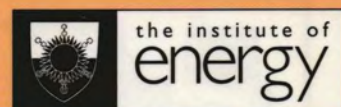


THE MAGAZINE OF THE INSTITUTE OF ENERGY

energy



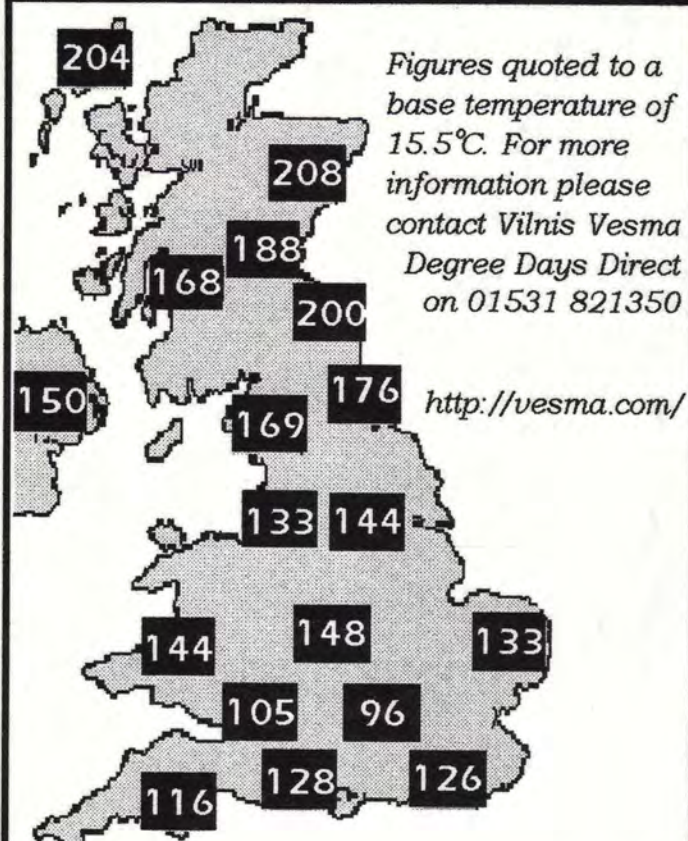
No.251 July/August 1997

world

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Urban energy use
Education & training
Alternative transport fuels

Degree days: May 1997



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Women engineers Help us Celebrate

September 5th

All female engineers are invited to the London Science Museum.

To mark the 18th year of the Insight initiative in the Year of Engineering Success, The Engineering & Marine Training Authority is planning a 'coming of age' celebration.

The very first Insight course was held in 1979 to encourage sixth form girls to consider a career in engineering. To date, 7,000 women have benefited, many of whom are now successful engineers.

To find out more or to register contact:

Sharon Spencer
EMTA
41 Clarendon Road
Watford
WD1 1HS
Tel: 0800 282167

Why not Host to get the Most from the National Standards for Managing Energy?

The Institute of Energy is the first national Delivery Centre for S/NVQ's in Managing Energy. We are able to visit your organisation to give a presentation, free of charge, on the National Standards for Managing Energy and VQ units in Managing Energy entitled "From Standards to VQ's"

The presentation covers:

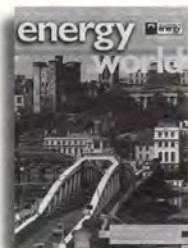
- the production of the Standards for Managing Energy and the reasons for their development.
- the links between the standards and organisational objectives, showing how implementing the standards can support the Investors in People Award, increase your competitiveness, define energy responsibilities and assist with job descriptions
- an overview of associated products introducing the issue of training and working towards those standards.
- more about a nationally recognised qualification (S/NVQ)

The programme is flexible of course. Perhaps you can help us to disseminate the information if you know of some interested parties who would be willing to provide a venue and some refreshments or who would like our talk to be added to the agenda of a meeting already arranged? Maria Adams would be delighted to hear from those able to host this event tel: 0171 580 7124, fax: 0171 580 4420 or email: madams@ioe.org.uk.

The Institute of Energy - Setting the Standard

THE MAGAZINE OF THE
INSTITUTE OF ENERGY

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RGO Exhibitions & Publications Ltd
Pam Bourne Tel/Fax: 01424 883110

PRINTED BY
Headley Brothers Ltd, The Invicta Press,
Ashford, Kent



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TERMS OF CONTROL
Energy World is circulated free of charge
to all paid up members of The Institute of
Energy. To libraries, organisations and
persons not in membership it is available
on a single subscription of £70 (UK),
£80 (overseas) for 10 issues.

ISSN 0307-7942

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COVER

A small part of the city of Newcastle upon Tyne, showing the 1876 Swing Bridge which carries 14,000 vehicles a day across the Tyne. The growth of transport in the City over the last five years has wiped out energy efficiency gains made in buildings, according to a report by the City Council's Development Committee and the Local Agenda 21 Working Group.

See page 14 for the full story

Carbon logic - why we cannot afford to develop the Atlantic Frontier for oil

Peter Melchett, Executive Director of Greenpeace UK

In the 1960s and the 1970s many feared that oil supplies would run out. Resource scarcity and the effects of pollution would 'limit growth'. The attempt by OPEC to force oil prices up in the 1970s frightened the West and as a consequence, sourcing other oil supplies became an obsession for Britain and other non-OPEC countries.

In May 1985 Britain announced its ninth Round of licensing blocks of sea for oil development, including the 'frontier' area of the Atlantic. Today that area stretches from Ireland to Norway, from far out in the Atlantic west of Rockall, to the waters 'West of Shetland'.

The exploration arm of the oil industry sees the Atlantic frontier as an exciting opportunity to test new technology and as a stepping stone to regions such as the Arctic. However, the logic of searching for new oil has been scuppered by the discovery that world is facing the threat of disastrous climate change.

Human activities over the last 200 years have resulted in emissions of greenhouse gases, primarily carbon dioxide from the burning of oil, coal and gas. This has altered the composition of the atmosphere causing the Earth's temperature to rise and changing the climate.

Exhaustive scientific study and debate since 1988 has led scientists of the Intergovernmental Panel on Climate Change to conclude that, if economies continue to rely on fossil fuels - the so-called business as usual scenario - greenhouse gases are likely to build to a level which could cause a global increase in average temperature of 1.5-4.5°C by 2100. Such a rise would be greater and faster than any for the last 10,000 years.

The most noticeable effects of climate change will not be a gradual warming. Extreme events such as severe droughts, floods and storms will happen more often. Sea level will rise and ocean currents will alter, possibly dramatically. In nature the changes will be too fast for many ecosystems to adapt and survive. Massive species extinction and widescale ecosystem breakdown is expected.

The IPCC predicts impacts on human health and 'significant loss of human life'. Diseases like malaria would spread and could even reach countries previously free of them, like Britain.

The Advisory Group on Greenhouse Gases working for the United Nations found that temperature increases beyond 1°C, or a rate of increase exceeding 0.1°C per decade, may lead to extensive ecosystem damage.

Greenpeace therefore believes a long-term increase in



temperature of 1°C above pre-industrial levels is the absolute maximum that policy makers should accept and that the rate of change should be kept to less than 0.1°C per decade.

It is possible to estimate a budget for fossil fuels: how much we can extract and burn, while limiting the temperature increase to 1°C. The small amount of oil, coal and gas we can burn could then be used wisely, in an ordered phase out.

Based on scientific work by the IPCC calculations of the world's climate show that, to stay within these limits, the total amount of carbon dioxide that can be released from the burning of

fossil fuels is around 225 billion tons - or gigatonnes - of carbon (GtC). These estimates do not imply that nature will be protected if we stay within them - dangerous changes could already be underway and surprises could occur. However, they provide a useful guideline.

To protect the world's climate, then, to the best of our current knowledge, it will be necessary to stick to a fossil fuels budget of 225 GtC. If no action is taken on deforestation (which also releases carbon dioxide into the atmosphere), the amount will be lower.

On this basis, at the current rates of fossil fuel use, a 225 GtC budget is exhausted in 40 years. In fact primary energy demand is increasing at over 2% a year globally: at such a rate the budget would be exhausted in under 30 years.

Reserves of oil, gas and coal identified as economically recoverable currently stand at 1,053 GtC. This would, if burnt, lead to a 5.0°C rise in temperature. In reality 'reserves' are rapidly expanding due to oil, gas and coal exploration. The resource base that could be brought into reserves is 4,000 GtC.

The logic of this is that, in terms of the actual resources of oil, coal, gas and other fossil fuels, 95% must remain in the ground. 75% of the known, economically recoverable reserves of conventional fossil fuels (as carbon) can never be used as fuel. Oil alone could take us over the limit.

So the new energy logic dictates an end to fossil fuels. They will not run out, they will have to be closed down. The obvious first step is to halt the exploration of new frontier areas for even more oil. Oil which climate science prohibits us from ever burning.

For further details of Greenpeace's Sane Energy Campaign visit the new Atlantic Frontier Internet site:
<http://www.greenpeace.org.uk/atlantic>

Sweden promotes cleaner sea transportation

A new 'differentiated environmental tariff' for shipping could lead to reductions in sulphur emissions of between 60 and 70% from the sea transportation of Swedish forest industry products. The Swedish Forest Industries Association recommends its members to start using low sulphur oil for transportation by sea on their own contracted ships and to introduce catalytic cleaning or equivalent measures.

"The Swedish forest industries are already in the lead internationally when it comes to the fight against harmful emissions from the production process itself. It is, therefore, quite natural to focus environmental work on transportation," says Staffan Thonfors, secretary of the transport committee at the Swedish Forest Industries Association. "There are relatively large environmental gains to be made in this area."

The new tariff, to be introduced by the Swedish Government from January 1998, means that ships which fulfil certain environmental requirements will pay lower fairway and harbour dues.

"We are in favour of this system which will lead to more environmentally-adapted shipping," says Staffan Thonfors. "Differentiated tariffs provide the incentives to sea carriers to accomplish environmental improvements. The forest

industries, which are Sweden's largest transport-user, are, because of their size, in a position to be a driving force in this development. We intend to make use of this opportunity."

"The agreement also shows that it is possible to introduce economic control mechanisms in the area of the environment which are mutually agreed by industry and the state. This is important for the continuing environmental work," says Staffan Thonfors.

French turbines generate wind power worldwide

Two thousand French-built, small-scale wind turbine generators rated between 1 and 60 kW are supplying power to some of the most remote and inhospitable locations on the planet. Robust and reliable, they make use of high technology components and materials.

French manufacturers have available a private centre in the mountains of Corbieres, to the south of Carcassonne in the south of France. Partly financed by the Environment Agency, it has around 15 wind generators and remotely monitored installations. The site carries out the development of new equipment, the testing of machines prior to shipping and the training of maintenance engineers.

Some of the wind turbines made in France meet the needs of regions isolated from major cities or France's overseas territories, but the bulk (90%) are exported.

A 5 kW turbine mounted on an unmanned offshore oil platform in the North Sea



Customers from poorer countries can benefit from financial arrangements appropriate to their means.

For example, the French Development Office has financed the electrification of a village in the Cap Vent archipelago, off the Senegal coast. It uses a 15 kW wind

turbine, with 10 m diameter blades, supplying 60 kWh per day to 20 families as well as providing the village lighting.

On the island of Desirade, in the West Indies, twenty 25 kW wind turbines are linked to the public electricity network and complement their diesel generators. Wind power

therefore provides half of the island's energy, which is 2 million kWh per year, and saves 600,000 litres of diesel oil.

For pumping water, in Mauritania's Adrar desert, a 5 kW wind turbine is linked to an ordinary immersion pump. This operates depending on the wind, pumping up to 20 m³ per day. The pumped water is stored in a reservoir until it is needed.

Off the English coast four robust 5 kW wind turbines have been operating for two years on completely unmanned offshore platforms. Amoco, which operates the platforms, chose wind turbines because they only require one maintenance visit every six months.

