Agriculture • Horticulture • Forestry • Environment • Amenity

LANDWARDS

Winter 2003

- Bio Fuel
- Micro Turbines

HYDROGEN

IAgrE JOURNAL Volume 58 No.6 www.iagre.org

DIARY of EVENTS

JANUARY 2004

Monday 12 January 19.30 h - Wrekin
Land Rover Special Vehicles
Speaker: Bob Honnor, Commercial & Utility Business Manager, Land Rover
Venue: Harper Adams University College

Monday 12 January 19.30 h - South East Midlands
Precision Livestock Husbandry
Speaker: Professor Christopher Wathes, Silsoe Research Institute
Venue: Conference Room, SRI, Wrest Park, Silsoe

Thursday 15 January 19.30 h - Herts & Essex
Inspirations in Engineering
Speaker: Eric May, Countytrac
Venue: Writtle College

January 14 or 15 - Northern Ireland
Visit to Mothers Pride Bakery
Speaker: Lynne Gowdy
Venue: Mothers Pride Bakery, Apollo Road, Belfast
Date and time to be confirmed.

FEBRUARY 2004

Wednesday 4 February 19.30 h - Scottish
Social Evening – Burns Supper
This is a unique opportunity for members to demonstrate their hidden talents. Details to be announced.
Venue: Dunblane Golf Club

Monday 9 February 19.00 h - South East Midlands
Branch AGM and Evening of Post Graduate Research Papers
Venue: Bar Function Rm, Cranfield University Silsoe

Monday 9 February 19.30 h - West Midlands
Concept of 6-Sigma
Speaker: Mark Rewhorn
Venue: Friends Meeting House, Stratford upon Avon
For more information email: westmids@iagre.biz

Thursday 12 February 19.30 h - Herts & Essex
Deep Sea Cable Laying
Speaker from Global Marine Systems
Venue: Engineering Department, Writtle College

Monday 16 February 19.30 h - Wrekin
Fighting Vehicles
Speaker: Tbc
Venue: Harper Adams University College
Contact Jim Loynes, Harper Adams, for details

February Meeting 20.00 h - Northern Ireland
Developments in Grass Harvesting Machinery and Systems
Venue: Agricultural Research Institute, Hillsborough
Date and Speaker to be confirmed

February Meeting - Southern
Details to be advised

MARCH 2004

Wednesday 3 March - Scottish
Branch Annual Conference 'Quality Cropping' and AGM
Venue: Moredun Institute, Bush Estate, Penicuik
A hot buffet will be served before the AGM – full details will be forwarded nearer the time.

Monday 8 March 19.00 h - East Anglian
Branch AGM
Venue and Speaker to be arranged

Monday 8 March 19.15 h - West Midlands
Branch AGM followed by technical talk by Presidential Representative
Venue: AGCO, Banner Lane, Coventry
For more information email: westmids@iagre.biz

Tuesday 9 March 18.30 h - Herts & Essex
Branch AGM followed by technical meeting entitled 'Whole Body Vibration on Agricultural Vehicles'
Speaker: Andy Scarlett, Silsoe Research Institute
Venue: Writtle College

Tuesday 9 March
IAgrE Young Engineers Competition
To be held at the JCB Compact Products Factory, Cheadle, Staffordshire
For further details contact the IAgrE Secretariat or email competition@iagre.org

Wednesday 10th March 19.00 h - Southern
Branch AGM and Annual Dinner
Venue: The Swan, East Ilsley, Newbury

Monday 15 March 19.00 h - Northern Ireland
Branch AGM and Technical Meeting entitled "Innovation and Engineering at JCB Ltd"
Speaker: Paul Hemingway, JCB
Venue: Glenavon Hotel, Cookstown

MINI CONFERENCE

SOUTH EAST MIDLANDS BRANCH

to be held on **Monday 15 March** from 15.00 h - 19.00 h
at NIAB Cambridge – Conference Rm

Potential Change in the Agricultural Use of Water in Eastern England

Speakers to include:
Keith Weatherhead, Cranfield University
Steve Dines, Regional Licensing Officer
Lindsay Hargreaves, Elevedon Farms
Jerry Knox, Cranfield Unversity

Conference Convenor: David Pullen

For further details contact the IAgrE Secretariat

Monday 22 March 19.30 h - Wrekin
Branch AGM followed by technical meeting entitled 'Opportunities in Agricultural Engineering'
Speaker: Dan Mitchell, President of IAgrE
Venue: Harper Adams University College

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LANDWARDS

The Professional Journal for Engineers, Scientists, and Technologists *in* Agriculture, Horticulture, Forestry, Environment and Amenity

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Front cover: *Tree harvesting (Courtesy:Timberjack (U.K.) Ltd)*

ISSN 1363-8300

EF3 Envirofire pellet stove in use; wood pellets are loaded in the top section of the stove, as demonstrated here (Photo: Sandra Hayes; featuring Marc Howell of www.bioenergy-devices.co.uk)

WOOD FUEL FOR HEATING

Sandra Hayes

Wood is a very versatile fuel and comes in many forms, the main ones being logs, chips and pellets or briquettes. Logs are used on open fires, stoves and manually fed central heating boilers. Woodchips are generally used in larger boilers (anything between about 30 kW to 50 kW upwards) and not on a domestic scale. Wood pellets or briquettes are manufactured from waste wood products such as sawdust and come in many sizes - briquettes can be used to replace logs whereas wood pellets are used in specially designed stoves and smaller scale domestic boilers.

No chemical additives are required to produce pellets because the lignin (which occurs naturally in the wood) heats up and binds the wood together when the pellets are formed. Pellets also have a low moisture content of 6 - 10% and a high density. They are also of a consistent size, so that they flow like a liquid and can be used in automatic clean burn appliances. Although fairly new to the UK, pellets are now manufactured here and are well known in North America and some parts of the Continent.

Efficiencies

Although wood is a source of renewable energy, being almost carbon neutral, it is important to use it in the most sustainable way possible. For this reason it is necessary to consider the efficiency of the wood burning appliance. Although many people enjoy an open fire, it has to be said that they are very inefficient, with a minimum of about 20% of the heat

going up the chimney. The efficiency of a wood burning stove is much better, in the region of 60 - 80% heat retained, with a pellet stove having the greatest efficiency of around 80 - 90%. Most new wood boilers, whatever the selected fuel, also now have high efficiency rates, in excess of 80%.

How the wood is burned has a direct effect on the efficiency of the appliance. Logs need to be well seasoned, preferably left for a year or more after being cut, before they are burned so that their moisture content is below 25%. When freshly cut, wood has a moisture content of up to 65%, although some woods, like ash, are much lower than this, at nearer 35%.

Like other fuels, wood needs plenty of air to burn well. It is best to allow a fresh change of logs to burn freely until they almost turn to charcoal and only then to 'damp down' the fire by reducing the air supply. It is also beneficial to keep logs relatively small to keep a good ratio of air to wood. For this reason, logs should ideally be no more than about a maximum of 10 cm thick, anything bigger than this should be split again.

'Travis Woodstove LOPI ENDEAVOUR'; a more 'ornamental' style wood stove (Photo: ©HEARTH Education Foundation. More information at www.pelletheat.org)

BIO NOTE

This paper was presented at the IAgrE Annual Conference entitled 'Energy and the Land-based Industries' and held at Silsoe Research Institute on 13 May 2003. Sandra Hayes is Senior Project Manager at the National Energy Foundation, with responsibility for the Log Pile project and has worked with the Foundation since 2000. Ms Hayes also provides advice on policy and planning issues on a consultancy basis.

The National Energy Foundation, Davy Avenue, Knowlhill, Milton Keynes, MK5 8NG. Tel: +44(0) 1908 665555 E-mail: Sandra@greenenergy.org.uk Website: www.greenenergy.org.uk or www.logpile.co.uk

Smokeless zones

Contrary to what many people think wood can be burned in smokeless zones, if the correct appliance is used. Many stove manufacturers, such as Vermont Castings, Clearview, Dovre and Dunsley produce log burning stoves which are suitable for use in smokeless zones.

Alternatives to wood burning stoves

Ceramic Stoves

Ceramic stoves are traditional in many parts of Europe. They are covered in tiles and can be works of art in their own right. They are highly efficient because the energy is stored and released over a 24 hour period with two hours burning all that is usually required. A well designed stove can heat more than one room, by strategically siting the flue. The surface of a ceramic stove should never be hot to touch.

Pellet Stoves

Pellet stoves were first introduced in the USA in the 1980's. They are similar to wood burning stoves, but have the following advantages:

- temperature and timer controls;
- fans that distribute warm air around the room;
- automatic ignition; and
- an integral hopper containing enough fuel for one to three days.

Wood fired central heating systems

Logs and woodchip

Wood fired central heating systems in commercial and public buildings are common in countries such as Austria and Sweden. Central heating boilers run on either logs or woodchips and therefore have the advantage of being able to use a low cost, locally derived fuel that benefits local woodland management.

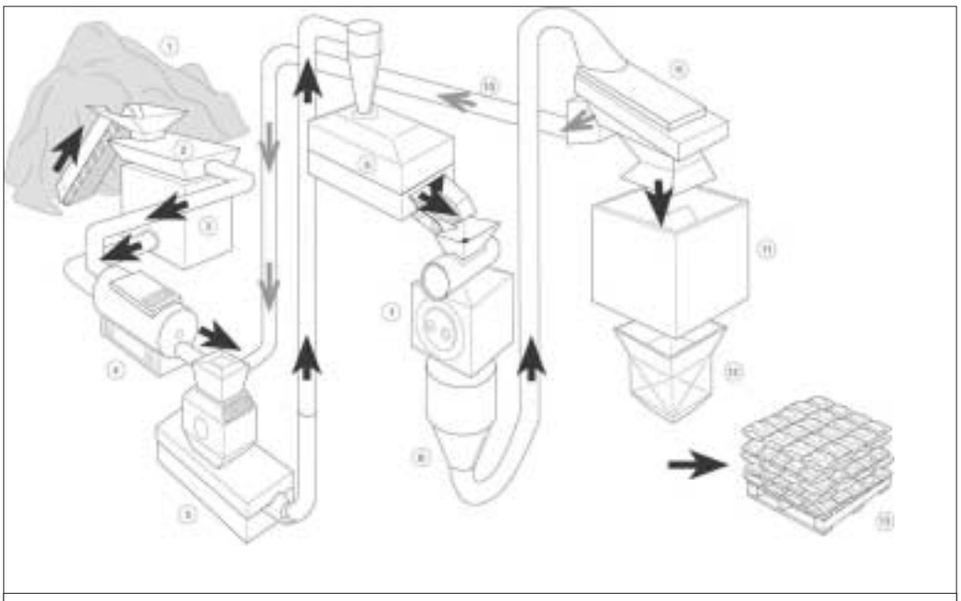
Boilers that run on logs, have to be handfed however, storage of the heated water may mean that it is only necessary to load it once a day with fuel. An added disadvantage is that a relatively large storage area is required, as wood chips and logs are of a relatively low density and the logs need seasoning.

