are the methods available to develop a new wind farm? Here, two researchers from the University of Glamorgan examine two development routes: the Windworks programme from National Wind Power and a more community-based approach exemplified by the Cwmni Gwynt Teg Co-operative.

During the 1980s and 1990s UK agriculture was hit with major setbacks. For example, the Chernobyl nuclear-power plant explosion in 1986, which increased radioactivity levels in parts of the UK, the salmonella scare in 1989, resulting in more than 3 million hens being slaughtered, and the BSE outbreak in the 1990s. To make matters considerably worse, 2001 saw a major outbreak of foot and mouth disease.

This has meant that farmers have been encouraged to diversify from agriculture into other businesses in order to survive. But diversification is not always easy; options available for some may not be available for all. Diversification options for Welsh hill farmers are particularly limited. Diversifying into the wind power industry could be a viable option for some.

Farming the wind

The 1000th UK wind turbine came into operation in January 2003 at the Moel Maelogen wind farm, north Wales. Indeed, over 30% of current land-based wind energy generating capacity in the UK is in Wales. However, development of the industry in Wales in recent years has slowed, with most of the generating capacity being installed before 1998. The bottleneck in the development of more Welsh wind power is the planning process.

European policy promotes renewable energy development, as does national policy, through UK policy instruments such as the Renewables Obligation. However, local government can have localised, often opposing agendas when it comes to planning decisions for renewable energy, especially wind power, projects. As one commentator noted: "planning for wind farms in Wales has virtually stalled, with a number of calls by the Welsh Assembly resulting in refusal of planning permission, or lengthy and expensive delays through public inquiries. A special irony this, when Wales is the only European country with sustainable development written into its constitution".

National Wind Power and Windworks

Launched by National Wind Power (NWP) in August 2001, the Windworks programme was intended to provide farmers/landowners with an

opportunity for a 'hands-on' approach to diversification through the development of small clusters of wind turbines. The programme was established by NWP to enable the company to achieve viable and manageable routes to small clusters of wind turbines. NWP hopes to be able to utilise smaller sites which would otherwise prove to be uneconomic in terms of time spent in the planning process. Under the programme, the landowner obtains planning permission for the turbines and NWP puts up the funding for the project. The attraction of the Windworks programme for a farmer wishing to diversify into wind power is that he/she does not have to raise project finance. In return for obtaining planning permission for the site, the landowner can expect a return of between £2,500 and £4,000 per turbine per annum.

In theory, the Windworks programme does give farmers an option to diversify into wind power without exposing their businesses to high financial risk. For NWP, the programme allows development of smaller sites that would otherwise be overlooked. By requiring the landowner to apply for planning permission, the scheme does not tie NWP into the resource-intensive planning process, and so the scheme potentially has significant benefits for both NWP and landowners. However, its success rate to date is low – by 2003 it had only had one successfully-developed wind development, High Sharpley wind cluster, a two-turbine project near Seaham, in County Durham.

The Cwmni Gwynt Teg Co-operative

The Cwmni Gwynt Teg (fair wind) co-operative was originally conceived by three North Wales hill farmers, one of whom owns and farms the existing Moel Maelogen wind cluster site. The co-operative plans to add a second nine turbine phase to the farm.

Moel Maelogen wind cluster is located on Moel Maelogen farm, 4 km east of Llanrwst in Conwy, North Wales. The site comprises upland pasture, suitable for grazing. There are three turbines on the site with an output of 1.3 MW each. The turbines are 41 m high, with a rotor diameter of 58 m. According to Conwy Energy Agency's Ail Wynt newsletter, the costs of connecting the wind farm to the national

By Dr Trevor J Price and Rhys Hughes, School of Technology, University of Glamorgan, Pontypridd

Farms in rural Wales

electricity grid was £800,000, with the electricity being sold to the Non-Fossil Purchasing Agency for 5.1p per kWh.

During construction all contracts and suppliers were sourced locally, except for the turbines themselves, thus encouraging nearby job creation. Two of the turbines are owned by Cwmni Gwynt Teg. The third turbine was sold during the planning stage in order to raise finance for the remaining two turbines, and is now operated by a German company, Energiekontor.

It was the planning process that caused the co-operative the biggest difficulty. According to Williams, "The biggest problem for us was planning. Harder than financing the wind farm", acknowledging a lack of knowledge regarding the planning process when work began. However, all three farmers are confident of obtaining planning permission for the next phase of the development particularly if more third-party assistance was available.