Finally, the white continent will soon be using wind power. It is proposed to install six 15 kW wind turbines in Antarctica, on one of the Kerguelen islands, where the icy winds blow at 180 km/h, to supply power to a French scientific base.

PowerGen moves in the Far East, National Power in China

PowerGen has agreed terms to secure significant interests in two independent power projects (IPPs) planned in Indonesia and Thailand.

The projects, which will cost £1.3 billion, will have a total generating capacity of 1850 MW, consolidating PowerGen's position as one of the world's leading IPP developers.

Deryk King, PowerGen Group Managing Director, said: "PowerGen's international business is gathering pace. Within five years, the total output from

international projects where we have significant interests will approach the same level as current generation from our UK plants." Both developments will be project financed.

In Indonesia, PowerGen has agreed terms for a 40% stake in the £398 million coal fired Serang power plant near Cilegon, West Java. PowerGen will project manage the 38 month plant construction programme and operate the 450 MW station when it commissions in early 2001.

Electricity from Serang will be sold to the state electricity company, PLN.

In Thailand, PowerGen has agreed terms with a consortium of partners to allow the formation of BLCP Power Ltd. The consortium plans to develop the 1,400 MW Map Ta Phut coal fired power station as part of the Electricity Generating Authority of Thailand's (EGAT) IPP programme. PowerGen has a 30% share in the £875 million project and the Group will operate and maintain the plant.

NATIONAL POWER IN CHINA

Meanwhile National Power and Power Pacific Company have teamed up to develop and invest in a significant portfolio of power projects in China. The two companies have signed an agreement to establish National Power Pacific Company (NPPC), through which the investments will be made.

The partners expect NPPC to invest between £130 and £200 million in power plants up to 200 MW in size in China over the next two to three years.

Geothermal power project for Guatemala

The Commonwealth Development Corporation (CDC) has approved a loan and an equity investment of to assist in the financing of Orzunil de Electricidad's £45

million project to build, own and operate a geothermal electricity generating plant in Zunil, Guatemala. The Orzunil project, developed by Ormat Industries Limited of Israel, will

be the first geothermal electricity generating plant in Guatemala.

The programme entails the construction, supply and operation of a power plant

with a total installed net capacity of 24 MW, and the sale of electricity to the local utility Instituto Nacional de Electrificación through a 25 year power supply agreement.

The first 'World Sustainable Energy Fair', held at the RAI exhibition centre in Amsterdam in May, attracted more than 5,000 visitors to its 230 participating companies, some 60% of which were from outside the Netherlands. Visitors from 56 countries included government delegations from India, the US, the European Commission, Greece, Belgium, France and Argentina. Co-organised by the London-based European Media Marketing Ltd and Amsterdam RAI, the event was backed by the Netherlands Agency for Energy and the Environment. The 1999 Fair will be held at the same venue on 25-27 May next year.



Third major PV installation at Changi Airport

Thermomax Limited, the UK-based manufacturer of high-tech solar heating systems, has handed over its third major contract at Singapore's Changi Airport.

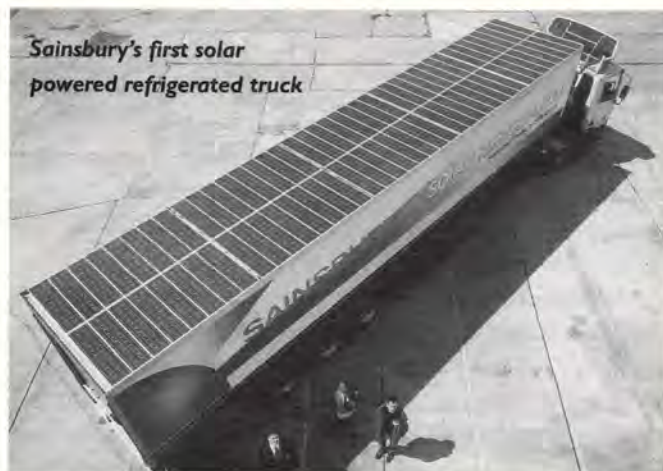
The contract to supply a solar system for Singapore Airport Authority's Flight Kitchen is thought to be the largest ever single contract for this type of solar equipment and the largest ever solar heating project in South East Asia. The system comprises 6000 evacuated heat-pipe solar tubes connected to four hot water storage tanks, each with

a capacity of 10,000 litres.

The installation, which will provide 80,000 litres of hot water every day, is expected to reduce energy consumption by about a half.

Thermomax has two factories in the UK and an engineering centre in Italy. Its evacuated heat-pipe solar collector is recognised to be among the most efficient solar systems available anywhere. Thermomax currently has over 60,000 installations in more than 40 countries, ranging from domestic hot water systems to process heating installations.

It's clean, it's fresh, it's solar powered!



Sainsbury's first solar powered refrigerated truck

Sainsbury's is harnessing the power of the sun to help fresh fruit and vegetables keep cool en route to its stores. The food retailer has formed a partnership with academia and business to develop what is believed to be the world's first solar powered refrigeration unit installed on a working articulated vehicle.

The trailer is already carrying fresh fruit and

vegetables from Sainsbury's distribution depot in Charlton, South East London to stores in London, Kent and Sussex.

Ample power for the refrigeration unit is generated by photovoltaic panels mounted on the trailer's roof. An on-board battery stores the excess power for use by the refrigeration system during the hours of darkness.

Most transport refrigeration equipment is powered by diesel engines. These have high energy demands and maintenance costs, as well as environmental impacts both in terms of emissions, which contribute to the greenhouse effect, and noise. The development team has already demonstrated that the solar powered refrigeration unit uses considerably less energy and produces less noise pollution. Emissions associated with diesel exhausts are totally eliminated.

The refrigeration system is capable of operating at temperatures down to +3°C. In this demonstration project, all aspects of the photovoltaic and refrigeration system operations are being monitored 24 hours a day. Data is transmitted remotely to Sainsbury's and the Sustainable Energy Research Group at Southampton University.

London's first solar homes

Greenpeace and the Peabody Trust, London's largest housing association, have joined forces to use solar power to help reduce household fuel bills for families on low incomes. Three terraced houses in Silvertown, in London's Docklands, were chosen to be wired up to photovoltaic panels to show that solar electricity can be generated in ordinary homes.

Each house is expected to save a third of its electricity bills each year - around £60. Although the installation costs are high (£19,000 in total), Greenpeace is currently campaigning for solar grants to revolutionise the market and make the sun's energy readily available for homes in the future.

Before this project there were only two grid-connected solar homes in Britain. However, other countries, notably Japan, are financing national programmes which will deliver tens of thousands of solar powered homes by the start of the new millennium. Britain currently has no plans to expand the use of this exciting new technology.

Three houses on Pirie Street in West Silvertown were fitted with photovoltaic panels by Greenpeace's engineers. In total thirty 110W solar electric panels from Siemens are mounted on a single shared roof with each house connected to ten solar panels. Greenpeace projects that each house will receive 825 kWh of solar-generated power each year, or nearly 25,000 kWh over the 30 year lifetime of the panels.

Mobil to use Interconnector to reach customer

Mobil Europe Gas Inc (MEGAS) has become the first company to announce a sale of UK-sourced gas direct to an end-user (as opposed to a wholesaler) in mainland Europe. From late 1998, Mobil will supply Norsk Hydro Agri's Sluiskil plant in southern Holland with up to 2.2 million cubic metres per day of gas over a 15 year period.

MEGAS is also the first non-equity holder to secure capacity in the Interconnector pipeline. The company announced that it has negotiated agreements under

which Mobil will have access to 800 mcm per year (about 80 million cubic feet per day) of Interconnector pipeline capacity over the life of the Norsk Hydro Agri supply contract.

The Interconnector is a 150-mile subsea gas pipeline stretching between Bacton in the UK and Zeebrugge in Belgium. Due to start transportation of gas in 1998, the Interconnector will be the first direct gas pipeline connection between the UK and mainland Europe and will further integrate Europe's natural gas grid.

BRITANNIA PIPELINE

Meanwhile, a new pipeline will, from next year, bring gas from the Britannia field to Britain for the next century. The recently installed 186 km (116 mile), 26 ins diameter pipeline will be the export route from Britannia when it comes on stream in the second half of 1998 to the SAGE terminal at St Fergus, Scotland. The field is operated by Britannia Operator Limited which is a joint venture of Conoco (UK) Limited and Chevron UK Limited.

Cap Gemini and EASL to run 1998 systems



The Cap Gemini data centre at South Bank, London, where the new Electricity Pool computer systems will be based from April 1998

The Electricity Pool has selected Cap Gemini to manage and run the Pool's new trading and settlement systems and processes schedules for

introduction in 1998 to support the fully competitive electricity supply market. In a parallel move, Electricity Association Service Ltd (EASL) has been appointed

as the Pool's Profile Administrator. EASL will conduct an annual load research programme and analyse the research data to provide the demand profiles needed for settlement in the non-half hourly metered market.

As the Pool's Initial Settlement Reconciliation Agent, Cap Gemini will start work immediately alongside the Pool's 1998 Programme Team to support the Pool's testing of its 1998 trading arrangements. Testing is expected to commence in Autumn 1997. Cap Gemini will also be responsible for the

running of the Initial Settlement & Reconciliation (ISR) system on a three-year renewable contract when it goes live in April 1998. The ISR system is currently under development by Logica.

Andrew Claxton, the Electricity Pool's Chief Executive and the Pool's 1998 Programme Director said: "Cap Gemini's selection and EASL's appointment are major milestones in the Electricity Pool's 1998 Programme. Considerable progress is being made on the Pool's programme and it is on track for its 1998 deadline."

Electricity prices fall as service standards improve

Electricity customers are enjoying further improvements in service as prices continue to fall, says Professor Stephen Littlechild, Director General of Electricity Supply, in his 1996 annual report.

Professor Littlechild said: "Domestic customers saw real prices fall by 5% last year, a reduction of 15% since privatisation. Prices to industrial customers fell by between 4 and 5%, and are now 16 to 23% lower than at privatisation. These reductions largely reflect the impact of my revisions to the distribution price controls which took effect from April 1996. I was also able to reduce the Fossil Fuel Levy from 10% to 3.7% from November 1996 and to 2.2% from April 1997. In addition, my revisions to the National Grid Company's transmission price control represent benefits to

customers of nearly £1 billion over four years."

Professor Littlechild also reported:

- further competition in supply, with the proportion of over 1 MW sites choosing second tier supply rising to 57%, accounting for almost three quarters of the output supplied to that market. The proportion of sites between 100 kW and 1 MW choosing second tier supply rose to 38%, around half of output.
- further developments in competition in generation, with National Power and PowerGen discharging their undertakings to dispose of a total of 6,000 MW of plant to competitors.
- good progress towards the overall target for energy efficiency.

Leicester's 'energy sense' to encourage householders

Leicester has kicked off

'Energy Sense', a new programme designed to encourage households to cut their energy usage in half by the year 2000. Leicester City Council has been at the forefront of environmental initiatives in the UK since 1990, when Leicester was named as the UK's first Environment City.

Claimed to be the first of its kind in the country, Energy Sense is a new partnership programme aiming to improve the energy efficiency of 15,000 City homes and cut Leicester's annual domestic CO₂ emissions by 9%.

Households will soon be receiving personal invitations to take part and the project team is hoping for a big response. Domini Gunn, project manager explained: "We are offering free energy audits to homeowners so they can see how much money could be saved on heating and

lighting bills and we can give advice on financing should they wish to make long-term energy saving measures in their home."

Later on, Energy Sense will launch a new discount card which will give participants money-off on energy efficient appliances, such as boilers, washing machines and lighting.

The Energy Sense partnership consists of Leicester City Council, the Energy Saving Trust, the European Union, the Co-operative Bank, De Montfort University, Leicester Energy Agency and the Leicester Energy Advice Centre. It is being run in conjunction with the European Union and a sister project is to be run in Barcelona.

While the programme is part funded by the European Union and the Energy Saving Trust, its target is to be self-financing by April 2000.