A further issue to consider, if contemplating a wood chip central heating system, is moisture content and chip size. Wet chips do not burn or store well and inconsistent chip sizes can cause problems with the feed mechanism.

For these and also economic reasons, woodchip systems tend only to be used where there is a relatively large heat demand, such as at Elvendon Priory near Thame, Oxfordshire or to run a district (or community) heating scheme such as at the Centre for Alternative Technology (CAT) in Wales. In countries such as Austria it is not uncommon for a whole community to be heated with locally produced wood using one boiler and a network of pipes carrying hot water to individual homes and other buildings. An alternative way to this type of contract, is where the user pays only for the heat that is used, the supplier provides the boiler, installs and maintains it and supplies the fuel. An example of this type of contract is Worcestershire County Council, whose offices are heated in this way.

Pellets

Wood pellet boilers are very convenient to use, with automatic ignition and feed. In addition they use advanced microprocessors to control the amount of fuel and air supplied to the combustion chamber.



Inner workings of a pelleting plant: (1) Wood waste; (2) Classifier; (3) Hog/tub mill; (4) Dryer; (5) Hammermill; (6) Holding bin; (7) Pellet chamber; (8) Pellet cooler; (9) Shaker; (10) Fines return line; (11) Bagger bins; (12) Bagger/sealer; and (13) Storage (Photo: ©HEARTH Education Foundation. More information at www.pelletheat.org)

They can cope with variable load demands and can be operated on a timer. In addition they are very efficient and produce only small amounts of ash.

There are now several examples in the UK of the use of pellet boilers. The Earth Centre in Doncaster has a 25 kW boiler with an automatic feed system that cost in the region of £7500 (plus VAT) installed. In addition Shenstone Lodge School in Staffordshire has a pellet boiler.

The 'Log Pile' project

The 'Log Pile' is a three year project by the National Energy Foundation (NEF), promoting and aiding the use of wood as a renewable energy. Supported by Department for Environment, Food and Rural Affairs (DEFRA) throughout, the project has two objectives, namely to promote:

- use of all types of wood fuel; and
- specifically the utilisation of wood pellets in wood pellet boilers and stoves.

NEF are promoting the use of wood fuel by expanding their existing database of wood fuel suppliers across England and making this available on line at www.logpile.co.uk to customers. Anyone interested in finding their nearest wood fuel supplier, simply needs to state the county they live in or the first two letters of their postcode.

To date over 400 suppliers in England have registered with the website, with more registering every week. In addition, the database has recently been extended to Scotland thanks to funding from the Scottish Forest Industries Cluster in partnership, with Scottish Enterprise. For those who prefer to telephone, this matching service is also available through **NEF's Freephone number 0800 138 0889.**

NEF are promoting wood pellet heating by:

- producing information sheets and case studies with information made available to the public on request and through logpile website;
- attending public events;
- giving presentations;
- writing publicity material;
- working with British BioGen (trade association of the biomass industry - www.britishbiogen.co.uk) to maintain and expand their database of wood pellet fuel suppliers and pellet fired heating appliances; and
- working with individuals and community groups to bring about the installation of wood pellet heating systems and stoves.

Pelleting machines, three visible, each producing pellets for consumption by wood pellet boilers or stoves (Photo: British Biogen - www.britishbiogen.co.uk)

Costs and grants

In terms of cost, boilers for wood fuel heating do cost more than their fossil fuel burning counterparts. In order to encourage an uptake in the use of this renewable energy source, the Government has recently introduced 'Clear Skies' grants in England and Wales for individual householders and community groups wishing to install automated

wood pellet stoves and wood fuelled boilers.

Under the grant scheme individual householders can get a grant of £600 toward the cost of a pellet stove and £50 per kWth (up to 300 kWth) toward the cost of a wood fuelled boiler.

Community grants are available not only to community groups, but to environmental trusts, housing associations, local authorities and universities, hospitals and other public service organisations. They will be available in four funding rounds each year for up to a maximum of 50% of total capital and installation costs, or £100,000, whichever is smaller. These groups will also be eligible to receive 75% of the cost of feasibility studies or £10,000 whichever is the lower, to help address key issues such as technical viability, legal and planning issues, and access to finance.

In Scotland, community and household grants are available through the Scottish Community & Householder Initiative (SCHRI), a one-stop shop offering grants, advice and project support. It is funded by the Scottish Executive and run by the Energy Savings Trust. Householders can apply for 30% funding of the installation cost up to a maximum grant of £4000. Community groups apply for technical feasibility funding up to £10,000 and capital funding up to £100,000.

In relation to the cost of the fuel itself, wood costs are competitive with electric, oil or liquefied petroleum gas (LPG) heating but not heating fuelled by mains gas.

HEALTH AND SAFETY

More top firms report on safety

Health and Safety Commission (HSC) Chair Bill Callaghan has welcomed the results of two surveys which show a significant increase in the number of companies that report publicly on their health and safety performance and a small increase in the number of companies where health and safety is directed at board level. The HSC is now calling on companies, workers, the public and other stakeholders to give them their views, before deciding on the next steps.

The reports measure the success that HSC has had in promoting corporate responsibility and accountability for the management of health and safety. This goal forms a key part of the Government and HSC Revitalising Health and Safety strategy which challenged the UK's top 350 FTSE companies and public bodies to publicly report their health and safety performance in their annual reports and recommended that every board should appoint one of their number to be a 'health and safety' director and not to delegate the role. The research concludes that the 'Challenge' has already had a positive and encouraging effect.

Bill Callaghan has said, "I am pleased to see the level of reporting of health and safety is going up, but simply mentioning health and safety is not enough, and now we need to encourage improvements in the quality of reporting. There is also a strong case to extend the Challenge to medium sized businesses."

"It's good to see companies responding to our challenge and we will continue pursuing this cause. It's not just about how you, your company and your employees stand to benefit from a reduced likelihood of being injured or killed at work; I believe you also stand to enhance your company's reputation and its value."

"I'm encouraged to see that most FTSE 350 companies and other large firms are taking health and safety seriously enough to allocate responsibility to board level directors. But there is room for significant improvement. I want to see all companies regularly review health and safety issues at board level, and that includes smaller companies as well." "The public sector must also play its part and these reports suggest that many parts of the public sector are lagging behind best practice."

"The HSC will consider these reports and discuss proposals for the way forward in October. We welcome this research going into the public domain now, as it gives HSC the opportunity to consider the views of stakeholders on the way forward. I want everyone involved at work to let us have their views."

"HSC has produced guidance to help directors and their companies understand what we are looking for them to do. I'd also like to invite comments on how useful this guidance is and what more it might say."

"I'd like to congratulate those companies who have shown a commitment to reporting their performance, especially United Utilities, the Boots Company, Carillion, Rio Tinto and Sefton Metropolitan Borough Council and I hope that other companies will now follow their lead. In particular the other companies might well find it helpful to look how the way they report on their performance and targets".

The public reporting survey covered all FTSE 100 companies and approximately 180 large companies mainly drawn from the FTSE 350, and a sample of public bodies including government departments, local authorities and NHS trusts. Among the main findings was a significant increase in the number of FTSE 100 companies publicly reporting – from 47% in 1995, to 56% in 2000, and now 91% in 2002. The overall figure for the companies surveyed in 2002 is 78%. The strongest sectors on reporting include; chemicals, construction and building materials, mining, oil and gas, tobacco and water.

Other bodies, such as the Royal Society for the Prevention of Accidents (RoSPA, have also done much to encourage businesses to report publicly on their performance in managing risks to occupational health and safety. RoSPA's report Going Public on Performance (www.gopop.org.uk) endorses the Government and HSC's strategy and supports the case for public web-based reporting.

The survey of Company directors' and boards' involvement covered a sample of 400 organisations drawn from top 350 FTSE companies, other large companies, the public sector and voluntary sector. The results showed companies where health and safety is directed at board level has risen from 58% to 66%. The main reasons cited for board level direction are best practice and that power and control is at board level. The main benefits given for appointing board level health and safety directors were that it shows strong leadership, demonstrates commitment and helps improve health and safety performance.

Microturbine cogeneration systems at the end of the production line prior to despatch

MICROTURBINE COGENERATION

Mike Langan

Introduction

The microturbine is a recently commercialised technology that generally utilises a small gas turbine directly linked to a high speed generator. One application of the microturbine is the integration into a cogeneration package to provide electricity and heat.

In the horticultural application, the carbon dioxide in the exhaust can also be used. This has been proven in a wide range of cogeneration applications over the last few years. The microturbine has a number of features and benefits, which include low exhaust emissions, simple design with a low maintenance requirement and high system efficiency.

Microturbine technology

Microturbines are small, high speed, gas turbine engines of a simple radial design, closer in concept to low cost turbochargers than the more complex axial designs of large industrial gas turbines, often derived from aero engines. Conservative operating temperatures reduce nitrogen oxide (NO_X) emissions and eliminate the need to use high cost sophisticated materials. This, together with their simplicity, facilitates low cost volume production.

Microturbines offer lower maintenance costs, produce less vibration and noise, lower emissions and are more compact, making them the ideal engine choice for cogeneration systems.

The microturbine is linked directly to a turbo alternator. This direct linkage allows the alternator to operate at turbine speed, which allows it to be

BIO NOTE

This paper was presented at the IAgrE Annual Conference entitled 'Energy and the Land-based Industries' and held at Silsoe Research Institute on 13 May 2003. Mike Langan is a chartered engineer. The area of his career relevant to this article involved developing new markets and applications for the commercially available microturbine based range of products. Mike is a member of both the Institution of Agricultural Engineers and the Institute of Energy. E-mail: mikey.l@bun.com

We gratefully acknowledge receipt of photographs from Bowman Power Systems, manufacturers of microturbine based cogeneration systems. Bowman Power Systems, Ocean Quay, Belvidere Road, Southampton, SO14 5QY. Tel: +44 (0)23 8035 2941 Fax: +44 (0)23 8022 1128 Mobile: +44 (0)77 8068 5920 Website: www.bowmanpower.com

A trigeneration system, where the heat is used to drive an absorption chiller to provide cooling

compact. The alternator also acts as the starter motor further reducing the size and cost of the package.

The high frequency output from the turbo alternator is converted to 50 Hz or 60 Hz by the microprocessor controlled power conditioner. Small simple cycle gas turbines generally have low electrical efficiency at small scale. In order to overcome this and increase efficiency, a recuperator is used to recover heat from the exhaust to preheat combustion air. Utilisation of high efficiency recuperators with microturbines, will increase the electrical efficiency by around 14% to 30%.