Second wind

Ail Wynt, meaning second wind, is the name given to the second phase of the Moel Maelogen wind cluster project; a proposal to develop a further nine turbines on Moel Maelogen farm. This phase of the project originally comprised 11 turbines. However, in consultation with the local community and the Countryside Council for Wales, project plans were revised and the number of turbines reduced and also sited within a more compact area, as well as in a natural hollow. This was done in order to reduce their effective height when viewed from a distance and their disturbing visual impact.

Approximately 120 ha of the site will also become a bird sanctuary, managed in partnership with the RSPB.

The majority of the funding for the first phase of the Moel Maelogen wind cluster came from Triodos Bank, in the form of a £1.7 million loan. Cwmni Gwynt Teg also qualified for European Objective One funding of £366,000. The second phase of the development, Ail Wynt, is funded differently. The developers plan to raise 75% of the total cost through a commercial bank, which will have charge over Ail Wynt's assets. The other 25% will be raised through a combination of investment issues offered to the local community (with a planned 8% annual return payable to investors) and from the co-operative's own financial resources.

The local residential community generally supported the development, with some 1,500 people attending an open day in September 2002 to watch the installation of the first turbine.

In return for their support, Cwmni Gwynt Teg attempts to repay the community, via, for example, sponsorship of the local rugby club. The co-operative also plans to donate £50,000 per annum to Conwy Energy Agency to be used to improve energy efficiency in houses in the upper Conwy Valley.

Conclusion

Wherever possible, diversification is the key to the successful future development of agriculture. What form this diversification takes depends on the needs of the individual farmer, the nature, and critically the location, of the farm. For those who diversify into wind power, the level of available assistance and advice needs to be improved. The example of Moel Maelogen wind cluster shows what is possible when led by determined individuals. Such schemes should be encouraged. The UK government's Department for Trade and Industry should promote such projects as examples of good practice. The National Farmers Union for Wales should also encourage farmers wishing to diversify into wind.

The future of agriculture in Wales is still somewhat unpredictable. The impact of recent changes in agricultural policy is that farming will become streamlined; larger successful farmers will continue to make a good living off the land. Smaller farmers will have to diversify or find another source of income, in order to continue farming. Wind power is a viable contender for some.



Welsh wind farming – one of the Nordtank turbines at the Taff Ely wind farm near Cardiff

Contact the authors at the School of Technology, University of Glamorgan, Pontypridd, Wales, tel: 01443 482206, e-mail: tprice@glam.ac.uk

This page lists some of the energy events being held around the world that are the most relevant to Energy World readers, including major events organised by the Energy Institute. A listing of events organised by EI branches can be found in the new Energy Network, distributed with Energy World.

To submit your event for inclusion here, please send brief details to eworld@energyinst.org.uk

March

1-2 March
Italian energy 2004
Conference, Milan
Details: SMi Conferences Ltd
Tel: 0870 9090 711
www.smi-online.co.uk/italianenergy.asp

1-3 March
Power-Gen renewable energy
Exhibition and conference, Las Vegas, USA
Details: PennWell
Tel: +1 713 963 6287
www.power-gengreen.com

3-4 March
FlameTECH
Exhibition and conference on gas, Amsterdam
Details: ICBI
Tel: 0207 915 5618
www.icbi-flametech.com

16 March
Wave and tidal technology
Symposium, Docklands London
Details: Renewable Power Association
Email: watts2004@r-p-a.org.uk

16-18 March
Maintec 2004
Exhibition and conference on maintenance and asset management
NEC Birmingham
Details: Conference Communication
Tel: 01252 783111
www.maintenanceonline.co.uk

18-19 March
Green power marketing
Conference, Lausanne, Switzerland
Details: Green Power Marketing GmbH
Tel: +41 1 296 8709
www.greenpowermarketing.org

17-18 March
Underwater technology
Conference on subsea technology
Bergen, Norway
Details: Possibility AS
www.possibility.no

29 March-2 April
Climate change – impacts and responses
Conference, London
Details: Centre for Professional Development, Imperial College London
Tel: 0207 594 6886
Email: cpd@imperial.ac.uk

30 March-1 April
NEMEX
National energy management exhibition and conference, NEC, Birmingham
www.nemex-energy.co.uk

30 March-1 April
et2004
Environmental technology and services exhibition, NEC, Birmingham
www.et-expo.co.uk

30 March-1 April
Implementing UK energy policy
Conference, NEC, Birmingham
Details: Climate Change Solutions Ltd
www.climate-change-solutions.co.uk

April

6-9 April
Economics and management of energy in industry
International conference, Lisbon, Portugal
www.cenertec.pt/ecemei