Testing sustainability from the foundations upwards

The challenge of making sustainability practical and visible is being tested in earnest with the start of the year-long construction of the first phase of the Earth Centre, a flagship Millennium Commission project designed to be a national visitor attraction and world centre for sustainable development. The Centre will be located at the site of two former collieries in South Yorkshire.

The management team is trying to use the best available environmental standards, techniques and technologies in the design of the buildings, its energy, waste and transport infrastructure and in ecological land restoration and management. For example in the first buildings to be built, it intends to use less than 25% of the energy typically used in buildings of a similar size.

The Earth Centre has employed consulting engineers Atelier Ten to select the design criteria, the building services systems and the building materials for the Planet Earth



An artist's impression of Inside the Ark, to be built at the Earth Centre

Gallery and Arrivals buildings, which are key parts of the £34 million stage one development of the centre due to open in the summer of 1998.

Atelier Ten project manager, Jim Grace said: "The initial choice of design criteria is the most fundamental consideration in sustainable building design. It affects insulation levels, determines whether air conditioning is required and governs the design of lighting, heating and hot and cold water systems."

The Earth Centre's annual

energy targets are set at 40 kWh/m² for gas and 50 kWh/m² for electrical, compared to typical figures for a similar UK building of 190 kWh/m² and 80 kWh/m² respectively. Targets for maximum summertime temperatures have been set higher than for a fully air-conditioned building but these will be quite comfortable for people in summer clothing.

Mechanical CFC-based air refrigeration is avoided through the use of a 'thermal labyrinth' beneath the Planet Earth

building, which stores night-time 'coolth' and uses it to cool the air in the building the next day. This system will last the life of the building rather than the 15-20 years of an air conditioning chiller plant, and plays a dual role as a structural raft to overcome the difficult ground conditions.

Solar panels will generate hot water; a vacuum drainage system will reduce water consumption by 75% and a greywater collection system will recycle waste water. The Environmental Preference Method (EPM) was applied rigorously to all materials chosen for installations such as polyethylene for pipes and galvanised steel for ventilation ducts, which both have low embodied energy.

The Earth Centre is a response to a call from the UN Commission of the Environment and Development for "vast campaigns of education, debate and public participation in order to promote sustainable development".

Power producers call for continued support for renewables

Britain's sustainable power sources should continue to be supported, according to a new report from the Association of Electricity Producers, even beyond the projected end of the Non Fossil Fuel Obligation arrangements.

The NFFO schemes used to support renewable energy since 1990 have been a great success, says the Association.

But, despite falling prices,

few renewable energy schemes are yet able to stand on their own feet in the competitive electricity market.

According to the Association, the Government will have to keep the NFFO going for the time being.

In the short term, the Association calls for urgent confirmation by the Government that it will invite bids for another round of NFFO in 1998. This is

essential, says the Association, because companies that are prospective developers of projects need to know whether it is worth staying in the renewable energy industry to prepare proposals for future generating schemes.

In the medium term, the Government should examine some of the drawbacks of NFFO. For example, it does not suit all technologies equally well - there are big differences

in price between the cheapest and the more expensive ones - and consider how to ensure that support is cost effective. It will also have to weigh up how renewable energy should fit into the fully liberalised supply market, post 1998.

In the long run, the Association suggests that measures to encourage the renewable energy industry should aim to meet at least 10% of electricity demand.

New national award for energy professionals across the UK

The 'Standards for Managing Energy' story has maintained a high profile in Energy World during the past 12 months. As a final instalment, the Institute is pleased to announce another major development.

On 6 June 1997 a National Vocational Qualification (NVQ or SVQ in Scotland) Level 4 in Managing Energy was launched at the Management Charter Initiative (MCI) conference in Wolverhampton. This is the culmination of much work behind the scenes for all the parties involved and the Institute is extremely pleased to have played a leading role.

You may remember that the early chapters of the standards story introduced TEMOL - Training in Energy Management through Open Learning. TEMOL is training material designed to complement and map to the standards to deliver the essential elements of knowledge and understanding that a professional seeking the S/NVQ 4 must have.

Following this, in February 1996, was the launch of the Standards for Managing Energy at an event attended by more than 700 individuals. It was not long before two supporting products became available in the form of the *Good Energy Manager's Guide* and the *Continuing Professional Development Manual in Managing Energy*. Both of these products are now being used by energy professionals throughout the UK as an easy reference checklist and a practical CPD tool respectively. At this time the standards were also accredited as S/NVQ Units in Managing Energy.

In March 1996 the Institute of Energy applied to become the first national delivery centre for the NVQ Units in Managing Energy. Working with the University of Oxford Delegacy of Local Examinations (UODLE), the Institute ran a VQ pilot programme to train 10 assessors to meet the training standards and assist 30 managers to each gain two units from the

Standards for Managing Energy. This work was successfully concluded at a Ministerial Award Ceremony at NEMEX '96 in December. Around this time the Institute also secured sponsorship to run a smaller pilot in Northern Ireland, thanks to the support of the Training & Employment Agency and Northern Ireland Electricity plc.

In January this year the Institute of Energy was approved by the SQA to offer the Scottish equivalent - SVQ Units in Managing Energy throughout Scotland. This work is developing in a partnership between the Institute, Anniesland College in Glasgow and Telford College in Edinburgh.

Some readers will remember that, in the middle of all this activity, the Government undertook a review of the education system in the UK and vocational qualifications were examined quite closely. The timing was not the most appropriate, and as the wheels of Government turned slowly, eventually the outcome of the review and subsequent recommendations were incorporated into revised standards which were launched in London on 29 April 1997 by the MCI.

Avid followers of the standards will be pleased to recognise that most of the content remains unchanged but vast improvements to language and presentation have been made.

The final chapter to this story began on 6 June 1997 when the S/NVQ in Managing Energy Level 4 was launched as the first management qualification for energy professional throughout the UK. This award must now proceed through an accreditation process which, it is hoped, will be completed in September 1997. As the units within the award are already accredited, individuals can begin to accumulate unit credits towards the full award.

The Institute of Energy is already recruiting new VQ candidates and the first introductory workshop took place at the Institute on 18 June. Candidates involved in last year's very successful pilot continue to gain certificates, and in Northern Ireland, the pilot is already showing signs of success for the individuals involved.

Contact Louise Evans at The Institute of Energy for further details: 0171 580 7124

The new energy qualification is for those managers whose key purpose is to ensure the effective management of energy resources to meet the organisation's objectives. These include managers whose roles are associated with energy management (with job titles such as energy director, energy manager and energy consultant).

The new qualification has been developed after extensive consultation with energy managers across the UK, and was in response to the growing number of managers with some form of responsibility for energy management in their jobs. Particularly in smaller organisations, energy spend can be one of the largest areas of controllable cost. Effective management of energy can, therefore, have a considerable impact on the finances of an organisation.

The Energy VQ is specifically designed to link to other energy management initiatives, including the increasing awareness of environmental issues, the implications of BS 7750, the Eco-Management and Audit Scheme (EMAS) and ISO 14001, the international environmental management standard.

For BS 7750 and ISO 14001, organisations are expected to achieve overall compliance with the broad directions laid out in the VQ. To comply with EMAS however, each site needs to nominate an individual to coordinate the public reporting of the various environmental performance criteria, including energy efficiency, outlined by the EMAS regulations.

New NVQ gives broader base for energy advice

by Sheila Keating, Head of Training and Technical Services, NEA

Talk about energy management and most people automatically picture large-scale operations in industry and business. But effective skills are needed at every level to ensure that people are able to manage energy in their own environment.

The Institute of Energy's National Vocational Qualifications (NVQs) in energy management and the NVQs developed by national charity NEA have been designed to set standards for the efficient use of energy and share a similar goal, even although they operate in different work situations. The use of energy in the home or in the high street shop or office may be on a small scale, but on a national level makes a substantial impact on the amount of energy saved - or wasted - each year.

NEA, which campaigns on behalf of the fuel poor, took on board the development of energy efficiency standards through training when the need for clearly recognised and nationally accepted standards throughout the insulation industry became evident.

It set about developing, with industry, standards not just for the practical work such as installing loft insulation, cavity wall insulation and draughtproofing but for the important task of providing energy advice. Whether given at a distance or face to face, energy advice has the potential to achieve considerable savings, often with no or low cost improvements - provided it is carried out effectively.

The NEA/City and Guilds qualification in energy awareness was the first qualification available nationally which met the training needs of those who give energy advice to householders. Well over 7,000 people - including staff of local authorities, fuel utilities, insulation companies and caring agencies

- now hold this qualification, which raised the level of knowledge among advisers significantly. Its success paved the way for NEA to develop an NVQ for energy advice staff as part of its range of NVQs. These qualifications are work-based and test the competence of the employee "on the ground". Despite some bad press for NVQs in general, they have been well received by the insulation industry and are now firmly established. More than 1,800 staff have gained NVQs, over 300 are working towards NVQs and take up is expected to increase over the next few years.

All NVQs are reviewed comprehensively every three to five years and NEA has used its three year review to carry out extensive consultation with the industry. This has resulted in major changes to the existing *Assessing Insulation Requirements (Level 2)* which has been revised and renamed as *Provide Energy Efficiency Services (Level 2)*.

Due to receive accreditation in July, it will for the first time, give a broad base for energy advisers. This NVQ has been revised because of the clear demand for a qualification to meet the needs of energy advisers in sectors other than the insulation industry, such as fuel utilities, housing providers and individual advice centres. Although it has not been targeted at local authorities, this would also be suitable for local authority staff who provide energy advice full-time.

To ensure a wide scale consultation and development process NEA invited all fuel utilities to participate as they have a responsibility to give advice on efficient use of fuel. This invitation was accepted by British Gas Trading and six electricity providers. Local Energy Advice Centres also actively participated in the review. The review was welcomed by Midlands Electricity in particular, who with the Department for Education & Employment

provided funding for the work. Midlands Electricity also made a commitment that the relevant NVQ would be the standard required for all their advice staff. Eastern Electricity has also registered an interest in becoming an NVQ centre for assessing its own staff.

The revised qualification includes a core of four mandatory units, after which there are two optional routes for staff. Option One is for those who provide information, advice and guidance and offers a choice of units depending on whether the energy advice is given at a distance - such as over the phone - or face to face in an office or home situation. Option 2 is for those providing surveying, estimating and sales services and is particularly appropriate for those working within the insulation industry.

The increasing demand for energy advice highlights the need for a qualification that covers all aspects of advice giving. NEA can give clear guidance to users of the NVQ as to what is implied by the different options available and also provides an NVQ advice line for any advice centres or utilities wanting further information. This summer NEA will also be holding a workshop for any fuel utilities considering implementing the new NVQ.

The debate about ways of evaluating or quantifying energy advice continues. Research into the effectiveness of energy advice is currently being undertaken in an effort to determine the quality and value of the service which energy advisors provide. In the meantime, the revised NVQ sets new and broader standards which will help to ensure that more of the people providing energy advice are recognised as competent to do so.

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Taking energy into education

by John Rodway, Centre for Research, Education and Training in Energy

Successful energy management is not confined to refurbishing plant and negotiating tariffs. It is increasingly important to assist non-technical administrators incorporate energy issues into their thinking and to encourage the users of buildings to take more responsibility for energy efficiency. This approach applies as much to schools and homes as it does to industry, offices and shops.

Over the last couple of years, the Centre for Research, Education and Training in Energy (CREATE) has received many requests from professionals who have not trained in energy management but for whom energy services are of increasing importance. They include headteachers, school bursars and governors. Others are local government officers who have been given responsibilities under the Home Energy Conservation Act (1995) or are responsible for Local Agenda 21 initiatives and who have realised that schools are key partners.

Now is an excellent time for qualified energy professionals to improve their contacts with this growing band of part-time and voluntary energy managers, helping them to demonstrate the benefits of good energy policies and to implement sound practices. If done with imagination and understanding, this should help raise the profile of energy management and publicise the specialist support that is available.