Cogeneration in horticulture

The piston engine is widely used in horticulture for the provision of heat and carbon dioxide. In general, the power generated by these systems is significantly greater than the electrical load and it is exported off site. The exhaust emissions are higher than acceptable for use in the greenhouse and a downstream catalyst is used to remove harmful pollutants. This adds a significant cost, reduces efficiency and limits the technology to large cogeneration installations.

The ultra low emissions of the microturbine are a key feature, with significant benefit to the horticultural application.

Emissions of nitrogen oxides, carbon monoxide and sulphur dioxide are sufficiently low to allow direct use of the flue gas for carbon dioxide enrichment in the greenhouse, without the requirement for downstream exhaust clean up. This avoids the capital and maintenance costs of the clean up equipment and improves the heat utilisation, increasing system efficiency to around 90%.

The reduced installation and operation costs allow the concept to be applied to smaller glasshouses where it had previously been uneconomic. The ultra high efficient use of energy and the use of the carbon dioxide combined give strong economic performance in this application; the strength of which is dependent on how the carbon dioxide is valued. The true value is the increase in financial performance per unit of glasshouse area. If this is used, the installation will cover its costs in a very short period and provide significant long-term rewards.

On sites where pure carbon dioxide is already used, savings are achieved through reduced operating costs and payback is generally short. Where the products of combustion from a gas boiler provide the carbon dioxide, the microturbine options can offer operational benefits as the carbon dioxide to heat ratio is higher and can still provide an attractive payback.

The heat recovery from the exhaust occurs at two stages. In the first stage, the heat is recovered in a hot water heat exchanger. This provides heat that can be used elsewhere on the site or stored for use when carbon dioxide is not required. As the exhaust is used directly in the glasshouse, much of the heat remaining in the flue gas is also recovered. This increases the total system efficiency to around 90%.

The concept is particularly attractive on sites that have or are installing supplementary lighting, especially where the installation of lighting will require an upgrade of the site's electrical supply. The cost of the capacity upgrade can be offset against the cost of the cogeneration installation.

As with many cogeneration installations, optimum financial performance is achieved when all the outputs from the cogeneration system are fully utilised on the host site. In the case of horticulture, a lighting load provides an ideal electrical load. Should the environmental benefits of carbon sequestration be fully recognised, the value of the power will increase to a level where export becomes attractive and the electrical load is not a requirement.

The turbine can offer further benefits, especially in areas in which the utility supply is unreliable. The Bowman turbine can protect against grid failures and offer an increase in power quality and reliability to the end user. An option is available which enables the cogeneration system to rapidly switch between grid parallel and island operation. This ensures that power is available even when utility supply is unreliable and improves site operability.

Economic performance evaluation

The financial performance of any installation will depend on the local site conditions and should be calculated after an individual site assessment.

On-site generation can be used to offset the upgrade costs on sites where the electrical infrastructure requires upgrading to increase capacity. Total upgrade costs for 100 kVA could be as much as £5000.

If neither cogenerated

Table 1 Operational cost value for each type of fuel [excluding climate change levy (CCL)]

Output	Quantity	Value	Cost	Total cost
Electricity	80 kW	4.0p/kWh	£3.20/h	
Hot water	133 kW	1.3p/kWh	£1.73/h	
Hot air	66 kW	1.3p/kWh	£0.86/h	
CO_2	53 kg	2p/kg or 10p/kg or 25p/kg	£1.06/h or £5.30/h or £13.25/h	£6.85/h or £11.09/h or £19.04/h

power nor renewable energy are used, the fuel and electricity are both subject to the climate change levy (CCL). The fuel that is used for cogeneration is exempt from this tax. Boiler efficiencies are generally between 70% and 80%. The gas cost (including CCL) for small growers is assumed to be around is 0.9 p/kWh. For the purposes of this evaluation an average boiler efficiency has been assumed which gives a value for the heat of 1.3 p/kWh. In the following calculations, it is assumed that the existing fuel and electricity are subject to the full CCL but the outputs from the cogeneration system are exempt.

Optimum financial performance is achieved when the electricity is utilised on site. Where supplementary lighting is used, there are sufficient electrical loads to utilise all the power. If there is insufficient load, the power can be sold with the CCL exemption although the value is lower. An electricity price of 4p/kWh has been assumed for the purposes of this evaluation.

The value of the carbon dioxide has a significant impact on the project economics. For the purposes of this calculation, three values for the carbon dioxide are given, namely:

- carbon dioxide is generated by combustion of gas in a boiler taking into account the cost of fuel and the operating costs for the boiler;
- carbon dioxide is used in a pure form, accounting for the cost of carbon dioxide only and not additional costs such as storage; and
- the predicted value of carbon dioxide enrichment to the grower, assuming an increase turnover of 15% from an initial £40/m^2.

The operational cost is based on the cost of the fuel (excluding the CCL) and the cost of maintenance. This equates to £1.28 per hour giving a net value per hour to the end user of £5.57, £9.81 or £17.76 respectively. Assuming an installed cost of £1000/kWe and annual operation of 4000 hours this can give a payback period of 3.6 years, 2 years or 1.1 years respectively.

Summary

The microturbine is now a commercially proven concept, which can offer a number of benefits to horticulture. The product will provide heat and carbon dioxide to the site as well as power that can be used for lighting or exported. The low levels of nitrogen oxides, carbon monoxide and sulphur dioxide allow the flue gas to be used directly for carbon dioxide enrichment. The optimum performance is achieved on sites where all outputs are fully utilised.

This technology opens up cogeneration to smaller growers and is particularly attractive on sites with electrical loads between 75 kW and 1000 kW. The high value of the power and carbon dioxide can give short payback and long term rewards. The high efficiency application is exempt from the climate change levy giving further financial benefit.

ENVIRONMENTAL FORESTRY

Carbon, climate change and UK forests – the facts

Britain's woods and forests have a role to play in reducing the impact of greenhouse gases and slowing global warming, according to a new report which gauges the impact of forestry on climate change.

The Forestry Commission Information Note *'Forests, Carbon and Climate Change: the UK Contribution'* explains the part played by forests and carbon in global warming and presents some of the facts and figures behind the many complex issues surrounding the subject. The paper was written by Mark Broadmeadow and Robert Matthews of Forest Research, the Commission's scientific agency.

Dr Broadmeadow said woodlands had an important role to play in the global carbon budget. "The forest estate of the UK covers an area of 2.8 million hectares, or 11.6% of the land surface, an area about the size of Wales," he explained. "Growing trees absorb carbon dioxide and retain carbon as biomass. The wood, branches and leaves making up these forests contain a quantity of carbon roughly equal to offsetting one year of carbon dioxide emissions from burning fossil fuels and certain industrial processes in this country."

He added: "We could increase the quantity of carbon in forests but for the UK to become carbon neutral through afforestation alone it would be necessary to create 50 million hectares of forest, approximately double the area of the country. Clearly forest carbon sequestration alone cannot be used to offset greenhouse gas emissions associated with contemporary ways of living and working.

"However the carbon sink associated with UK forests could make a useful contribution. Any measures taken now to protect and expand forest areas can increase the biomass resource potentially available to future generations and support any efforts to move towards a 'low carbon' economy. Wood has the potential to do this when used as an energy efficient material or as renewable wood fuel."

In the free information note the roles played by growing trees and mature woodlands, forest soils, harvested wood and wood products in use are discussed and compared. Statistics and supporting interpretation identify the current and potential contribution of UK woodland in mitigating global warming. The information provided on carbon management in forests is relevant to woodland managers and forestry practitioners as well as those considering involvement in carbon trading and carbon neutrality schemes.

CONTACT

'Forests, Carbon and Climate Change: the UK Contribution' is available from Forestry Commission Publications, PO Box 25, Wetherby, LS23 7EW. Tel: 0870 121 4180. Fax: 0870 121 4181. E-mail: forestry@twoten.press.net Web: www.forestry.gov.uk/publications

GREEN FARMING

Green survey highlights more action by small farms needed

The most comprehensive research yet into the environmental behaviour of the UK's small farms, reveals that many are still failing to take action to protect the environment – but agriculture is doing more than most other sectors. The SME-nvironment 2003 survey of small and medium-sized enterprises (SMEs) was commissioned for the NetRegs website which launched environmental guidelines aimed at the agriculture industry late last year.

The site – www.netregs.gov.uk – was developed by the UK's environmental regulators to help SMEs comply with the green legislation governing their activities. The guidelines cover everything from agricultural waste and emissions to water, to disposal of animal carcasses and fuel storage.

The survey found that 31% of farming SMEs questioned had taken practical measures to limit their environmental impact compared to just 23% of businesses across all 28 sectors surveyed. Such measures include appointing a member of staff with responsibility for environmental matters or carrying out an environmental assessment. Of those agriculture SMEs surveyed, 30% had an environmental policy in place compared to only 24% of businesses generally.

The research also demonstrated that few farming SMEs are aware of the business benefits of going green. When asked what had motivated them to take measures to prevent environmental damage, 51% of respondents referred to a general concern for the environment and a further 38% said they were motivated by legislative pressure. However, only 12% cited potential business benefits as the reason for going green.

Despite listing legislative pressure as a key motivating factor, only 23% of businesses asked could name any environmental regulations affecting their activities unprompted, compared to just 18% of businesses across all sectors. Only 19% had heard of the Duty of Care Regulations, which apply to all firms.

The SME-nvironment 2003 survey also found that 44% of farming SMEs asked would like more information and advice in dealing with environmental matters.

The farming sector is estimated to produce 0.5 million tonnes of waste a year and was responsible for 7% of all pollution incidents in England and Wales in 2001. The Environment Agency estimates that that adopting simple techniques to reduce environmental damage could save the nation £331 million per year in the short term.

Environment Agency Chairman Sir John Harman said: "Every farm, no matter how small, has an environmental impact. But what this research shows is that many are still failing to take steps to limit the effects of their activities. NetRegs is designed to help farming SMEs navigate the environmental legislation affecting their particular activities. But compliance is not just good for the environment, there are also real commercial benefits for smaller businesses – a greener farm is often more competitive."

NetRegs contains environmental legislation broken down by country while clicking on the 'More Resources' button provides links to business support and other helpful organisations. The site is free to use and anonymous – there's no need to register.

The agriculture industry was chosen as one of the first of about 100 business sectors to be included on the NetRegs website. The agriculture guidelines have attracted a daily average of 1,243 page impressions since they were launched in November.

CONTACT

'The Duty of Care Regulations, 1991' control the storage, handling and disposal of waste and apply to all businesses which produce or dispose of waste.
'The SME-nvironment 2003 survey' comprised a telephone survey of 343 farming SMEs. To view a summary of the full results visit www.netregs.gov.uk or call Melissa Cullum. Tel: 0117 983 6400.

WILDLIFE CONSERVATION

Foresters batty about bats

Foresters in Dumfries have given hundreds of bats a home and are hoping to tempt many more into a new 70 metre long des res.