19-24 April
Hannover Fair
Technology exhibition, Hannover, Germany
Details: Deutsche Messe AG
www.messe.de

20-21 April
Modernising central European electricity markets
Conference, Prague, Czech Republic
Details: Highbury Business Communications
Tel: 01322 611263
Email: s.linnell@highburybiz.com

21-22 April
IWEA 2004
Irish Wind Energy Association Conference, Carrick-on-Shannon, Ireland
Details: IWEA
Tel: +353 71 9646072
www.iwea.com

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		Nov 03	Dec 03	Jan 04
1	Thames Valley	168	287	285
2	South East England	214	331	324
3	South Coast	170	274	297
4	South West England	168	247	244
5	Severn Valley	197	299	294
6	Midlands	215	325	323
7	West Pennines	216	327	310
8	North West England	217	375	379
9	Borders	219	322	316
10	North East England	246	374	321
11	East Pennines	221	333	323
12	East Anglia	212	324	336
13	West Scotland	225	346	322
14	East Scotland	238	349	338
15	North East Scotland	249	352	356
16	Wales	199	289	285
17	Northern Ireland	233	310	332
18	North West Scotland	222	312	324

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



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- ?? Monitor and report on activity for the area of responsibility

This ambitious, self-motivated and professional individual will:

- ?? Possess excellent verbal and written communication skills in both French and English (and ideally German)
- ?? Be a lateral thinker with the ability to problem solve
- ?? Have proven experience of customer relations
- ?? Be of graduate calibre/educated in a relevant discipline.
- ?? IT literate

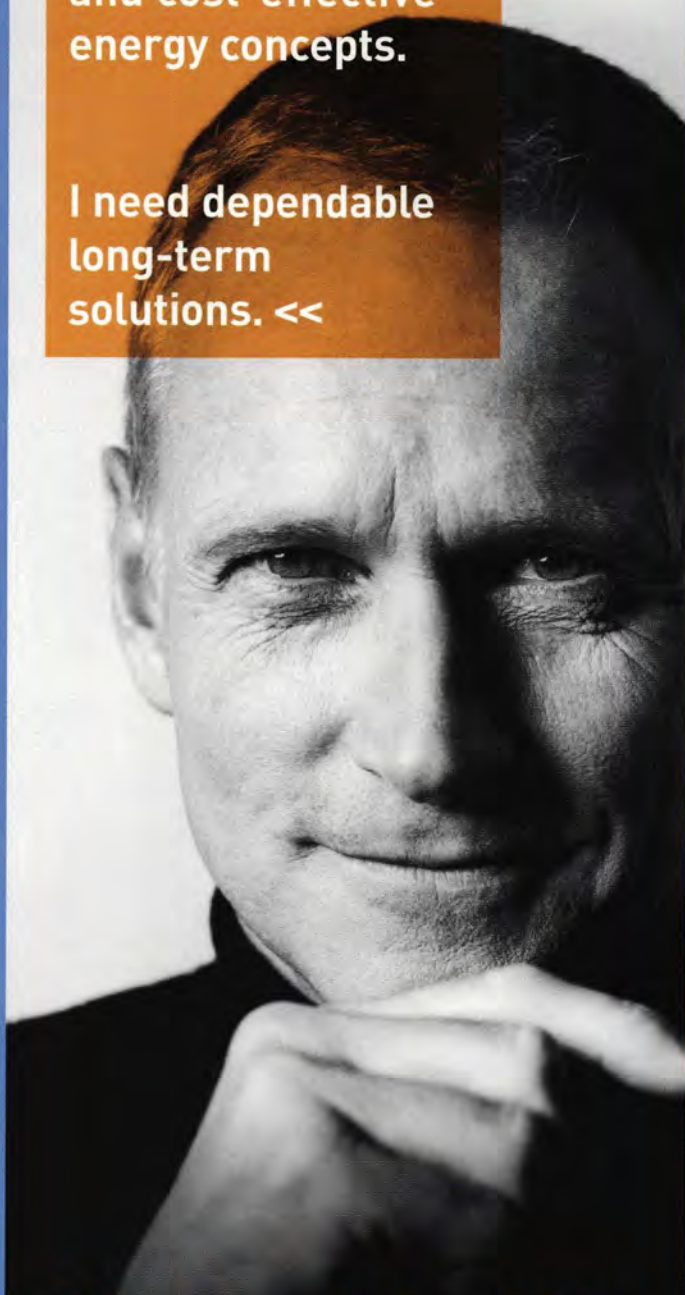
Knowledge of the oil/petrochemical industry is desirable but not essential, however candidates must have a flexible approach to travel and working hours in addition to cultural awareness

In return you can expect, a rewarding role within this global organization with a high level of responsibility and great development opportunities.