Members of the Institute can assist this process within schools by:

- getting directly involved themselves,
- making educators aware of the resources, assistance and guidance that are available from CREATE and kindred organisations around the country,
- suggesting that installations with which they are involved are made suitable for use as teaching resources (eg locating meters where they can conveniently be read by pupils).

Some energy management practitioners are

reticent about dealing with school personnel because they are not sure how they will be received, especially when they deal with educational aspects. However, there are a number of existing initiatives that they can use to help them establish productive partnerships. Some of these are outlined below.

ENERGY CASHBACK

The delegation of budgets to school governors is forcing headteachers to look at ways of reducing their energy costs. The Energy Cashback Scheme of the Energy Saving Trust is providing over £2 million of rebates over three years to help schools upgrade their heating, lighting, hot water, control systems, etc. CREATE is managing the scheme on behalf of the Trust.

Specially commissioned software is supplied to help with monitoring. The participating school supply monthly data to CREATE, where it is analysed and progress reported back. One of the conditions is that pupils must be involved in the processes of auditing and monitoring in ways that are both appropriate to their understanding and are educationally worth while.

Rooks Heath High School, Harrow, in north London is a typical participant. As part of its three-year action plan, they have upgraded boiler and lighting controls, improved insulation and fitted door-closers in a scheme that cost £4,636. Cashback contributed half and the projected savings indicate a payback period of five years.

Environmental benefits include a reduction in emissions of about 6.3 t of CO₂ per annum.

Because of the pupil involvement, Rooks Heath was able to enter the British Gas/Department of the Environment Powersavers '97 competition with little extra effort. They were successful in the regional stages and well-placed in the national finals.

Two hundred and three schools were awarded rebates in the first year, worth in total over £517,482. Applications for Year Two are now being received. Institute Members with children at school should make sure that their headteacher is aware of the cash on offer. An introductory leaflet is available from CREATE.

LA21 AND HECA

Local Agenda 21 was adopted by world leaders at the Earth Summit in Rio in 1992. The conference recognised the essential role of communities and individuals in its implementation. In the UK there are Local Agenda 21 officers on the staff of most county and borough councils. They initiate, encourage and coordinate initiatives at grass roots level. Focus for action ranges from cleaning and greening eye-sores, through facilitating recycling, to reducing energy consumption. LA21 Officers are pleased to make contact with people with relevant expertise who can assist neighbourhood groups.

Amongst the UK's responses to the Declarations made at Rio is the Home Energy Conservation Act (HECA). This requires all local authorities to work in partnership with their citizens to reduce domestic energy consumption by 30% over 10-15 years. This is being done in many ways (see *Energy World* May 1997). Authorities have realised that education is as important as

management



EST chief Eoin Lees with children of North Ealing Primary School, London. The school is reaping the benefits of energy efficient light bulbs, draughtstripping and a new hot water boiler.

installing physical measures. Establishing co-operation between action in schools, workplaces and homes can unify this process.

For example, Coventry City Council has given all its schools the opportunity to involve parents as well as children and staff in energy-saving initiatives. HECA funding provided already-proven materials for teachers to help pupils and their families save energy at school and at home. It included software to help work out the energy efficiency of houses.

To assist the adoption of the materials, 120 teachers attended courses at a teachers' centre. This helped them plan the incorporation of energy and its efficient use into their teaching schemes while satisfying the requirements of the National Curriculum. Later there was an exhibition of the resulting work as part of the national Science, Technology and Science Week.

A similar scheme was adopted in Hemel Hempstead by teachers and Dacorum Borough Council. The software was used as the focus of an Environment Day in a local shopping centre, when home energy efficiency assessments were carried out by pupils for members of the public.

AWARDS AND COMPETITIONS

National awards and competitions available for schools and pupils involved in energy conservation work include:

- Eco-Schools Award - Europe-wide recognition for schools with good environmental practices. One of the guidebooks deals with energy. It gives practical advice on how to involve pupils in school energy management by combining the requirements of the curriculum with those of the Awards Scheme.

SOME USEFUL RESOURCES

Building Energy Efficiency in Schools is the key publication in BRECSU's series for schools. It is supported by a short audio tape: *Turn on Budget Savings* aimed at school managers. BRECSU, Building Research Establishment, Garston, Watford WD2 7JR. Tel: 01923 64258

Eco-Schools Awards Scheme: c/o Tidy Britain Group, The Pier, Wigan WN3 4EX. Tel: 01942 824620

Powersavers '98: Helen Growden, British Gas Home Energy, The Wharf, 5 Wharf Lane, Solihull, West Midlands B91 2JP

Solar Programme: A scheme to provide schools with photovoltaic systems to supplement their mains electricity supply. Information pack from Intersolar Group, Cock Lane, High Wycombe, Bucks HP13 7DE. Tel: 01494 452945, fax: 01494 437045, web site: www.solar.org.uk/solar/

- Powersavers - a national competition for 7 to 14 year olds run by British Gas in association with the Department of the Environment. It encourages schools to reduce their energy bills by identifying low-cost, environment-friendly ways of saving energy. The 1997 competition is now over, but Powersavers '98 is getting under way.

CREATE encourages Members of the Institute to contribute to these activities.

Further information and advice on strengthening links with schools is available from: CREATE, Kenley House, 25 Bridgeman Terrace, Wigan WN1 1TD. Tel: 01942 322271, fax: 01942 322273, e-mail: info@create.org.uk, or visit the web site at www.create.org.uk

From flexible running your

The British energy industry has gone through more than its fair share of radical change over the last decade, including privatisation, restructuring and downsizing. Here, the Institute of Management presents its view of flexible working - a key ingredient of modern employment practice, while the NatWest Bank offers help for those planning to establish their own small business.

Flexible work demands management innovation

Flexibility is key to the competitiveness of UK plc. Growing flexibility is leading to fundamental changes in the workplace and challenges the way we think about work. It is equally placing new and increasing demands on today's managers.

The Institute of Management has been consistently tracking these changes and developing new ideas on best practice methods for managing effectively flexible employees. Flexible working is now central to corporate planning in the UK. It is therefore vital for organisations and individuals to plan for the opportunities and challenges it will present.

There are deeply embedded cultural and psychological values attached to the work an individual does and how they do it. Part-time and flexible work retains an image of being less serious than full-time work. But if flexible working is here to stay, then attitudes have to change.

The Institute of Management believes that UK plc's move towards flexibility represents a significant and long-term shift in the relationship between people and work. Managers must look at both sides of the flexible working coin. The benefits to organisations in terms of controlling costs and improving productivity are well versed but what are the benefits for individuals and what does it mean for management practice?

Over the course of the 1990s, flexible working has been one of the fastest

growing areas of UK employment. From 1984 to 1996 growth in full time employment remained relatively flat. However, flexible working grew by 30% and Government statistics now indicate that a quarter of the UK workforce works part time. And it is growing faster for men than for women. While growth in the number of women in part time work was relatively flat between 1984 and 1996, the number of men in part time work grew by 108%.

Our research shows that UK organisations use a wide range of flexible working methods - from subcontracting through to zero hours contracts. More than one third use flexible hours contracts and more than one quarter use job sharing.

Flexible employees are found at all levels of organisations. The majority are in clerical, secretarial and other support roles. However, nearly half of the managers we surveyed said their organisations use flexible employees at management and professional levels and one in four said technical grades also had flexible personnel.

The bald statistics, however, hide a significant change, prompting a re-think of ingrained perceptions of corporate hierarchies and the responsibilities associated with particular jobs. Flatter organisations have led to an increase in responsibilities at all levels. The importance of information and knowledge to today's organisations, has led to the upgrading and revaluing of clerical,

secretarial and administrative staff who now require a broad range of skills and a high degree of technological competence to fulfil their tasks.

Flexible employees undertake tasks central to the success of today's organisations - information analysis, financial management and customer care. Today's flexible employees are as likely to be skilled data analysts as they are cooks or cleaners.

Changing customer demands have led to new work patterns and increased demand for flexible employees. Twenty-four hour banking and financial services, 24-hour computer and technical support services, late night shopping, customer care lines and round-the-clock news and entertainment are now commonplace. Flexible workers are on the front line - bringing customers in and keeping them happy. They deliver products, services and promises. When research shows that 86% of customers will defect to the competition if they don't get good service, flexible staff are essential to corporate success.

Flexible employees are a corporate rapid reaction force and managers say their prime motivation for implementing flexible employment is to access skilled people as and when they are needed.

Despite a widespread perception that organisations introduce flexible working to save money on wages or training, or because the staff have fewer employment rights, these issues are thought largely to be irrelevant by managers. In fact, the majority of managers believe that flexible staff should be entitled to similar employment rights as their full time colleagues.

Flexible working is popular with employees. Our research has revealed the growing problems of long working hours and increasing stress levels within the workplace. Flexible working can empower

working to own business

employees, allowing them to manage their careers achieve a better balance between home and work life.

Managers recognise that flexible employment does not let them off the hook of management best practice. If anything, it involves a greater investment of management time, effort and commitment. Flexible employees are not a bolt-on extra. Organisations have to significantly enhance their skills in communication and team building to ensure the effective integration of flexible employees so they can take ownership of and be committed to corporate strategies and objectives.

As the number of flexible employees increases, so does their value and market power. For organisations to compete effectively for the best and most skilled flexible employees they need to offer similar benefits to full time and flexible staff including training and development.

Flexibility increases the importance of learning and skills development. Individuals have to acquire highly developed transferable skills and ensure they are continually updated. Organisations need to implement career and personal development planning for all staff. Inevitably this includes learning not directly connected to a specific job and external to the corporate culture. It is no good knowing only one company's approach when you might be working for three or four.

Flexibility cannot be a 'one way street' operating solely for the benefit of organisations. The relationship - what is often termed the psychological contract - between employees and organisations must become more fluid. The loyalty the organisation expects will need to reflect the loyalty offered.

There are a growing number of best practice models developing and the

Institute of Management can help provide support, guidance, education and knowledge to ensure individuals and organisations stay at the leading edge of management practice and enhance competitiveness.

Contact the Institute of Management on tel: 0171 497 0580, fax: 0171 497 0463.

Surviving the small business jungle

Everybody knows that small business in this country is having a rough time. Figures from NatWest show that during the 1990s, four out of every five businesses shut down within six years of starting trading. What people generally don't know is that the nature of the typical small business is gradually changing - and for the better.

Today's new entrepreneur is more mature than in 1990 - the average age is 37 instead of 32. With maturity comes stability; many of these new proprietors own their own homes, and have a wide range of experience and contacts in their chosen trades that will stand them in good stead. The boom times were marked by some people starting businesses without a clue as to what they were doing (one in three new owners in 1990 had never run a business before nor worked before in their proposed line of trade) and with no desire to seek advice or training. Now one in four new owners gets advice from Enterprise Agencies or Training and Enterprise Councils (TECs), and three out of four do have previous relevant experience.

This fits in well with the pattern NatWest has established of exactly who the survivors of the last recession have been. NatWest's research teams have discovered that the single most important

factor in deciding whether a business prospered or failed has been the age of the proprietor. A small business set up by someone aged between 50 and 55 has a 70 % chance of still trading three and a half years later - compared with a 30% chance for a similar business set up by somebody aged between 20 and 25.

These mature survivors typically had other things going for them, such as educational qualifications, vocational experience or apprenticeships in their line of trade, or going into business with partners who were able to provide mutual support and a good combination of skills. They often had the common sense to seek financial advice and support from their bank and others - vital when you consider that two out of three business closures are due in large to poor financial management by the owners.

So what must you consider when deciding to invest your hard earned redundancy in starting up your own business? First, and foremost, seek professional guidance. There is more to funding a business than running up an overdraft. Financial skills can be learned and bank and business can form a relationship that benefits both.

Taking just one bank, NatWest, as an example, its Business Start Up Service includes:

- a small business adviser,
- a business bank account with 12 months banking free of account charges,
- 18 months free banking if you have attended a *Business Start Up Training Course*,
- free *Help for your Business guide*,
- free business insurance quote,
- free 24 hour telephone banking service.