Over 700 bats are currently sharing the workplace with Forestry Commission Scotland staff in Dumfries by using the office roof space as a hot roosting spot. At the same time, foresters in Mabie forest, just outside Dumfries, have unblocked a 70 metre long underground tunnel and fixed a special bat grill to turn it into a des res for bats. The tunnel was an ex-industrial shoot thought to have powered a sawmill in the forest.

Conservation ranger at Mabie is Stuart Spray: "Everyone in the Dumfries office was fascinated to find out that 700 bats were living right above them. We were keen to let staff see all the strange antics going on in the roost so installed a camera in the roof to beam pictures back into the office.

"Visitors and staff can now see all the action and observe the bats walking around on all fours, stretching their wings and scratching away."

There are plans to organise a public event to watch and learn more about the bats in the Dumfries office, including a slide show and counting session at dusk.

The bats – Soprano Pipistrelle – were first found in the roof space last year but the colony was quite small. It is unclear why the numbers have drastically increased over the past year but one theory is that another nearby roost may have become unsuitable, forcing the bats to find a new location.

At Mabie, Stuart is hoping he can attract a colony of bats to the tunnel in winter. A constant temperature of about 0 to 5 degrees is needed so foresters will continue to monitor airflow so that conditions are just right for the bats. There are now 16 species of bat found in Britain, eight of which can be found in Dumfries and Galloway. It is hoped that the tunnel will attract a range of species including brown long eared, natterers, Daubenton's and whiskered bats

HYDROGEN
FUEL FOR THOUGHT

Richard L Witney

Introduction

Fossil fuels provide the majority of the world's energy and have been the catalyst for the industrial revolution. However, the increasing demand for energy has not been without its problems. Scientists and energy companies are in agreement that carbon dioxide (CO_2) emissions are exacerbating the problem of climate change. In the UK, we are already experiencing warmer and drier summers as well as milder, wetter and stormy winters. Recent scientific studies have highlighted that greenhouse gases will contribute to a 0.3^{o}C temperature increase per decade and the long term research indicates a temperature increase by 2100 of between 1.4^{o}C and 5.8^{o}C. Energy has to be used more efficiently and emphasis placed on cleaner methods of energy generation. The future for energy is looking to hydrogen as the fuel for the 21st century and beyond.

BIO NOTE

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Hydrogen as a fuel

The use of hydrogen as a fuel is not new. In towns across the UK at the turn of the 19th century, gas lights lit the street at night and provided heat and light to middle class homes. This gas was a hydrogen rich mixture called 'town gas' produced from steam and coal and consisted of mainly raw hydrogen, some methane and small amounts of carbon monoxide (CO) and CO_2. Town gas is still used today in some areas of the world, including China and other Asian countries.

Today, hydrogen is mainly used as a chemical and is produced in large volumes. Current worldwide production is approximately 500 billion [N] m^3 per year (normal cubic metres). Most of this hydrogen is produced and consumed on site at oil refineries. Other long running uses of hydrogen include fuelling both the main engine of the Space Shuttle and the fuel cells that provide the Shuttle's electric power.

From large scale production, hydrogen costs around £0.50/kg if it is consumed on site. When hydrogen is sold as a product, the costs of liquifying the hydrogen and transporting it to the user adds considerably to production cost.

Hydrogen has the advantage that when burned in air it does not produce CO_2, CO, sulphur dioxide (SO_2) or volatile organic compounds (VOCs). The only by-products of hydrogen combustion are water, and a very small amount of nitrogen oxides (NO_X) and emissions can be zero if fuel cells are used instead of combustion

The future of hydrogen production has to be independent of fossil fuels to support our goals of sustainable energy. Last year Romano Prodi, European Commission President, announced the European Union's long term plan to transition from fossil fuels to renewable energy and hydrogen future. Philippe Busquin, European Commissioner in charge of research, added, "Fuel cell technologies are expected to play a key role in a future economy in which electricity and hydrogen become principal and interchangeable energy carriers. Europe's society deserves the best. Therefore, we seek to develop and deliver world class technology meeting ambitious objectives for sustainability" (Smith, 2003)

Storage of hydrogen

Hydrogen is one of the lightest elements and has very small molecules so it can escape from tanks and pipes more easily than conventional fuels. However, if it is to be used as a

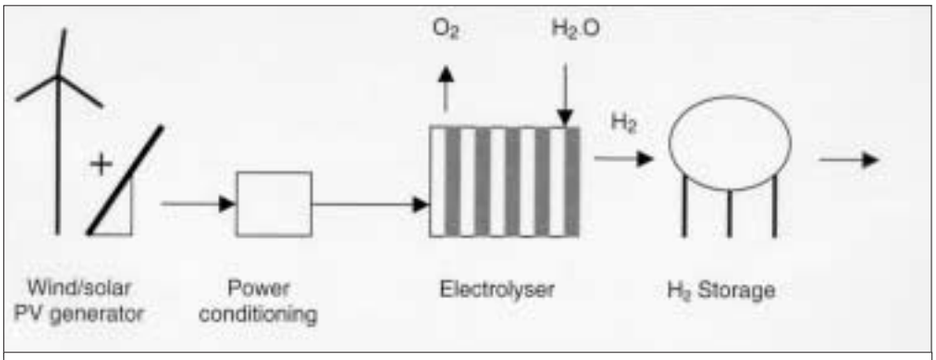

Fig. 1. The main elements of system to produce hydrogen using wind/solar photovoltaic electricity for the electrolysis of water (Boyle, 1996)

fuel for transport or power generation then there must be ways of storing it cost-effectively. There is also a need to get it from the production site to the end user. Storing hydrogen can be done in three main ways, in compressed form, liquid form and by chemical bonding.

• *Compressed hydrogen*
Compressing hydrogen is similar to compressing natural gas but, as hydrogen is less dense, the compressors need better seals. Hydrogen is normally compressed to between 200 and 250 bar for storage in cylindrical tanks of up to 50 litres.

• *Liquid hydrogen*
In order to reduce the volume required to store a useful amount of hydrogen, particularly for vehicles, liquefaction may be employed. Since hydrogen does not liquefy until it reaches -253°C (20 degrees above absolute zero), the process is both long and energy intensive.

• *Bonded hydrogen*
Metal and liquid hydrides and adsorbed carbon compounds are the principal methods of bonding hydrogen chemically. They are the safest methods as no hydrogen will be released in the event of an accident, but they are also bulky and heavy.

The role of renewables

Using renewable energy technology such as wind and solar photovoltaic (PV) is one sustainable solution to the issue of how to produce hydrogen. Electrolysis of water using electricity generated from renewables is the future for hydrogen production. It is both potentially more cost effective and environmentally beneficial than any other method. Indeed, the hydrogen production could be produced locally to the point of use (Fig. 1).

Hydrogen from the electrolysis of water

Electrolysers work by splitting water molecules into its constituents parts, hydrogen and oxygen. These are collected as gases, hydrogen at the cathode and oxygen at the anode. The process is quite simple. Direct current is applied to the electrodes to initiate the electrolysis process. The reaction that occurs at the anode is:

$4OH^- \geq 0_2 + 2H_20 + 4e^-$

At the cathode:

$4H_20 + 4e^- \geq 2H_2 + 4OH^-$

The overall reaction is:

$2H_20 \geq 2H_2 + 0_2$

where e denotes an electron.

The energy required to produce hydrogen via electrolysis (assuming 1.23 V) is about 33 kWh/kg. For 1 mole (2 g) of hydrogen, the energy is about 66 Wh/mole. Practical electrolysers today achieve efficiencies of over 80% and, on this basis, electrolytic hydrogen can be regarded as a storable form of electricity. Typically it will take 3.9 to 4.5 kWh to produce 1 [N] m^3 of hydrogen by electrolysis (McGrath, 2002).

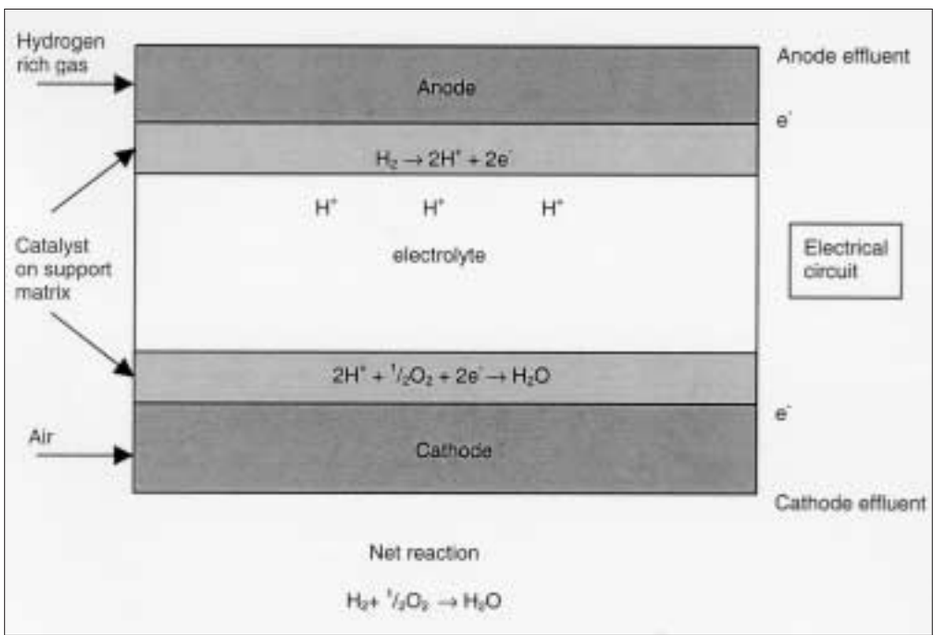

Fig. 2. The principle operation of the phosphoric acid fuel cell (PAFC)

How fuel cells work

The fuel cell was invented by Sir William Grove in the middle of the nineteenth century, but development work did not really start until the 1950s.

A fuel cell is a device that produces electricity silently via an electrochemical reaction without combustion (USEPA, 2003). The principle of the fuel cell is electrolysis in reverse: gases such as hydrogen and oxygen (or air) are pumped in and DC electricity is the output. The only by-products are water and there are virtually no pollutants.

A fuel cell consists of two electrodes, a negative electrode (or anode) and a positive electrode (or cathode), sandwiched around an electrolyte. Hydrogen is fed to the anode and oxygen is fed to the cathode. Activated by a catalyst, hydrogen atoms separate into protons and electrons which take different paths to the cathode. The electrons go through

an external circuit, creating a flow of electricity. The protons migrate through the electrolyte to the cathode where they reunite with oxygen and the electrons to produce water and heat (Fig. 2).

Types of fuel cell

There are several different fuel cell technologies in use and under development. Fuel cell efficiency is about 30-40%, double that of an internal combustion engine, and 7-10% more efficient than grid electricity.