Should you wish to be considered for this role, please send a covering letter and CV to Liz Brook at ebrook@caleb-brett.com or by post to HR Services, Intertek Caleb Brett, 734 London Road, West Thurrock, RM20 3NL.

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COURSE DATES:
22 - 23 March, 2004

COURSE VENUE:
London, UK

£1500.00
(£1762.50 inc VAT)

GAS UTILITIES - FINANCE, REGULATION AND TARIFF DESIGN

This **two-day course** draws on the extensive expertise of three people with a wealth of financial and regulatory experience. Not only will they provide views from their perspective in other areas, each will also lead one of the three sections introducing the relevant issues, illustrating them with examples and discussing the implications of the analysis with delegates. Delegates will be given exercises and work in small groups to solve them.

WHO SHOULD ATTEND?

Anyone working in finance or planning functions that have dealings with the natural gas (or more generally, energy) industry; company executives involved in regulatory affairs' functions; bankers, commercial, multi-lateral and ECA's; lawyers; those taking up international assignments or seeking international contrasts and comparisons; anyone new to modern gas markets; executives with managerial responsibility, but not operational experience in tariff issues; regulatory staff and new regulators.



COURSE DATES:
24 - 25 March, 2004

COURSE VENUE:
London, UK

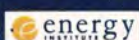
£2000.00
(£2350.00 inc VAT)

CAPACITY TRADING SEMINAR - HOW US AND CANADIAN GAS CAPACITY TRADING WORKS - IS IT APPLICABLE IN EUROPE?

This **two-day**, intensive seminar focuses completely on capacity trading. The course will unveil the mysteries of how this works, who benefits, who doesn't, and what goes on in a practical sense in commodity trading of pipeline capacity.

WHO SHOULD ATTEND?

Commercial staff needing to improve their understanding of the commercial issues facing their industries; executives recently charged with running new, European gas transportation companies; the commercial and planning staff at other energy related industries; regulators, their staff, advisors and political masters; bankers, financiers and risk management service providers; legal advisors needing a broad perspective of the gas and electricity industries; consultants, lobbyists and others associated with the energy industries.



COURSE DATES:
29 - 31 March, 2004

COURSE VENUE:
London, UK

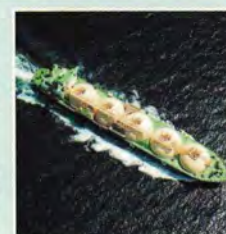
EI MEMBER:
£1400.00 (£1645.00 inc VAT)
NON-MEMBER:
£1600.00 (£1880.00 inc VAT)

LNG - LIQUEFIED NATURAL GAS INDUSTRY

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

WHO SHOULD ATTEND?

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



COURSE DATES:
20 - 23 April, 2004

COURSE VENUE:
London, UK

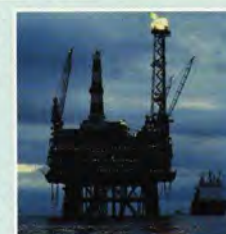
EI MEMBER:
£1900.00 (£2232.50 inc VAT)
NON-MEMBER:
£2100.00 (£2467.50 inc VAT)

OVERVIEW OF THE NATURAL GAS INDUSTRY

This **four-day course** provides an overview of the economic and contractual aspects of the natural gas industry. The peculiar features of natural gas will be highlighted in order to explain the economic differences between a crude oil chain and a natural gas chain. Gas chains can become very complex, rigid networks which penetrate deep into energy markets and the associated, broad range of crucial economic, marketing, and legal issues of the gas industry will be examined.

WHO SHOULD ATTEND?

This course is particularly appropriate for those with experience in the oil, gas and energy industries wishing to widen their understanding and knowledge of the natural gas business, together with new entrants, analysts, planners, etc. It is also suitable for those who are concerned with natural gas and work in other sectors such as banking or government where they need an understanding of the industry.



COURSE DATES:
26 - 30 April, 2004

COURSE VENUE:
The Moller Centre,
Cambridge, UK

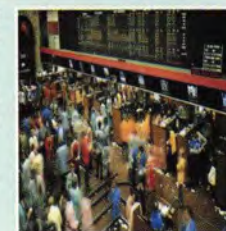
£2800.00 (£3290.00 inc VAT)

TRADING OIL ON INTERNATIONAL MARKETS

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

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

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



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For more information, see enclosed inserts or contact Nick Wilkinson

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