Contact the NatWest London Regional Small Business Team, tel: 0171 714 5815

Transport growth efficiency gains

Newcastle upon Tyne City Council has published a review of the first five years of its efforts to coordinate improvements in energy efficiency across the City. The review report - summarised below - does not make comfortable reading, but the breadth of the City's vision is to be admired.

Looking at the energy scene across the whole City, growth in demand - particularly in the transport sector - have wiped out some considerable savings made elsewhere over the last five years. This means that the potential to greatly reduce energy use and greenhouse gas emissions in the City as a whole has yet to be realised. These are the main conclusions of the review carried out by the City Council's Development Committee and the Local Agenda 21 Working Group.

In 1992 the City Council published its *Strategy for Energy and the Environment*, demonstrating that cities such as Newcastle can make a major contribution towards international climate protection programmes. Proposals and projects were put forward and evaluated, along with their means of implementation. The Strategy was widely distributed and welcomed.

During the same year, the future of the global environment was considered at the Rio Earth Summit. National governments set themselves targets for environmental

improvement and entered into new commitments. Local Agenda 21 emerged in the wake of Rio as a key means of turning such commitments into reality by involving local people, companies and authorities.

The Newcastle Strategy used 1990 as its base year and looked forward to 2010 using two scenarios - 'business as usual' and 'new initiatives'. The Strategy showed that Newcastle could build on the City Council's in-house success in reducing energy consumption and costs, and that a City-wide strategy could make a real contribution. Proposals for improvement were set out under four headings:

- combined heat and power
- energy efficiency
- renewables
- transportation

Setting targets and reviewing progress is at the heart of the Local Agenda 21 process, so a review of the Strategy after five years was expected to be revealing. The review examined progress made under each of these headings, identified barriers holding them back and the policy changes necessary to will help in implementation.

One of the key points to emerge is that the wide ranging and complex nature of energy related matters means that no single agency can deliver a comprehensive approach. A real partnership of action is required with national and local government, energy utilities and consumers each playing their part.

The overall picture is that all the energy savings achieved over five years have been wiped out by traffic growth. There has been little overall change in total energy use and pollution. However, growth in the use of gas for electricity generation and more significantly petrol and diesel, has been considerable. Without the achievements made in energy efficiency there would have been significant overall growth in energy use.

Newcastle is therefore not yet on track to achieve the considerable improvements the 1990 Strategy showed to be possible. This is a disappointing conclusion which indicates that business as usual is the prevailing scenario. Tables 1 and 2 summarises the changes in energy use over the five year period.

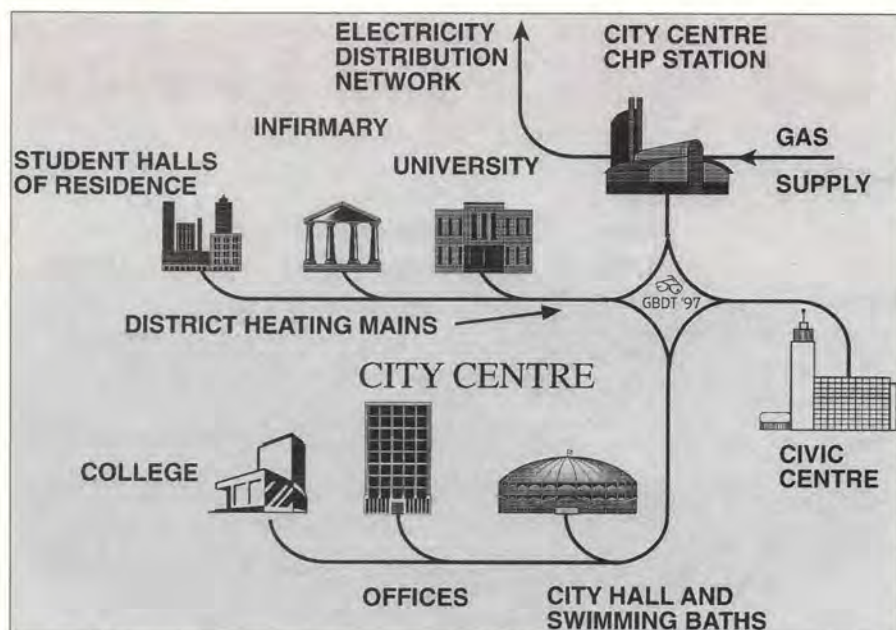
The data on emissions of pollutants to the atmosphere reinforce the picture. Emissions of sulphur dioxide are down 16% over the five year period, carbon dioxide and oxides of nitrogen are both down slightly, while carbon monoxide emissions rose by 25%. The figure exclude the effects of aviation fuel use.

Progress has been made, says the report, in installing small-scale CHP, upgrading the Byker district heating scheme to CHP operation, insulating homes, and developing a demonstration photovoltaics building facade. The achievements made and the work they represent is considerable, but many contributors to the report think that they still only scratch the surface of the potential.

Table 1 Changes in energy use by fuel

Fuel	Total use in 1990 GWh	Total use in 1995 GWh	Change %
Electricity	1185	1250	5
Gas	2368	2400	1
Oil	453	272	-40
Petrol/diesel	961	1180	23
Aviation fuel	92	147	60
Refuse-derived fuel	75	53	-29
Coal-derived solid fuel	450	300	-33
Total	5584	5602	0.3

wipes out energy



The proposed City-centre CHP/district heating project

A number of significant proposals have not been implemented, notably large scale City centre CHP; and traffic growth has been relentless in spite of improved public transport services and traffic calming measures.

The review report suggests that, given the prevailing relatively low cost of energy on the world market, new mechanisms are required to initiate capital intensive projects such as CHP and public transport infrastructure improvement. Further consideration needs to be given to environmental taxation which recognises the differing levels of damage caused by fuels and processes. New instruments could include an enterprise zone approach to CHP

development with tax incentives. Energy efficiency requires more resources for actual works, information and assistance.

There is a real cost involved in maintaining the current UK business as usual approach, says the report, in terms of missed opportunities for local economic development and job creation, as well as environmental improvements.

The report is pessimistic about the future, suggesting that the possibilities described in the new initiatives scenario are as unlikely to be achieved in the next fifteen years as in the last five years, unless there are clear targets and a greater emphasis on mechanisms and resources for implementation and accountability. The fact that UK carbon savings have been achieved

largely by the greater use of gas has tended to distract from other opportunities.

The Home Energy Conservation Act 1995 (HECA) is an important step in the right direction, but without adequate resources its level of success is very uncertain. The report says that an extension of the HECA approach to cover comprehensive energy and environment strategies is urgently needed, and that dialogue between the Government, local authorities and other agencies on the resourcing of HECA and the extension of its approach is vital.

The review nevertheless proposes a new set of targets to be achieved by the year 2010:

- completion of a City-centre scale CHP project
- implementation of the Home Energy Conservation Act 1995 to save 30% on domestic energy, together with a comparable programme in the commercial, institutional and industrial sectors
- renewables in the wider region to supply 5%, and photovoltaics in the City 1% of Newcastle's electricity, the City Council to purchase a specified proportion of its electricity from renewable sources; active solar panels to provide 1% of Newcastle's domestic hot water
- road transport energy use to be returned to 1990 City average levels
- reduction in overall energy use of at least 17%
- reduction of at least 20% in CO₂ emissions associated with energy use, working towards a 35% reduction.

Table 2 *Changes in energy use by sector*

Sector	Total use in 1990 GWh	Total use in 1995 GWh	Change %
Housing	2379	2399	1
Transport	1073	1347	26
Commerce	934	850	-9
Industry	1198	1006	-16

Nuclear power - guilty until proven

Nuclear power is a safe, clean and secure energy technology seldom treated fairly by the media; the industry's accident record and 'problems' around the storage and disposal of its waste are minor issues compared with those of other industries, argues Paul Spare, who has worked in the nuclear industry since 1974.

From the 1940s to the early 1980s, nuclear power was seen as the natural fuel to advance mankind into a brave new world. The image that is now presented is vastly different. High-technology industries are viewed with suspicion and nuclear power, as it grew out of the production of a bomb, is seen as the worst of all.

I hope to explain that this is a total distortion. Nuclear technology is well understood, safe and monitored under international safeguards. We should be looking to nuclear-generated electricity, as the safest, cleanest and most secure route to maintain our well-being, way of life and long-term liberty.

Our radioactive world

When pressure groups object to any release during normal operation, it is rarely explained that radioactivity is all around us. Figure 1 shows the typical breakdown of radiation exposure to the public in the UK. Nuclear power plant adds only a fraction of a percent to the total of natural background and medical sources. Close to some reprocessing plants, this contribution could rise to several percent amongst critical groups.

There are radioactive isotopes all around us: potassium, radium, uranium, thorium etc. produced in the supernova whose debris formed the solar system. We and all the other species on the planet have evolved amongst them, and have been to some

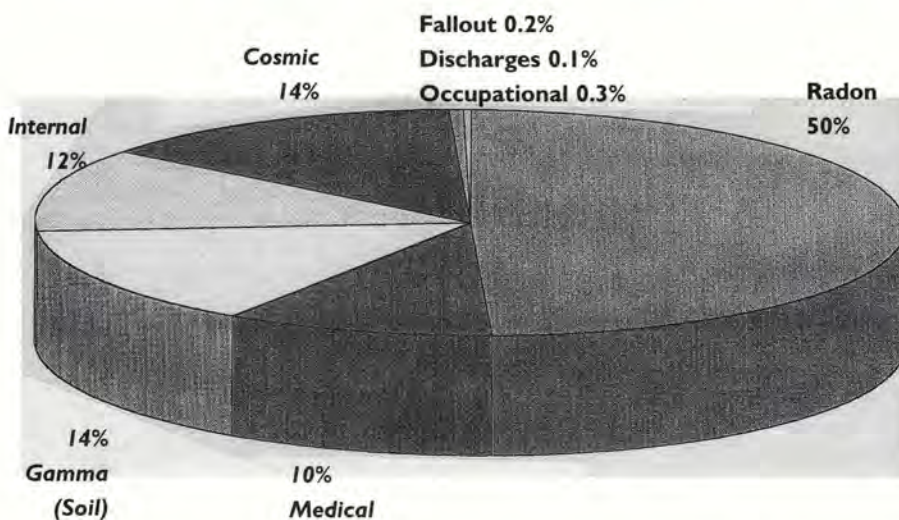


Figure 1 Sources of background radiation in the UK - average dose 2.5 milliSv

extent shaped by them. We normally have no reason to pay any attention to them.

Let us start with one of the materials that frequently causes some concern - uranium. Natural uranium is found in large pockets in many parts of the world, with the radioactive U235 comprising about 0.07%. Extrapolating back to the beginning of life on earth 3,000 million years ago, the concentration of the radioactive U235 would have been about 5%, ie uranium everywhere was emitting some 70 times more radioactive particles than today. Life multiplied and thrived in an environment that was far more radioactive than today.

Even today if the soil in the average garden were to be dug out to a depth of 1 metre and heaped up, at one part per million there would be about 1 kilo of uranium and we walk about on top of it all the time! That is why it is futile to be opposed to a radioactive environment. It is as logical as being opposed to the earth's magnetic field.

The filtering effect of our atmosphere was considerably weaker millions of years

ago than it is today so that cosmic rays and other high energy particles reached the ground. On average outer space provides about 10% of our annual dose. This high cosmic ray flux is experienced by every passenger in a jet aeroplane. At 30,000 ft, the dose from space is about 150 times that at sea level. Sixty hours flying per annum and the normal annual dose from this source can be doubled. There is however no need to rush for the life insurance application form. Aircrew are at most risk from this source, doubling their normal ground based uptake, but like health service staff or workers at nuclear power plants, doubling of the annual dose uptake has not been observed to produce any increased health risk.

Certain rocks, notably granites, contain sufficient radioactivity to cause the background levels in the West Country to be many times what they are in other parts of the country, but no increased incidence of cancer has been observed.