Proton exchange membrane

The proton exchange membrane (PEM) uses fluorocarbon ion exchange with a polymetric membrane as the electrolyte. They operate at low temperatures with efficiencies of 50-60% and are best for buildings or light vehicles.

• *Phosphoric acid fuel cell*

The phosphoric acid fuel cell (PAFC) consists of an anode and cathode made of finely dispersed platinum catalyst on carbon paper, and a silicon carbide matrix that holds the phosphoric and electrolyte. They operate at 55% efficiency and at temperatures of 160-220^{o}C. This is the most commercially developed type of fuel cell and is being used in hotels, hospitals and office buildings

• *Solid oxide fuel cell*

The solid oxide fuel cell (SOFC) uses a thin layer of zirconium oxide as a solid ceramic electrolyte, and includes a lanthanum manganate cathode and a nickel-zirconia anode. They are used for high powered applications such as industrial uses or central electricity stations. They currently operate at very high temperature of 800-1000^{o}C, and at efficiencies of 55-65%.

• *Alkaline fuel cell*

The alkaline fuel cell (AFC) uses an alkaline electrolyte such as potassium hydroxide. Originally used by NASA on space missions, it is now used for applications in hydrogen powered cars. They operate with efficiencies of 50-60% in converting chemical fuel to electricity. They operate at 620-660^{o}C

Fuel cell applications

Vehicles

Fuel cell technology is developing fast and is already being tested in commercial vehicles, including farm equipment. In 1959, Allis Chalmers developed and demonstrated the first fuel cell powered vehicle in the world (Fig. 3). Powered by an alkaline fuel cell system (at the time the largest fuel cell system in the world), in October 1959 it successfully ploughed a field in West Allis, Wisconsin, USA.

Fig. 3 Allis Chalmers fuel cell powered tractor, 1959 (Courtesy: Smithsonian Institute)

After the demonstration, the Allis-Chalmers Manufacturing Company donated the tractor to the Smithsonian Institute. Since this development, fuel cells have not progressed much further in farm equipment but companies, such as John Deere, are beginning to consider the electrification of their products using fuel cells.

Research into the modern use of vehicle fuel cells stepped up a gear after a revolutionary car travelled the equivalent of 420 kilometres on just one litre of liquid hydrogen. The car designed by SiGen, an Aberdeenshire based company, made its debut in the Shell Eco Marathon in Alford.

Domestic

The fuel cell has the potential of producing the heat and electricity requirements for the household. Berwickshire Housing Association, in the Scottish Borders, proposes to install an early demonstration of renewable hydrogen technologies to provide a solution to the provision of electricity and heat to remote communities. If the research study proves the system feasibility, a PV and wind system will be connected to an electrolyser to generate hydrogen. The hydrogen will be stored and used on demand to provide fuel for a stationary fuel cell. The Berwickshire Housing Association has made one of the first grant applications to the Scottish Community & Householder Renewables Initiative (SCHRI) and will be undertaking this feasibility study with engineering consultants Whitbybird to evaluate the feasibility of solar PV/wind production of hydrogen for use in 1-2 kW PEM fuel cells.

In the future, the household's total energy requirements may be met from fuel cell technology. The household will run on one fuel cell and augmented by connecting the car's fuel cell into the house's system.

Agribusiness

Looking beyond the current grant-aided initiative, a car could be replaced by a wide range of other seasonal self propelled machines. The modular designs of agricultural machines projected as the future concept in the 1960s never reached the market place. Farmers did not have any enthusiasm for manoeuvring a driver capsule and an engine module from one specialist machine to another.

Indeed, some highly mechanised enterprises, went to the opposite extreme and were even prepared to dedicate an individual tractor to each separate mounted machine rather than spend time connecting different machines to the power take-off shaft and three point linkage. The new fuel cell concept, however, accepts the multiplicity of self-propelled machines for different operations, each with their individual fuel cells. When not in seasonal use, each could be connected to the local 'grid' to boost the electricity available for domestic use. There is endless scope for further development of the Hydrogen Economy as one facet of the importance now being allocated to realising the potential of renewable energy sources!

Scottish Community & Householder Renewables Initiative

The Scottish Community & Householder Renewables Initiative (SCHRI) is an exciting new project funded by the Scottish Executive to bring renewable energy to households and communities across Scotland. It has two funding streams that provide grants to assist with the installation of a range of renewable technologies.

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... Profesor John Alliston
Dean of Agriculture, Royal Agricultural College

THE WORLD OF PEOPLE

People make life interesting and a considerable amount of my time has been spent with groups or individuals.

Mentoring

It is with enthusiasm that I refer to President, Dr Dan Mitchell's drive to involve the Institution in mentoring young members and students. Throughout my life I have had a great deal of help from many people. All these individuals have one thing in common: they are genuinely interested in people. In education, it is possible to watch the careers of students and colleagues develop. Those with a clear cut vision of what they want to achieve usually reach or exceed their own goals.

The ability to relate to people of all ages

My father recently died at the age of 93. Reflecting on his life we realized that he had the great gift of relating to people of all ages. He looked back on his life with pleasure but he also continued to plan for the future right up to the end. In education, it is essential to relate to people of all ages. Usually this is done on a daily basis because colleagues' ages now range from mid-sixties down to mid twenties and students including postgraduates, who range from 18 to sixty. This can sometimes be frightening but is always stimulating. The young do not take things for granted. Rightly, they challenge established ideas and principles. At the present time it is encouraging to know that young people are prepared to join the agricultural industry because it is fast moving, important, diverse, and rewarding but it is also risky and challenging. This is why the young people are so important for the future of the agricultural industry in the UK.

The Royal Agricultural College

So what is the Royal Agricultural College doing to ensure that future generations are stimulated to succeed? Firstly, we are modifying our syllabi to reflect the widespread responsibilities that agriculture now embraces. To the production of food is now added woodland management, agritourism, environmental management, leisure activities, as well as bed and breakfast, building development and a concern for biodiversity.

The ability to understand and be able to run a business is essential. Graduates are articulate and must have the self-confidence to command respect in the workplace. Students also need to be aware that a good philosophy is to treat other people as you would wish to be treated.

Leadership

In 1998, I travelled to India, Kenya, America and Mexico studying Leadership in agriculture. This was sponsored by the Nuffield Farming Scholarship Trust and from it was spawned the Institute of Agricultural Management Leadership programme. The objective of this three week series of meetings and discussion sessions is firstly to develop the personal attributes of twelve people who have already demonstrated leadership qualities and secondly to allow them to think about the rural issues whilst exchanging opinions with the present agricultural policy makers.

Additionally, we run a number of other courses including a business course for agricultural managers under the umbrella of the John Edgar Memorial Trust.

It is essential in the fast changing world that the agricultural workforce keep up to date by undertaking continuous professional development. This can take many forms but is essential if people are to develop.

As I reflect on my past jobs, I feel privileged and proud that I have interacted with so many talented people.

BOOK REVIEW

Don't Worry (It's Safe to Eat)

Andrew Rowell

Price: £16.99
Publisher: Earthscan Publications Ltd
ISBN: 1-85383-932-9

Investigative journalist Andrew Rowell's new book, *Don't Worry [It's Safe to Eat]* is a compelling read, providing an insight into how agricultural decision-making is affected by the food industry. The sometimes controversial links between scientists, corporations and the government are examined, using the three significant issues of genetic engineering, bovine spongiform encephalopathy (BSE), and Foot and Mouth disease.

With the recent release of results from genetically modified (GM) crop field trials in the UK, there is continued debate about whether the UK should or should not 'choose' to remain a GM crop-free nation. Meanwhile, GM crops are expanding. In 1996, it is noted there were already 1.7 million hectares; by 2002 the global estimate was 58.7 million hectares, grown by 6 million farmers in 16 countries. Four countries continue to produce 99% of the worlds GM crops: USA, Argentina, Canada and China.

The phenomenon of relying increasingly on the absence of evidence as the evidence of absence is discussed. The similarities between the management of GM technology and the handling of the BSE and Foot & Mouth incidents are debated in detail, with a reminder that whilst BSE may be in decline and out of the media spotlight, there were still 243 new cases in the first half of 2002.

A detailed account is given of key scientists who are considered to be criticised for being alarmist during the BSE crisis, but who have since appeared to have been found to be 'chillingly correct'. The compounding effects of decisions by regulatory bodies and arbiters are exposed, relating to the review of scientific findings following GM research.

The impact of industry involvement in science is questioned. Among the effects examined are the use of industry based 'ghost-writers' for publications in scientific journals; and the tendency for Research Councils to be increasingly motivated away from 'out of the blue' ideas or lengthy non-profitable works, and towards ideas consistent with broad research priorities.

There is a concluding focus which covers: the potential benefits of promoting public interest science; the need for providing a food supply which the consumer can be confident is safe; the requirement for incorporating farming practices that sustain environmental improvement; the role of supermarkets; and the outlining of recommendations for facilitating change.

Consumers and farmers are seeking to achieve 'safe, local, organic fresh food, they want the environment and wildlife to be protected; and farm animals to be treated humanely. They also want to know how their food was produced and whether producers were given a fair price for their products.'

For those with an interest in the complexities and barriers which may impede such aims, parts of *Don't Worry [It's Safe To Eat]* engages with the intrigue of an espionage thriller. This is a knowledgeable text which is supported by extensive interviews from scientists – not all of whom are in agreement. All involved in the industry would benefit from at least perusing the challenges for change, outlined in the concluding chapter. And, as a book intended to spark an honest debate about food safety and the future of science, it certainly deserves consideration.

SMWS

GREEN ENERGY

Web boost for bio energy

A new website, which puts new research information about short rotation coppice at the fingertips of all those interested in green energy crops, has been launched.

The site brings together up to the minute information on techniques and conditions for growing energy crops. High yielding willow and poplar can be used as alternatives to fossil fuels in power stations and heating systems, with potential to reduce emissions of greenhouse gases and contribute to the Government's targets for renewable energy.

Scientists at Forest Research have been examining how the yield from over thirty varieties of these energy crops varies in different climates and sites. This national research programme has been jointly funded by Defra, DTI, the Forestry Commission and DARD-Northern Ireland, as part of a programme to help develop the UK biomass industry.

"Fast growing willow and poplar are amongst the most promising tree species for short rotation coppice," explained Paul Henshall, project leader at Forest Research. "The website shares the results of our research trials, but it has also enabled us to pull together a lot of practical information on cultivation and on grant support, which we hope will help existing and potential growers as well as the policy makers."

Helen McKay, the Forestry Commission's principal advisor for forest operations and the environment said interest in biomass crops such as willow and poplar was growing, especially since the Government's recent announcement of funding to help build new biomass fuelled power plants in the UK.

"It's exciting that woody crops as renewable sources of electricity, heat and transportation fuels finally seem to be taking off in the UK. Energy crops like short rotation coppice really do offer a lot of environmental benefits when grown on suitable sites – as you can find out on the website."

CONTACT

Web:
www.forestry.gov.uk/src

Bimonthly WINTER 2003

MEMBERSHIP MATTERS

THE NEWSLETTER OF THE INSTITUTION OF AGRICULTURAL ENGINEERS

SocEnv PROGRESS AT IAgrE

The last issue of Landwards contained a fairly detailed background to the formation and progress of the new Society for the Environment (SocEnv).

There has also substantial activity at the IAgrE Secretariat in preparing for the Royal Charter which we hope will be granted in the first quarter of 2004.

To oversee IAgrE activities and its linkage with SocEnv, three groups have been formed.

- The ***Action Group*** will ensure that the appropriate actions required of IAgrE are indeed under way and on target. The Action Group comprises:
  - Peter Redman (President Elect) - Chair
  - Professor Paul Miller (SRI)
  - Professor Mark Kibblewhite (CU-S)
  - Professor William Stephens (CU-S)
  - David Killer (Forestry Commission)
  - Vaughan Redfern (Rural Development Consultant)
- The ***GrandParenting Group*** will be responsible for overseeing the application procedure for those IAgrE Corporate Members (as at Charter vesting day) who wish to become Chartered Environmentalists. The GrandParenting Group comprises:
  - Dr Steve Parkin (Chair of the current IAgrE Membership Committee)
  - Professor Jim Harris (CU-S)
  - Professor Mark Kibblewhite (CU-S)
  - Professor William Stephens (CU-S)
- The ***SocEnv Sub-group of the IAgrE Membership Committee (MC)*** will ensure that the interests of those seeking IAgrE membership who have an environmental 'bent' are well served. This Sub-group includes members of the MC who are sympathetic to, and have an understanding of what is required of those with a background in, the environment; and currently comprises:
  - Dr Steve Parkin (Chair of MC)
  - Professor Jim Harris (CU-S)

  More members of this group will be recruited as and when the initial batch of IAgrE members are awarded CEnv.

Other activities currently underway at the Secretariat include:

- the nomination of IAgrE internal auditors to serve on the SocEnv Internal Audit panel (Dr Mark Cooper (Aston University) and Paul Martin (IAgrE lead internal auditor) have both agreed to undertake this task)
- a redrafting of the Membership Procedures Manual and IAgrE publicity material to incorporate the workings of SocEnv including the writing of:
  - a GrandParent CEnv application procedure
  - a full CEnv application procedure
  - SocEnv/CEnv guidelines for IAgrE members
  - the drafting of a formal application to SocEnv for the provision of a licence to award CEnv
  - updating of IAgrE approved courses list to better identify and incorporate those leading to the award of CEnv.

So far, progress has been good and we are confident that Secretariat Procedures will be finalised in good time and will be ready for the various Membership related activities once the Royal Charter has been awarded.

Once arrangements have been finalised, we will contact those current members who have expressed interest in becoming Chartered Environmentalists with further information on how to apply via the GrandParent procedure. If you have not yet registered interest please do so.

Chris Whetnall

RedR RECRUITING

RedR - Engineers for Disaster Relief is stepping up its *recruitment drive* and has also just announced its new *Internship Scheme*.

Many aid agencies don't offer training to new staff yet expect them to come with field experience under their belt. This has resulted in the paradox where thousands of people apply to become aid workers yet field managers are desperate for more staff.

RedR has recognised this Catch 22 situation for those wishing to start out as aid workers and has *introduced RedR's Internship Scheme***.** The aim is to find suitable entry points into humanitarian work for those who have the professional skills but lack the field experience.

Candidates for the scheme must have relevant professional experience and be available to take positions of 6 - 12 months for very modest pay. Candidates will be carefully selected by RedR and will be required to undergo training.

If you are interested, please contact Julie Kingsland at **julie@redr.org**

For those of you who already have a strong profile in humanitarian relief, RedR is also interested in hearing from you.

More information is available on the RedR website **www.redr.org/getinvolved/applying/app_London/index.htm**

MEMBERSHIP CHANGES

Admissions

– a warm welcome to the following new members

Fellow
C J Rook (Bedfordshire)

Member
T Myatt (West Midlands)

Associate Member
A J Bushell (Wiltshire)
T J Cooper (Suffolk)
A Curnock (Worcestershire)
J Dring (Lincolnshire)
M A J Howell (Essex)
R W Hudson (Suffolk)
D J Massey (Hertfordshire)
R E Mosley (Berkshire)
R J Pengelly (Cornwall)
N J Wilby (Norfolk)

Associate
B Hamilton (Peebles)
S M M Nijam (Saudi Arabia)

Student
Cranfield University:
L J G Bonneau
J D Owusu-Sekyere

Greenmount College:
W C Armstrong
M T J Baxter
M Blair
L W Boyd
L Campbell
S W R Cochrane
G Davison
J H Dunlop
A S J Farquhar
S Friel
J M E Gilpin
S Graham
K T Gribben
R Hunniford
B Hunter
W R Jamison
D P Kelly
D T Kerr
P Lagan
R W Martin
G McBurney
K D McCaughern
S McClements
P McCue
A S Meehan
J K Mullan
P Niven
J Reid
D Scott
P Whyte
S M Woods
A Wylie

Reinstatement

A Paul (Canada)

Transfers

– congratulations to members achieving a further phase of their professional development

Fellow
C F H Bishop (Cambridge)
W S Cragg (Lincolnshire)
C R Whetnall (Hertfordshire)

Member
D Price (Staffordshire)
J M Sparrey (Bedfordshire)

Associate Member
A Brown (Shropshire)
R S Carter (Essex)
M H A Ingram (North Somerset)
R J Sharpe (Cheshire)

Engineering Council Registrations

– congratulations to the following members who have qualified as Chartered Engineers or as Incorporated Engineers, entitling them to use the designatory letters CEng and IEng, respectively, after their names

CEng
W J Copeland (Co Armagh)
R E Hughes (Essex)
M E Worth (Cardiff)

IEng
R Cole (Norfolk)

DOES ANYONE KNOW THE WHEREABOUTS?

Name	Last known address
Christopher Gower Brown	c/o Management Division, Mott MacDonald Ltd, St Anne House, Wellesley Road, Croydon, Surrey CR9 2UL
Stephen John Watson	University of Lincoln, Caythorpe Campus, Caythorpe, Grantham, Lincolnshire NG32 3EP

NEWS OF MEMBERS

Congratulations to **Gordon Fowlie** who has recently been awarded the MBE for services to the community, especially for agriculture in Lewes, East Sussex. Gordon is chairman of Harper & Eede Ltd of Ringmer, East Sussex and has been a member of the Institution since 1975.

It is a pleasure to announce that our Chief Executive & Secretary, **Chris Whetnall**, has been transferred to the grade of Fellow. The designatory letters were amended on the Contents Page of the last issue of *Landwards* (for those with an eagle eye for detail), but his contribution to the IAgrE deserves a higher profile of recognition than just languishing in the fine print - congratulations on the transfer and appreciation from the membership for the work it represents on their behalf.

Dr Dan Mitchell is the author of *Calf Housing Handbook* and co-author of *Calf Rearing.* A new edition of *Calf Rearing* was published in October 2003 by the Crowood Press ISBN 1-86126-643-X priced at £15 per copy. The Crowood Press has taken over a number of titles from Farming Press. Dan has also contributed the Housing section to Volac Ltds new *book Calf Management Guide* which was launched in September 2003.

Tony Chestney

Write to Tony with your news! His address is: 32 Beverley Crescent, Bedford MK40 4BY

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Suttieside
Forfar
Angus
DD8 3EE

Rotomation Ltd
Summerwood Lane
Halsall
Ormskirk
Lancashire
L39 8RH

White Horse Contractors Ltd
Lodge Hill
Abingdon
Oxfordshire
OX14 2JD

ACADEMIC MEMBERS

Askham Bryan College
Askham Bryan
York
YO23 3FR

Cranfield University Silsoe
Bedford
MK45 4DT

Duchy College
Rosewarne
Camborne
Cornwall
TR14 0AB

Harper Adams University College
Newport
Shropshire
TF10 8NB

Myerscough College
Myerscough Hall
Bilsborrow
Preston
Lancashire
PR3 0RY

Oatridge Agricultural College
Ecclesmachan
Broxburn
West Lothian
EH52 6NH

Pencoed College
Pencoed
Bridgend
CF35 5LG

Reaseheath College
Reaseheath
Nantwich
Cheshire
CW5 6DF

Scottish Agricultural College
SAC Ayr Campus
Auchincruive Estate
Ayr
KA6 5HW

Sparsholt College
Sparsholt
Winchester
Hampshire
SO21 2NF

Wiltshire College - Lackham
Lacock
Chippenham
Wiltshire
SN15 2NY

Writtle Agricultural College
Chelmsford
Essex
CM1 3RR

LONG SERVICE CERTIFICATES

Name	*Grade*	*Date of Anniversary*
25 years		
Lancelot **Butters**	EngTech MIAgrE	5 Nov 2003
James Geoffrey **Hunt**	AIAgrE	24 Nov 2003
Leo Paul **Wunder**	MIAgrE	11 Dec 2003
Michael John **Bennett**	MIAgrE	13 Dec 2003
John Robert **Watkins**	MIAgrE	14 Dec 2003
Nigel Malcolm **Fox**	EngTech MIAgrE	14 Dec 2003

SAC AWARDS

Mr Marc Smith of Nethy Bridge, has scooped three awards, including Best Overall Student on the HND in Agriculture course at the Scottish Agricultural College's Aberdeen campus (Craibstone Estate).

He was also awarded the SAC Prize for Farm Mechanisation and the Crop Production Prize at the recent SAC awards ceremony.

CONTACT

Marc Smith can be contacted by e-mailing: Sab1125@ab.sac.ac.uk

Marc Smith of Nethy Bridge in the Scottish Highlands; winner of three Scottish Agricultural College (SAC) awards (Photo: The Strathspey & Badenoch Herald www.sbherald.co.uk)

A NATION OF ENGINEERS

In his 1776 tract, Wealth of Nations, Adam Smith famously characterised the British people as a nation of shopkeepers, governed by shopkeepers to explain our increasing influence in world affairs. Had he been writing in the 19th century, he may well have cited instead our engineering prowess, when the works of men such as Isambard Kingdom Brunel and Joseph Bazalgette helped propel the nation into the modern era.

Britain has a great engineering heritage, reflected in Higher Education today: nearly 250 departments in 90 universities offer some form of engineering degree. Yet 79 university science and engineering departments have closed in the last six years. This decline has grave consequences for our prosperity and well-being. Fewer engineers means less innovation means fewer new products and services which are a significant boost to wealth creation and standards of living. And now the Higher Education Funding Council for England (HEFCE) proposes to slash funding for undergraduate programmes in at least eight engineering disciplines.