Some common materials contain measurable levels of activity. Brazil nuts,

innocent?

By Paul Spare, Prosafe Engineering Ltd

coffee, garden fertiliser and tea could all be classified as radioactive substances under the 1983 Radioactive Substances Act, because the definition is set as such a low value (370 Bq/kg) - one Becquerel is one disintegration per second. Coffee contains about 1000 Becquerels per kilo and if were not a natural substance would have to be disposed of according to strict nuclear industry controls.

Not surprisingly, a tiny fraction of the radioactivity in the food remains inside of us, so that every adult contains a quantity of radioactive potassium 40. Every second there are several thousand radioactive disintegrations inside us from this source alone, giving about 12% of our annual dose.

We know therefore that throughout the evolution of life, radioactivity has been a natural fact of life. Our internal repair systems developed and operate under these conditions and may even depend on them.

Nuclear plants

The emission limits for power stations, research centres and treatment plant are imposed by the Environmental Agency (formerly Her Majesty's Inspectorate of Pollution) and the Ministry of Agriculture, Fisheries and Food. These levels ensure that there is no harm to the environment and this is tested in practice by the sampling of foods, the air, water and the land around important licensed sites.

As with all populations, statistics will always show small differences in any parameter that is being measured. No property is spread uniformly, whether it is height, numbers of people with false teeth or aspects of health. There are instances where the incidence of leukaemia or cancer have been found to be very slightly above that expected but,

around the majority of nuclear sites, the incidence of overall cancers are much lower than expected. There are in addition many non-nuclear sites, particularly the 'new towns' where leukaemias were observed to increase in the fifties that had no nuclear connection at all. No increased health risk has been observed amongst the workers on the sites, who, if there had been any un-notified release, would have been subjected to much higher levels than the public outside. No increased cancer risks have been found around any of the much more numerous nuclear sites in the USA and France.

In spite of repeated attempts to apply the 'mud sticks' principle of journalism, there is adequate evidence that there is no increased risk from the use of man-made radioactivity in Great Britain. The fact that the regulatory authorities in the UK, the EC and the United Nations, government departments and knowledgeable health professionals and cancer specialists are also not looking for any further evidence gives strong support to the claim that these activities pose no hazard.

The man-made contribution.

Up to 90% of the man-made contribution arises from health treatments of one form or another and these vary widely between individuals. Most people are familiar with bone and teeth X-rays, cancer treatments and other diagnostics. Many use short half-life isotopes like technetium that enable the body's behaviour to be mapped quickly and then decay to nothing.

In the UK, there are on average about 500 X-rays per 1000 population per annum. One chest X-ray will give about

0.05 millisievert, ie about a 2% increase over the natural background. This is the same amount that you would receive if you camped on the boundary of a nuclear power station site all year round - an existence so uneventful that nobody can be motivated to undertake it.

The health risk

It is assumed pessimistically that every extra millisievert (40% of normal annual dose) carries with it an increased risk of 1 in 20,000 of a fatal cancer. Pro rata, medical activities would then increase the risk to everyone by about 1 in 200,000. That could mean 300 extra cancer deaths from the population of the UK. Even if it were true, which is highly unlikely, it would not be detectable in the 150,000 deaths that occur annually from all cancers. This level of risk is considered acceptable when balanced against the benefits of the use of radiation in medicine.

The risk from power stations and processing plant is at least two orders of magnitude (100 x) lower than this and can be justified on the same risk/benefit analysis. Table 1 Shows some of the other risks to which we are exposed.

Accidents

Nuclear power stations are made much safer than most of the technology that we have around us by virtue of exhaustive safety analyses and the counter-measures that are then built into the plant. These form the evidence that enables the nuclear industry to make claims about safety, but fault trees cannot be easily presented in 'sound-bites' on the television news.

The International Atomic Energy Agency has therefore developed a logarithmic ranking like the Richter scale,

for classifying accidents. It covers the range from 1 to 7. There has been only level 7 event in the 40 years of reactor operation throughout the world - Chernobyl. There have been no level 6 events and only two level 5 events - the Windscale fire and Three Mile Island. Level 5 is associated with some release beyond the site boundary, but no fatalities. An equivalent scale for the chemical industry, mining, oil or gas, leisure facilities or shipping and railways would be overflowing with entries in the 6 and 7 levels if it

were to be taken back to the 1980's let alone the 1950's. Multiple fatalities in these sectors hardly ever result in calls for them to be closed down, eg Moorgate, Clapham, Kings Cross or Hixon. In 1996 an

international conference with delegates from over 70 countries presented the findings of medical investigations ten years after Chernobyl. Of all the groups affected, the post-accident clean-up force, the evacuees and those in contaminated zones, only one group has shown a detectable increase in leukaemia or cancer incidence. This group is the children born up to six months after the event. There has been an increase in thyroid carcinomas to 5 per 100,000 children, but these can nearly always be treated by therapeutic procedures. The forecast excess fatalities in the clean-up force based on the Japanese bomb victim statistics has not occurred. No increase in inherited abnormalities has been observed nor would be expected, as none have been observed in children born to the Japanese bomb victim survivors.

Waste disposal

The disposal of nuclear waste is the issue that probably receives the most attention in the media. The nuclear industry

produces about 0.02% of the 140 million tonnes of 'Controlled Waste' was generated each year in the UK. Some 90% of this is Low Level Waste that can be picked up by hand without any elaborate precautions. Intermediate Level Waste comes to about 4,000 tonnes and High Level Waste a few tonnes. The volume of High Level Waste from the 40 years of commercial nuclear power would fit into the volume of a pair of semis (ie less than 1000m³).

The Intermediate Level Waste that

requires handling precautions is either inert dry waste or if it is liquid, is solidified in concrete and stored in stainless steels drums, ultimately for further over packing with concrete. In contrast, 70-75% of the wastes from the chemical industry (including 3 million tonnes solid toxic and 1.4 million tonnes liquid toxic) are poured or tipped onto the local landfill where they can percolate down through the local aquifers if they are not left bound to the 40 million tons of domestic waste that we provide as a low cost sponge.

The European Commission is battling against great resistance from UK landfill operators to ban the disposal of liquid wastes and of hazardous wastes with non-hazardous wastes. For the time being, the pollution will continue.

Whilst it is important to prevent the abuse of the environment, attention should be concentrated on more serious abuses by other industries, not on criticising waste disposal arrangements that are well engineered and cautious.

Long term storage

The plutonium that is produced in the nuclear fuel cycle is a desirable material because in 'Fast' reactors, it offers a further fifty fold increase in energy release over the original U235. This results in several benefits:

- only small amounts of the material have to be won from the environment,
- only small amounts of waste have to be disposed of,
- elaborate precautions can be taken for storage and security without excessive costs.

But because it has such a high energy density, a small amount can cause a great of destruction and so, like dynamite or guns, it has to be kept away from some people.

Nuclear economies are

accused of being irresponsible in accumulating plutonium because it could be dangerous for centuries and the present social structure can not be assured for more than a few decades ahead. This latter point is indisputable, but will the long term storage of plutonium waste or fuel be the principal concern if there is breakdown in the social system? The following is a list of far more serious problems that would confront humanity in those circumstances:

- explosions of liquefied natural gas facilities
- gross pollution and dangers from unmanaged oil and gas wells
- methane explosion risks from mines and waste tips
- poisoning from escaping chlorine, insecticides and solvents
- malnutrition from the failure of food processing, storage and distribution
- outbreaks of typhus, dysentery and other gastro-intestinal complaints from lack of clean water and failed sewage treatment
- increase in infant mortality from infectious diseases in the absence of antibiotics.

Table 1 Comparative risks

Activity	Annual risk of death
Solo rock climbing 5 hours per week	1 in 100
Smoking 10 cigarettes per day	1 in 200
Natural causes for someone aged 40	1 in 700
Working in a coal mine	1 in 7000
Accidents in the home	1 in 10,000
Road accident	1 in 13,000
Natural background radiation (2 millisievert)	1 in 20,000
Working in the nuclear industry	1 in 50,000

Compared with these threats, the presence of a few kilogrammes of waste buried underground and with no immediate use, is rather academic. The ancient Egyptians managed to incarcerate the highly desirable treasures of Tutenkamum underground for several millennia.

Almost all important sectors of an industrial society depend on electrical power. The breakdown of society is likely to follow long-term interruption to the supply of electricity. There is therefore a strategic need to invest in the systems that will

generate electricity in the future - principally, but not exclusively, nuclear power.

Costs

If simple basic market economics prevailed, then we would be entitled to cut down all

the trees in our village to keep our houses warm. As well as ruining the countryside, this would also release dangerous quantities of semi-oxidised carcinogenic, aromatic hydrocarbons into the air. A cheap option is not necessarily a good option in the long-term.

The only type of economics that can be applied consistently to energy use, and similar commodities that have a profound effect on the environment, is 'opportunity costing'. What opportunity is foregone by using the commodity as a fuel. From wood - the production of furniture and other artefacts; from oil or coal, chemical feedstock for plastics; from gas - direct combustion to generate sensible heat rather than electricity. In the case of uranium, there is no opportunity foregone. It is merely worthless orange mud. However, this mud has such energy density that as oxide fuel in an AGR, a pellet the size of a mint humbug can provide all the electricity one person needs for a year with a volume of waste smaller than a golf ball.

Alternative sources of power

There have been many studies in Europe and the USA comparing the risks of different power sources. Taking the integrated effect of all aspects of the fuel cycle, nuclear and gas emerge as the safest, with oil the next, about a factor of ten worse. The very significant disadvantages of using gas for electricity production are the quantities of greenhouse gases, methane and carbon dioxide, and the prodigious waste of 30-

would have to be repeated for every year the nuclear plants remained closed. That is an increase of about 200 over the period 1980-1997.

Summary

The above information has been prepared to put some of the criticisms of nuclear power into perspective. It is not a perfectly safe means of producing electricity, but it is better than all the others. The information has been assembled from peer-reviewed scientific

papers, government documents, and conference proceedings that are available to the public. Unfortunately, comments by media personnel are not subject to similar verification. Groundless theories about

harm from nuclear power or radiation are repeated. Until standards in the media are improved, with energy issues covered by staff with a medical, scientific or safety background it will be an uphill battle to correct public misconceptions and to improve the image of the industry.

Table 2 Annual fatalities

Year	Fatalities in mining	Fatalities in railways
1950	493	212
1951	487	172
1952	420	202
1953	392	203
1954	371	165
1955	425	179
1956	328	172
1957	396	176

40% of the potential heat release, even in a combined cycle plant.

Security of supply was the primary concern when the first nuclear programme was introduced. Unlike the factors that would be considered today in justifying the investment in an alternative power source, no account was taken in the 1950s of the fatalities in the mining industry nor the railways associated with the transport of coal. Table 2 shows the levels of risk when Calder Hall started work and indicates the numbers of lives saved when nuclear power replaces coal.

If as a result of an irrational response to Three Mile Island, the UK had shut down the first five AGR's, 6,000 MW of coal plant would have been needed instead for electricity production. That would have required an extra 12 million of tons of coal per year.

In 1980, there was one fatality for every million tons of coal produced, so winning that coal would have resulted in an average of 12 extra fatalities. That

Paul Spare is a director of Prosafe Engineering, a nuclear safety and decommissioning consultancy. He has worked in the nuclear industry since 1974, progressing through the AGR construction programme (with the Nuclear Power Company), AGR and Magnox support, waste treatment, NIREX repository and project management. Since 1995 he has been engaged largely on work for the UKAEA Dounreay and Harwell decommissioning programmes.

The Powershift Funding Partnerships will bring together, for the first time ever, businesses and local authorities interested in placing joint orders for all types of vehicles powered by cleaner fuels, such as liquefied petroleum gas (LPG), natural gas (NG) or electricity.

The Energy Saving Trust will fund up to 50% of the cost of conversion of the vehicles or of the difference in cost between the alternatively fuelled vehicle and the petrol or diesel version. The funding partners will also benefit from combined purchasing power.