These cuts seem to have been engineered through a cleaving of closely related subjects. These have then been assigned to different pre-determined "price groups" that aim to reflect the relative cost of provision of their respective programmes.

Previously, all science and engineering subjects were assigned to the same price group. Under the new regime, that price group would split to give physics, chemistry and chemical, mineral, metallurgy and materials engineering a 15.7% increase in their resource rate. This is to be welcomed. Or would be if, meanwhile, we were not on the other hand about to witness the reduction resources for general, electrical, electronic, computer, mechanical, aero and production engineering programmes by an average of 7.4%.

Robbing one set of engineering Peters to pay another set of engineering Pauls appears to contradict HEFCE's own aspirations to assign academically cognate subjects to the same price groups in order to reduce *"the likelihood of activity near the borders between disciplines being reassigned to higher-weighted cost-centres."*

"the likelihood of activity near the borders between disciplines being reassigned to higher-weighted cost-centres."

So Information Technology and Systems Sciences now face the same average change in resource rate as Computer Software Engineering – a 5% cut. However, Computer Engineering is going to get even less than that, but would there not be some activity near those borders?

HEFCE describes the group of subjects to which they want to allocate an extra 15.7% as "high-cost laboratory-based science, engineering and technology". The other group, looking forward to 7.4% less resources, is described as "*other* laboratory-based science, engineering and technology" (my italics). Yet aero-engineering and electronic engineering degrees, for two, include hugely expensive laboratory activity.

Other inconsistencies are common in the new proposals. For example, civil engineering is going to attract 7.4% less funding from 2004-05. Materials engineering will gain 15.7%. So we can expect to see fewer civil engineering departments and more materials engineering departments. And so more materials engineers but fewer civil engineers to use the materials they create.

For the science, engineering and technology (SET) community, the HEFCE proposals raise more questions than they answer. Will engineering departments simply re-name their programmes to attract more funding? Will they seek to attract more overseas students, who pay full fees, to the lower-funded engineering programmes to make up for new shortfalls, thereby squeezing out the UK's potential in this area? How many engineering departments will close?

Unfortunately, HEFCE is reflecting the confusion throughout our education system over engineering. For students, teachers and careers advisors the options for studying engineering and pursuing it as a career are not always clear. Differences between disciplines are not known but, more importantly, their similarities are also unfamiliar. There is great overlap between what is taught and practised in physics, chemistry, mathematics and the engineering subjects. So why separate them out as HEFCE has done?

Indeed, engineering skills are some of the most transferable to be found in the workplace and engineers can end up occupying a variety of key roles in our economy. They are widespread in the top management of FTSE 100 companies, prominent in the venture capital industry, enjoy success as entrepreneurs and head nearly half of the UK's higher education institutions

This is now the choice facing us: long-term prosperity or short-term cuts. The Skills Strategy White Paper published in July rightly brought into sharp focus the challenge of improving the UK's productivity and competitiveness. Central to this must be increasing access to diverse engineering and technology education. This will give the engineers of the future the best chance of realising their potential and provide businesses with the talent they need. A nation of engineers helping to establish the high-skills, high-technology economy to rival those of our international competitors.

This article from Dr Sa'ad Medhat, Director of Education at the Engineering and Technology Board, on proposed HEFCE funding cuts, first appeared in the THES in September. E-mail: smedhat@etechb.co.uk

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HEALTH & SAFETY

A new way to help protect workers' backs

The Manual Handling Assessment Chart (MAC) to help managers identify high risk manual handling jobs has been launched by the Health and Safety Executive.

Employers, safety reps, health professionals and members of the public should find the website useful as it provides up to date information on health and safety relating to Musculoskeletal Disorders (MSDs) – the general name for conditions such as back pain and RSI (Repetitive Strain Injury).

Over a million people a year suffer from a MSD caused or made worse by work and in 2001/2002 it is estimated that about 37% of over three day injuries reported were due to manual handling.

The MAC is designed to help make easy and accurate assessments of three different types of operation: lifting, carrying and team handling. For each task it helps you go through the risk factors and record a risk rating – green, amber, red or purple – on a score sheet. The rating indicates which jobs are more likely to put workers health at a greater risk.

Graham Reeves, part of BP's Health and Safety team, was one of the first to try out the MAC. "We were pleased to help develop and use this new tool based on HSE's current guidance. I found that the MAC was not only quick and effective but also helped me to decide the level of risk associated with each factor.

"The MAC allows you to 'score' an assessment which means you can rank individual assessments, decide which are the greatest risks and take action on these first."

Richard Wheatcroft Senior Environmental Health Officer at Chesterfield Borough Council, said: "The MAC has proved to be an invaluable tool in assessing manual handling activities. The exercise has really consolidated officers' competence in assessing manual handling activities. The MAC's success lies in its straight-forward approach."

Malcolm Darvill, Head of Ergonomics policy at HSE said: "On the website you can test out your own practical risk assessment ability by scoring some real manual handling tasks and then comparing your scores with an ergonomics expert. The website also offers users practical tips to reduce risks of MSD injury."

The website also contains case studies, main guidance relating to MSD, links to other useful sites, research on MSD and answers questions on issues such as risk assessment, display screen equipment use and manual handling. The information on the site will be updated regularly.

MORE INFORMATION

[Find the MAC at www.hse.gov.uk/msd/mac The MAC must be used in conjunction with the assessment procedure laid out in the guidance on the Manual Handling Operations Regulations. Manual Handling Operations Regulations 1992: guidance on regulations (L23) ISBN 0 7176 2415 3 #8 from HSE Books. A revised version of the guidance will be available in spring 2004. HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG. Tel: 08701 545500 (HSE InfoLine). Web: www.hsebooks.co.uk

RECYCLING

Expanding markets for compost in growing media manufacture

A report published by WRAP (the Waste & Resources Action Programme) has mapped out UK compost production together with growing media manufacture for the first time and highlighted the potential of the growing media market as a high-value application for composted products.

Around 68,000 m^3 of composted products are currently sold to growing media manufacturers in the UK and this is set to expand rapidly in the next few years. The report estimates that the UK compost industry will be producing 275,000 m^3 of composted products of the right quality for the growing media market in two to three years. This represents a four-fold increase in production levels and sufficient capacity to supply 30% of retail growing media products currently manufactured in England.

This rapid expansion will be achieved through both increased capacity of existing facilities and the introduction of new facilities. WRAP's recently-announced competition for capital investment to support composting and added-value product manufacturing facilities will aid this expansion.

The WRAP report concludes that the geographical distribution of the two industries is a key issue that needs to be addressed to ensure that the incorporation of higher levels of composted products in growing media is economically viable.

"This report has highlighted the opportunity provided by the co-location of composting and growing media production facilities. By providing information and contact details of organisations in both industries, this work will enable the compost production industry and the growing media manufacturing sector to work more closely together to plan their future investment in terms of both supply and production," explains Liz Morrish, WRAP Materials Support Officer.

CONTACT

The report, entitled Compost and growing media manufacturing in the UK, opportunities for the use of composted materials, is on the WRAP website at www.wrap.org.uk or contact Liz Morrish, Materials Support Officer. Tel: 01295 819925. E-mail: liz.morrish@wrap.org.uk

ENERGY EFFICIENCY

Action energy serves up energy savings for food & drink industry

The food and drink processing industry is the fourth highest individual energy user in the country, accounting for 11% of the UK's industrial energy demand. The Industry has already done much work to reduce energy consumption but further savings may be hard to find. Action Energy can help food and drink manufacturers achieve these savings with a wide range of free tailored services to reap the rewards of energy efficiency.

Some companies know their total energy use, but are not necessarily aware of the split between various services and operations. This means that these companies do not realise just how much could be saved if some operations were done a little differently. Action Energy can help food and drink manufacturers identify such savings, with the following services on offer.

- A free survey of their current energy usage is available. Each assessment is specific to the company's needs and could put thousands back into a company's profit margin.
- Additionally, by taking advantage of the Government's Enhanced Capital Allowance (ECA) scheme and ensuring that new purchases take into account the Energy Technology List, companies stand to further benefit from energy saving.

Action Energy aims to increase the competitiveness of the UK food and drink industry by improving energy efficiency. It offers guidance to help cut costs in all areas of the industry's energy use including:

- improved energy management;
- monitoring and targeting;
- maintenance of industrial boilers and heat distribution systems;
- compressed air generation, usage and leakage reduction;
- use and management of motors and drives; and
- improvements to refrigeration systems.

Dr Garry Felgate, Director of Action Energy comments: "Action Energy surveys can help companies in the food and drink industry implement low cost energy efficient measures with quick paybacks. We can also help with developing long term solutions. Companies should take advantage of the free practical help offered by Action Energy and start saving energy and money today."

Steve Reeson of the Food & Drink Federation adds, "The cost of energy is a key issue for the food and drink industry, particularly with gas prices on the rise and the introduction of the Climate Change Levy. Action Energy offers a real business opportunity for the industry to reduce operating costs as well as helping the environment at the same time."

FORESTRY

Forest Enterprise Scotland share out head office functions

The head office functions of Forest Enterprise Scotland, the forest management arm of Forestry Commission Scotland, will be shared between its existing territorial offices in Inverness and Dumfries.

In Parliamentary Questions, John Farquhar Munro (Ross, Skye and Inverness West) (LD) asked the Scottish Executive to advise on the outcome of its review of the location of the headquarters of Forest Enterprise Scotland. Mr Allan Wilson, the Deputy Minister for the Environment and Rural Development, responded: "The Executive has carefully considered the different options put forward in the report of the review team, and decided that the head office functions of Forest Enterprise Scotland will be delivered by its existing territorial offices in Inverness and Dumfries. The views of staff, the Trade Unions and external stakeholders were taken into account, and our decision is to retain both offices. We have decided that Inverness will be designated as the Head Office, with Dumfries playing a vital role in support."

The retention of both offices will, therefore, be guaranteed for the foreseeable future as FE Scotland maintains a dispersed organisation. It will allow for excellent services and a significant presence in both the north and the south of the country, reflecting the importance of forestry to both of these regions.

NO CHARGE

Fee abolished for Customs seizure of infringements

Roger George, Chairman of the Chartered Institute of Patent Agents' Trade Mark Committee welcomed the decision to abolish the fee for applying to Customs and Excise for them to seize goods which infringe certain intellectual property right such as Registered Trade Marks.

"Few people realise the extent to which popular brand names are illegally copied. Companies invest large sums in establishing their brands in the market place only to see unscrupulous organisations cashing in on their hard work," said Roger." In certain areas these counterfeit goods can be positively harmful. Take spare parts for aircraft and pharmaceuticals. Who in their right mind would willingly fly in an aircraft fitted with counterfeit parts or take a drug not really produced by the company with their name on the packet. Yet, many people do so unwittingly".