The combined effect of these savings means the traditionally high capital cost of vehicles could be halved. This will overcome the major obstacle to the wider use of cleaner fuels by businesses, including bus, fleet and taxi operators and distribution companies. The cost of running alternatively fuelled vehicles is also much lower than conventional vehicles as tax on petrol and diesel has been steadily increased in line with Government's environmental targets.

Jonathan Murray, Transport Programme Manager, Energy Saving Trust, said: "The Powershift Funding Partnership programme is the most important step ever to creating a sustainable market for alternatively fuelled vehicles in this country. These vehicles have enormous benefits for operators, in terms of running costs and environmental savings. And, as local authorities insist on higher air quality standards, businesses will find that it makes real sense to switch to alternative fuels. Powershift Funding Partnerships provide the first real option for businesses to do this cost effectively."

It is expected that more than 1,000 businesses and local authorities will become Powershift Funding Partners by the turn of the century, putting more than 1,000 alternatively fuelled vehicles onto the roads. This will allow Britain to make a small start to catching up with some other countries - there are around one and-a-half million alternatively-fuelled vehicles in Italy, half a million in the Netherlands and 200,000 in Russia.

Powershift is a three year programme, initiated in 1996 by the Energy Saving Trust,

Powershift to put powered vehicles

Launched last year, Powershift is the Energy Saving Trust's major initiative aimed at the transport sector. It calls on businesses and local authorities to join Powershift Funding Partnerships to create new orders of up to £60 million for manufacturers of alternatively fuelled vehicles. If successful, it will bring 1,000 new alternatively-fuelled vehicles onto Britain's roads. It will also help Government meet its targets for reductions in greenhouse gas emissions and help local authorities further the Government's National Air Quality Strategy. Here, the Trust explains how Powershift works.



One of each - from left - an LPG-fuelled Vauxhall police car which operates in Hampshire and Bedfordshire, an electricity-powered Peugeot owned by the City of Coventry and a British Gas demonstration vehicle powered by compressed natural gas.

which aims to create a sustainable market for alternatively fuelled vehicles. It is the UK's largest environmental transport initiative.

Powershift works by pooling companies and local authorities interested in placing joint orders for alternative fuelled vehicles into Powershift Funding Partnerships, to accelerate the adoption of vehicles powered by liquefied petroleum gas (LPG), natural gas (NG) or electricity and maximise economies of scale. The programme is also launching 15 vehicle pilot schemes around the country, run in partnership between the Trust, vehicle

manufacturers, operators and fuel suppliers. These pilot schemes will help to stimulate more widespread interest in the Powershift Funding Partnerships.

Vehicle emissions have become a significant environmental problem, affecting the quality of the air we breathe and contributing to global warming. Air pollution can trigger asthma and other respiratory diseases and it is estimated that anything up to 10,000 deaths a year are caused by vehicle emissions. Yet alternatives do exist and, contrary to general perception, have advanced well beyond the research and

1,000 gas and electric- on the road

development stage.

Despite the scientific evidence, three major barriers prevent the wider acceptance of alternative fuelled vehicles in the UK:

- lack of knowledge among vehicle operators about alternative fuelled vehicles,
- the relatively high cost of such vehicles compared with diesel and petrol vehicles,
- the lack of an infrastructure for refuelling alternative fuelled vehicles.

Powershift aims to overcome these barriers by shifting attitudes and shifting vehicles powered by alternative fuels into general use. The Energy Saving Trust is providing funding of some £6 million over three years, plus extensive marketing and publicity support for the initiative as a whole.

The programme will run in three phases. During the first year the primary objective is to prove the technical and economic viability of alternative fuelled vehicles by establishing the pilot schemes and, crucially, an embryonic refuelling infrastructure.

Phases two and three will focus on reducing the cost of alternative fuelled vehicles by bringing together vehicle operators in the Powershift Funding Partnerships. This will be supported by a campaign to target urban projects in particular.

During the life of the vehicles purchased through the Powershift programme, it is estimated that 100,000 tonnes of carbon dioxide will be saved. There will also be reductions in the levels of other pollutants, such as carbon monoxide, nitrates of oxygen, sulphates of oxygen, ozone and particulates (thick smoke).

**Contact the Energy Saving Trust's
Energy Efficiency Hotline - 0345 277200
for further details.**

Oxford's LPG- powered ambulances

Oxford Ambulance NHS Trust is involved in a pilot project to test 14 gas-powered ambulances operating in real-life emergency situations.

The project aims to increase the public and business community's perception of LPG as a viable road fuel and extend the refuelling infrastructure for LPG vehicles in the Oxford area. Supergas is providing the infrastructure and will also give ongoing specialist training and support to Oxfordshire Ambulance Service.

The first two ambulances went into commission in Oxford in February this year. These Ford Transit 2.9 litre petrol ambulances were converted by AG Autogas Systems in Holland to use liquefied petroleum gas (LPG) instead of petrol and will still be able to perform with the same speed and responsiveness.

The remaining 12 ambulances will be converted at the Oxfordshire Ambulance Service's vehicle workshops by one of its own technicians who has spent time training with AG Autogas Systems.

The Oxfordshire project is part of a wider nationwide pilot test of light commercial vehicles run on LPG. Other partners in the nationwide LPG pilot include the Hampshire Police, Hampshire and Dorset Ambulance Services, Vauxhall Specialist Vehicle Operations, Calor Gas, Shell Gas and Supergas.

Bournemouth light vehicle project

The Bournemouth Light Commercial Vehicle Project is the UK's largest CNG (compressed natural gas) municipal fleet comprising 16 gas powered Ford Courier

vans. The vehicles took to the road in October 1996 for a 12 month study.

The aim of the project is to demonstrate the viability of CNG as an alternative fuel and to provide a basis from which other fleet operators can assess the implications of operating Natural Gas Vehicles (NGV) in differing applications.

Compressed natural gas is widely recognised as one of the cleanest fossil fuels. The project aims to reduce carbon dioxide emissions over the whole fuel cycle by at least 22%.

The vehicles are operated by Bournemouth Borough Council. The project also involves British Gas building a new CNG refuelling station in Bournemouth.

Coventry electric vehicle project

The Coventry project is the UK's largest electric vehicle test fleet comprising 14 Peugeot 106 electric cars and vans. Findings will be closely monitored and analysed by industry experts, MIRA, and the results published. Vehicles took to the road in February this year for a 12 month study.

All the vehicles are powered by nickel-cadmium batteries, a superior alternative to the lead-acid battery types traditionally used in electric vehicles. This type of battery can deliver a range of up to 45 miles with a top speed of 56 mph and acceleration of 0-31 mph in 8.3 seconds.

The primary objective of the Coventry project is to document the operation of advanced electric cars and vans in real commercial situations.

Partners in the project are: Coventry City Council, East Midlands Electricity, Peugeot, PowerGen and Royal Mail. The Energy Saving Trust acts as project coordinator.

Universities challenge

Further education for energy professionals is changing. Here, two universities set out their plans to incorporate economics, resource/supply issues and sustainability into more traditional teaching areas.

Teaching sustainability

Leicester's De Montfort University has launched a new Masters course in Energy and Sustainable Development starting in October 1997. The course is aimed at both recent graduates wishing to specialise in energy and sustainability and professionals wishing to extend their knowledge and expertise.

The course will cover three broad areas, and involve training in transferable skills:

- Cities and Sustainability - to provide students with a thorough understanding of international, national and local factors which influence sustainable development: resources, energy sources, energy usage, buildings, transportation, waste and pollution, Agenda 21. To emphasise the non-environmental benefits and the need for policy integration.
- Energy in the Urban Environment - a broad overview of urban energy management, with an emphasis on integrated resource planning and renewable energy utilisation. The role of the EU, local authorities, and utilities in encouraging energy efficiency and the development of renewable energy.
- Renewable Energy Technology - to provide a broad understanding of the potential for renewable energies within the urban (and rural) environment. The need to integrate renewable energy technologies into the design and refurbishment of buildings.

Training in transferable skills will provide a grounding in research methods and computer skills to enable students to undertake a dissertation. An understanding of management, how organisations work, basic statistics and data analysis methods, will be taught.

Many of the Institute staff are recognised as international experts in

their field of energy or sustainable development. In addition, the Institute can call upon external professionals to deliver expert seminars in particular fields. The Institute has exceptionally good contacts both locally

within the UK and in the European Union on energy related projects.

The new MSc, which fills a gap in the market for professionals trained in the growing field of energy and sustainable development, is ideally suited to new graduates or existing professionals. The full-time and part-time course offers a convenient way of studying.

Contact: Details from Montford University on 0116 257 7401, or visit the web site at <http://www.iesd.dmu.ac.uk>

Adding to technology

City University, situated within a stone's throw London's financial centre, launched its Energy Management courses in 1993, both at BEng/MEng level and at the Masters level for industry sponsored or more mature students.

These courses were designed to be technology oriented and tailored to fit with the engineering based work of the School of Engineering. Although very successful, experience has shown that industrial employers are seeking a wider understanding of the energy sector than just its technological base. For instance the post-privatisation developments, the growing interests in 'voluntary actions', for energy management and the increasing likelihood of regulation or a more stringent taxation regime following the Kyoto agreements to be finalised later this year, now mean that a new



De Montfort University's award-winning Queens Building

emphasis is needed.

The University believes that a sound grasp of the principles of energy economics, global resource/supply issues and some of the more sophisticated management techniques - as a complement to the technology base - have now become a pre-requisite for a successful industrial career in the energy sector.

A fundamental component of this complementary knowledge is the techno-economic assessment of renewable energy technologies, which are certain to take an increasing role in the new millennium at the commercial/industrial as well as national level. As an example of these linkages, for the last two years the University has been running a very successful weekend course at the Dartington Estate in Devon for its mature MBA students. The requires an assessment of the 'energy island' concept from those with sound commercial acumen, but little knowledge of the technologies or their implications.

The University now plans to broaden the scope of its engineering based courses to reflect these changing demands and, particularly, looks to helping UK industry and government capitalise on best practices and technologies to improve energy production and its efficient/economic use.

Contact Prof LR Wootton, Dean of Engineering, City University, Northampton Square, London EC1V 0HB. Tel: 0171 477 8100.

August 1997

Making a business from biomass

Conference, 24-29 August, Montreal
Details from the US National Renewable Energy Laboratory, fax: +1 303 275 2905, e-mail: rossj@tcplink.nrel.gov

September 1997

Industrial use of electricity

EA Technology course, 4-5 September, Capenhurst
Details from Paul Bagg at EA Technology, tel: 0151 347 2467, fax: 0151 347 2178, e-mail: pjb@eatl.co.uk

Reserve acquisition in oil and gas

Conference, 8-9 September, London, £899 + VAT
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

Offshore Europe 97

Oil and gas exhibition and conference, 9-12 September, Aberdeen
Details from the Offshore Europe Partnership, tel: 0181 949 9222, fax: 0181 949 8186, e-mail: oe97@spearhead.co.uk

Switchgear technology for power systems

EA Technology course, 10-11 September, Capenhurst, £675 + VAT
Details from Ms Del Bennett at EA Technology, tel: 0151 347 2557, fax: 0151 347 2256, e-mail: db@eatl.co.uk

Managing the future

Conference to mark the 25th anniversary of the Department of Applied Energy, Cranfield University, 11-12 September, Cranfield
Details from Prof Doug Probert, tel: 01234 750111 x5302, fax: 01234 750728, e-mail: hunt@cranfield.ac.uk

EXPOGAZ

International exhibition on gas technology, 16-19 September, Toulouse, France
Details from IDEXPO, tel: +33 1 4665 1834, fax: +33 1 4663 2600

Third party access in European gas

Conference, 18-19 September, London, £899 + VAT
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

Incineration of municipal waste with energy recovery

Short course at the University of Leeds Department of Fuel and Energy, 22-23 September, Leeds
Details from Jamie Strachan, tel: 0113 233 2494, fax: 0113 233 2511, e-mail: shortfuel@leeds.ac.uk

The commercial implications of the Gas Interconnector for the European gas industry

Conference, 22-23 September, Brussels
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

The principles, manufacture and application of photovoltaic systems

Short course at the University of Reading, 22-26 September, £1000
Details from Dr A E Wheldon, tel: 0118 931 8756, fax: 0118 931 3327, e-mail: a.e.wheldon@reading.ac.uk

Investing and competing in the deregulating European energy

Conference, 29-30 September, Brussels
Details from Anna Lees, Icom Group Conferences, tel: 0181 642 1117, fax: 0181 642 1941, e-mail: anna@icompub.demon.co.uk

Combustion fundamentals

Imperial College course, 29 September - 3 October, London, £650
Details from Mrs R Wilkinson, Department of Chemical Engineering, tel: 0171 594 5570, fax: 0171 594 5629, e-mail: r.e.wilkinson@ic.ac.uk

ASME ASIA 97

Exhibition and conference on petroleum and gas turbines, 30 September - 2 October, Singapore

Details from the American Society of Mechanical Engineers, tel: +1 404 847 0072, fax: +1 404 847 0151, e-mail: puntneyj@asme.org

PETROLE EXPO

International exhibition on petroleum, gas and petrochemistry, 30 September - 2 October, Marseille, France
Details from IDEXPO, tel: +33 1 4665 1834, fax: +33 1 4663 2600

POLLUTEC 97 INDUSTRIE

Environmental technology exhibition, 30 September - 3 October, Paris
Details from UN Miller Freeman France, tel: +33 1 4756 2115, fax: +33 1 4756 2120

October 1997

Measurements of air pollutants - are we all in agreement in Europe?

Conference, 1 October, Paris
Details from AFITE, tel: +33 1 4023 0450, fax: +33 1 4023 0539

North African gas and the implications for European gas markets

Conference, 6-8 October, London, £899 + VAT
Details from SMi Ltd, tel: 0171 252 2222, fax: 0171 252 2272, e-mail: 100531.3067@compuserve.com

Understanding heat treatment

Course, 7-9 October, Birmingham, £735
Details from the Wolfson Heat Treatment Centre, Aston University, tel: 0121 359 3611, fax: 0121 359 8910

Cables for power systems

EA Technology course, 14-15 October, Capenhurst
Details from Ms Del Bennett at EA Technology, tel: 0151 347 2557, fax: 0151 347 2256, e-mail: db@eatl.co.uk

GasElec Expo 97

Exhibition, 14-16 October, Amsterdam
Details from GasElec Expo, tel: +31 20 549 1212, fax: +31 20 549 1894, e-mail: gaselecexpo@rai.nl

Northern Ireland Setting the Standard



(Left-right) At work; Charlie Nicell, David Milford, (Trainee Assessor) Steven Abraham, Bob Stuart

In the May edition of *Energy World*, we informed you of the pilot programme in Northern Ireland. In this article you can see the candidates and trainee assessors taking up the challenge. Fifteen energy professionals and five assessors will undertake a series of activities in an integrated programme to achieve VQ units in Managing Energy and Assessor qualifications respectively.

The Institute of Energy is project managing this exciting initiative as the first national UK delivery centre for VQ units in Managing Energy. The steering group for the project includes the two sponsors, NIE plc, T&EA, NCVQ Northern Ireland, and the Engineering Training Council.

The candidates come from a variety of organisations; consultancies, NHS Trusts, power stations, pharmaceutical companies

and food manufacturers, proving that the standards are applicable to anyone who has a responsibility for managing energy. The successful candidates and assessors will be awarded their certificates at a prestigious awards ceremony in Northern Ireland in February 1998.

What will happen after the pilot?

The Institute of Energy will

have a satellite site at Upper Bann Institute in Portadown with five qualified assessors to support and develop VQ candidates who wish to achieve VQ units in Managing Energy in Northern Ireland.

Interested potential candidates, assessors and satellite sites, can contact Louise Collins at The Institute of Energy on Tel: 0171 580 7124, Fax: 0171 580 4420. email: lcollins@ioe.org.uk



(Left to right) Trainee Assessors: Robin Davey, David Milford, Eric Maddison, David Bell, Andy McCrea, Martin Fry (IV), Louise Collins (IoE)

Amendment to the Bye-laws

By Order of Her Majesty's Most Honourable Privy Council, dated 30 April 1997, the relevant Bye-laws of the Institute have been amended to allow eligibility for admission to the grade of Associate Member to energy practitioners who are not engineers, and to permit all Associate Members to use the designation AMInstE. Prior to this amendment only those

members who were also registered as Incorporated Engineers (IEng) could use AMInstE.

For many years The Institute of Energy has allowed suitably qualified and experienced energy practitioners such as economists, scientists, managers etc. into corporate membership and this latest amendment is seen as addressing an anomalous

situation between the conditions imposed for AMInstE and those for the more senior corporate grades (MInstE; FInstE).

It is hoped that this move will provide recognition for energy managers, administrators, etc. who are responsible for managing the energy bill for their company, but who are not, in themselves, engineers.

Events

SEPTEMBER 1997

NOTTINGHAM UNIVERSITY

Monday, 15 - Wednesday, 17 September

"Heat Powered Cycles" The Department of Architecture & Building Technology is running this event in association with The Institute of Energy, member rates available. Contact Dr I Eames, tel: 0115 951 5151

Obituaries

Frank Moles, Friend and Visionary

Frank Moles, first Chairman and inspiration behind the establishment of FCT, died suddenly on 15 May 1997. Frank was a philosopher, a pragmatic academic, and above all, a visionary who was committed to positive and quantifiable outcomes for his students, FCT employees and FCT's clients.

FCT will honour Frank's unique contributions with an annual sponsorship, details of which are currently being finalised. Frank is survived by his wife Ann and his daughter Sara Jane.

Damian A Scanlon, Executive Chairman, FCT International Ltd.

Frank Moles was a larger than life character, whose presence will be sadly missed in the combustion field. His gift of seeing right to the kernel of any issue, whether it was a complex combustion and heat transfer problem, or management philosophy, enabled him to motivate a research team that saw the fruits of their work implemented on process plants all over the world.

I first met Frank twenty years ago in May 1977, shortly after I joined Rugby Cement. I consulted him about Ferriby kiln 3, which had never achieved its rated output of 1000 tonne/day, rarely achieving more than 850. A few calculations by Frank and his team, based on some research they had previously undertaken, led us to make a small change to the burner. The following day the kiln produced 1050 tonnes, and never looked back. Frank ran a highly international research team with the best people selected

regardless of other factors. They undertook research on combustion and heat transfer in rotary kilns and other process plant for more than thirty years, developing a treasure trove of knowledge which was the very foundation of FCT's culture, which has been further developed by continuing to fund research at several universities around the world.

Frank's international approach has been mirrored in the make up of FCT staff today. Currently we are employing staff from a wide variety of cultures around the world including Australia, Canada, Ethiopia, England, France, Germany, India, Ireland, Mexico, New Zealand, Sri Lanka, Sweden and the USA. His influence on myself, and many younger engineers, was to be far-reaching, on the one hand he taught me how to employ effective modelling techniques to the solution of real industrial problems - on the other he gave me an appreciation of good food and excellent wine! Over a pint of beer I had many far ranging discussions with Frank; I will surely miss those conversations and his extraordinary insight.

Peter Mullinger, Honorary Secretary of the Institute and founding Director and Deputy Chairman of FCT.

Douglas Alfred Hall
MBE, D.Sc, Ph.D, C.Eng.,
F.R.S.C., F.I.Min.E.,
Sen.F.Inst.E.

16.09.1907 to 12.04.1997

Douglas Hall was born in 1907, a few months before Asquith became Prime Minister. Rudyard Kipling won the Nobel

Prize for literature. Women did not have the vote. In his lifetime he saw motor cars change from toys of the rich to everyday transport for nearly everyone. The crude radios of his youth have evolved into colour TV's and videos. He lived through two World Wars, and saw man land on the moon. In his own area of science he was himself responsible for some of the changes through which he lived. Through it all he absorbed and adapted always interested, always questioning, but never losing his sense of wonder.

Douglas did not have the easiest start in life. After his father was lost at sea he contracted tuberculosis and, at the age of 9, was sent to stay with his grandfather to recover in the country.

Recovered, he returned to Bristol where he won entry to Bristol University, obtaining a BSc (First-class Honours) in Chemistry. He was engaged in research on gaseous flames and explosions, under the direction of Prof WE. Garner, and he obtained a PhD. He later gained a DSc and an MBE for services to science: all things of which he was justly proud.

In the second World War he worked on special projects as part of the team which, for example, came up with the idea of spreading coal dust on rivers so that German bomber pilots could not find their way by following reflected moonlight.

Following experience at the Fuel Research Station and the Nottingham and Birmingham Coal Surveys Laboratories, he joined the National Coal Board in 1947

as Chief Survey Officer, West Midlands Division.

He moved to Whitley Bay in 1951 as Chief Divisional Scientist, Durham Division, rising eventually to Divisional Chief Scientist, North East. He was awarded the Dunlop Research Prize in 1938 for inorganic research carried out at Birmingham Technical College, and the Greenwell Medals by the North of England Institute of Mining and Mechanical Engineers in 1955 and 1970.

He participated actively in the work of other research associations. In 1956 he was appointed to the Research Committee of the British Carbonization Research Association. He contributed to the work on coal drying prior to carbonization, which ultimately led to the application of preheating in the coking industry in the United Kingdom and abroad. His technical paper on this work earned him the COMA Medal in 1962.

Among other honours he was Chairman of the North East Division of the Institute of Fuel 1965 (Treasurer in 1963) and again in 1987 (Treasurer in 1985). He was President of the North of England Institute of Mining and Mechanical Engineers in 1975-1976. After retirement from the Coal Board he worked as an independent consultant until well into his eighties. He was a fine gentleman in the full sense of the word. He leaves a loving wife Jessie who he married in 1939 and a loving son Micheil.

Obituary was edited by Mr P Whitfield, North East Branch, Institute of Energy.

Calling all golfers:

**£45 For a day's golf complete with
breakfast, lunch and an evening meal**

The Stanmore Golf Club, Gordon Avenue, Stanmore, Middlesex, HA7 2RL

Wednesday, 15 October 1997

**7.45am for breakfast
8.30-9.30am Tee off
12-2pm lunch
1-2pm Afternoon Tee off
7.30pm 3 course dinner**

The Institute invites you to take up this splendid offer which has been organised by our immediate Past President, Peter Johnson. An avid golfer, Peter would like you to accompany him on this 100 year old golf course. The course has a variety of holes to appeal and test all types of golfers. The infamous signature hole, the seventh, is played from the highest point in Middlesex, through an avenue of trees, onto a generous fairway below. So come mix with your fellow members of the Institute in the peace and tranquillity of the 6,000 yards of woodland, parkland, and heathland.

A 5 minute drive from Stanmore Station on the Jubilee underground line.

The course is just off of Junction 4 on the M1, parking is available.

Directions, location maps and further details will be sent to you on receipt of this booking form.

It is hoped to run these events at courses around the country giving every member a chance to join in, if you would like to host one in your area, then please call us

BOOKING FORM

Name: _____	Payment																				
Membership No: _____	<input type="checkbox"/> Credit card																				
Address for correspondence: _____	<input type="checkbox"/> Mastercard <input type="checkbox"/> AMEX																				
_____	<input type="checkbox"/> VISA <input type="checkbox"/> SWITCH																				
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Tel No: _____	<input type="checkbox"/> I enclose a cheque for £45 made payable to <i>The Institute of Energy</i>																				
Fax No: _____	<input type="checkbox"/> Please invoice me _____																				
email: _____																					

Return to:

Maria Adams, The Institute of Energy, 18 Devonshire Street, London, W1N 2AU
Tel: 0171 580 0008, Fax: 0171 580 4420, email: madams@ioe.org.uk