Roger went on to make the point "However you look at it, this form of infringement is tantamount to theft. That is why we in the Institute welcome any moves which aid the legitimate trader".

CONTACT

Ted Blake, The Chartered Institute of Patent Agents, 95 Chancery Lane, London WC2A 1DT. Tel: 020 7405 9450. Fax: 020 7430 0471. E-mail: mail@cipa.org.uk

LANDSCAPE MANAGEMENT

BAA establishes innovative recycling and composting operation at its airports

British Airports Authority (BAA) have established an innovative recycling operation to compost and recycle 2000 tonnes of cut grass from Stansted airport.

Under Civil Aviation Authority (CAA) regulations BAA are required to keep grass areas around the runway at a particular height, thickness and maintain a spiky consistency to prevent birds and insects landing, foraging and nesting. To do this BAA annually carries out a "bottoming out" operation, which cuts the grass and removes the build-up of thatch from regular grass cutting operations throughout the year.

The bottoming out operation is significant as BAA cuts over 1000 hectares at its airports. This year over 5000 cubic metres (2000 tonnes) of grass, enough to fill two Olympic swimming pools, have been cut from Stansted alone. The grass has to be cut in a one-pass operation, naturally BAA is anxious not to leave bales of grass around the runway grass areas. The grass has no value as livestock feed and was previously taken off site by the airports waste contractors, an expensive and unsustainable option.

To solve the problem of what to do with the grass BAA called in Aardvark EM Limited, an environmental scientific group specialising in waste management, sustainable development and environmental innovation. Aardvark has developed techniques for handling difficult or large volumes of wastes. In this case, they established an on-site composting programme off the main Stansted Airport site, gaining exemptions and permission from the Environment Agency and Local Planners.

The system uses active composting techniques using a specialist compost windrow turner, a Le Bouche 4100. Large elongated heaps (windrows) 4 m wide and 2 m high are formed from the grass cuttings and turned on a frequent basis, with temperatures reaching 60 degrees Celsius. The windrows are monitored daily for temperature and moisture. Samples are also taken for analysis to determine carbon to nitrogen (C/N) ratio and other parameters.

Several operating difficulties have been encountered and overcome during this project – such as maintaining the structure of the windrows during periods of really wet conditions. To this end, Aardvark has developed the innovative use of recycled tyres as a structure enhancer.

The trial is now nearing completion, with much of the first composting stage complete. The compost will be left to mature for 5 months and during this time analysed for nutrients and soil conditioning properties. Finally, the compost will be recycled on to the airport grass promoting the spiky growth required by CAA regulations and replacing the artificial fertiliser previously used.

David Mulholland, Group Landscape Manager, BAA Property says: "Aardvark has initiated an excellent organic waste handling programme both environmentally and financially. Disposing of the cut grass has been a real challenge for many years. The system will now recycle grass and green waste from the grounds maintenance operations back to our own sites. This represents significant environmental benefits, in terms of recycling, and reducing our use of chemical fertilisers. Furthermore, with fewer, and shorter vehicle movements and the processing of this material by aerobic rather than anaerobic means, we also anticipate reduced emissions of green house gases – we now plan to roll this out across all our airports"

MORE INFORMATION

Aardvark EM Limited, Hartnoll Farm Centre, Post Hill, Tiverton, Devon, EX16 4NG. Tel: +44 (0) 1884 234851. Fax: +44 (0)1884 234854. E-mail: info@aardvarkem.co.uk Web: www.aardvarkem.co.uk

FASTER WELDING

Wind power success for TWI

TWI is partnered with UK-based tower and welding equipment manufacturers for a £250k project to develop a high speed welding process for the construction of wind turbine towers.

UK Department of Trade and Industry funding has been recommended under the New and Renewable Energy Programme for this project and work is planned to start in the last quarter of 2003.

Meanwhile, European Union funding has been granted for a £450k CRAFT project to develop innovative non-destructive testing (NDT) techniques and technologies for the inspection of wind turbine blades. It is expected that the work will enable the deployment of faster, more accurate NDT techniques that should reduce operations and maintenance costs while also providing higher levels of confidence at post-manufacture inspection. The project, involving a number of small and medium enterprises is due to start in early 2004.

CONTACT

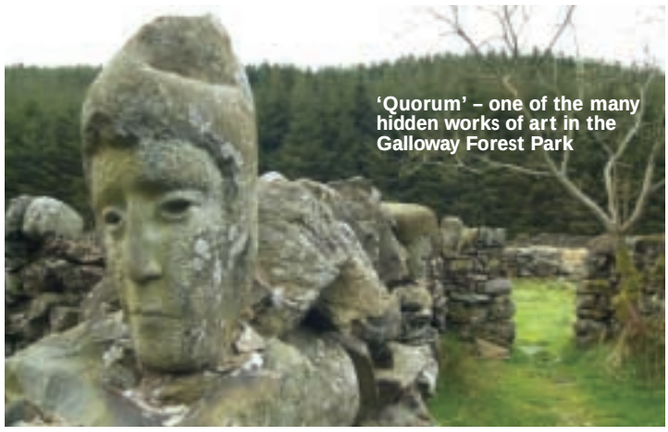
E-mail: power@twi.co.uk

ECOFRIENDLY ART

Hidden art to be discovered in Galloway

Visitors to Galloway Forest Park are now in for a mysterious adventure when they discover hidden works of art in the forest.

Over the last three years, Forestry Commission Scotland and the Dumfries and Galloway Arts Association have been working away to provide visitors with some amazing art installations concealed along the popular forest trails. Now that the project is complete, the art is there to be discovered, and to make this easy a handy new leaflet has been produced giving details and directions.



'Quorum' – one of the many hidden works of art in the Galloway Forest Park

Rena Tarwinska of Forestry Commission Scotland believes the Galloway Forest Arts Programme will be a big hit with tourists and locals: "We are always keen to give visitors to the forest an experience to remember. These eye catching works of art will certainly stop people and make them think about their surroundings. We worked closely with each artist to match the work with the location. "Part of the experience is enjoying the different forest atmosphere at each site. It's fun, but also a celebration of the unique sense of place found within the forest."

Some of the stunning art includes:

- a 50 metre wide Labyrinth which winds along the landscape and ends with a cairn and water feature;
- a series of carved stone heads built into an old sheep fold;
- an eight metre spire made of red-earth tiles;
- a carved granite otter along a popular river bank; and
- various gunmetal seats attached to trees and with patterns of pinecones for decoration.

Jenny Wilson, Director of Dumfries and Galloway Arts Association, said: "Galloway now has its very own mysterious arts adventure just waiting to be explored in the forest. The hidden rewards are the icing on the cake and make a visit a treat. "It's a marvellous project and we are delighted that the Scottish Arts Council Lottery fund had the vision to back the project. So often people imagine that adventurous arts projects are solely based in the big cities, but here's an instance of high quality visual art in a rural setting."

CONTACT

Copies of the free Galloway Forest Park Art Programme leaflet are available at any of the Galloway Forest Park visitor centres, or by contacting the Commission's Galloway Forest District. Tel: 01671 402420. E-mail: galloway@forestry.gov.uk

EDUCATION

Want to get more out of your workforce whilst giving back to the community?

Science and Engineering Ambassadors (or SEAs as it is affectionately known) is a national programme through which people working in or with an interest in science, technology, engineering or mathematics (STEM) can volunteer to work with their local schools. Co-ordinated by SETNET (the Science, Engineering, Technology and Mathematics Network), and managed locally by their network of 53 SETPOINTs across the UK, SEAs gives your staff the opportunity to enthuse and inspire young people about STEM, whilst at the same time developing their own communication and presentation skills.

Ambassadors are already working with schools on a wide range of activities, events and challenges, giving pupils the chance to understand the excitement and opportunity a career in science, engineering and technology can bring. As part of a company scheme, Ambassadors can focus on schools and activities particularly relevant to their industry, or get involved in the wider range of activities offered by the local SETPOINT. In return, we offer them membership of a nationally recognised programme, access to insurance when involved in SEAs activities and the opportunity to develop their own skills, as well as having fun.

The benefits don't stop there. As one of our supporters puts it, company involvement in SEAs can provide "useful learning and development for its employees, a source of recruits, a greater sense of pride in the Company amongst employees and our communities and a recognition that we do care about and invest in the future".

Everyone with an interest in promoting science, technology, engineering or maths is welcome as a SEA. Volunteers are asked to complete a CRB check and are briefed on education today. SETPOINTs are then available to support and advise, offering exciting activities within which Ambassadors can get involved.

MORE INFORMATION

SETNET is a government funded, registered charity set up to help promote STEM subjects in schools. Find out how your company can join companies like Rolls Royce, Ford, BAE Systems and IBM by becoming involved in SEAS. Tel: 0207 6367705. Web: www.set-net.org.uk

FOOD FAVOURITES

The great taste of success

Tyrrells Potato Chips are thrilled to have won a Gold Award with their hand fried Parsnips and Black Pepper chips plus five other awards for various flavours of potato chips in the prestigious Great Taste Awards 2003. Tyrrells Potato Chips have only recently celebrated their first anniversary and are delighted with how much they have achieved. Based on their farm in Herefordshire, Tyrrells are the only UK potato chip maker to grow and produce chips. Quality ingredients are used and the chips are delivered direct to customers giving them fresh, naturally grown chips with a traditional home made taste.

Based on the success of the Parsnips and Black Pepper chips, Tyrrells Potato Chips have recently introduced a new root

variety, hand fried Celeriac with Sea Salt and Black Pepper. Tyrrells' owner, William Chase said "We like to be innovative at Tyrrells and this variety of chip will be completely unique to us".

The Tyrrells team are also launching Caramelised Onion Dip and Hot Red Pepper Dip, William said "The dips will really compliment our existing product range on offer to our customers".

In addition to these new products Tyrrells have been experimented growing sunflowers to use the crushed seed to make oil for frying the chips. William said "We already grow our own potatoes and make our chips on our farm, making our own oil would ensure the quality of our products from seed to chip".

CONTACT

William Chase, Tyrrells Potato Chips, Tyrrells Court, Stretford Bridge, Leominster, Herefordshire HR6 9DQ. Tel: 01568 720244. Fax: 01568 720455. E-mail: will.chase@tyrrellspotatochips.co.uk Web: www.tyrrellspotatochips.co.uk

AWARD

Agricultural organisation wins National E-Commerce Award

A rural community charity based in Penrith, Cumbria has been singled out in the DTI-backed InterForum E-Commerce Awards. The Pentalk Network beat 343 entries to be national winner of the Voluntary & Community category which is sponsored by the Home Office's Active Community Unit.

Originally established during the foot and mouth crisis, The Pentalk Network provides free computers and training to promote computer literacy and business adaptation to the local farming community, to encourage the business recovery of the agricultural farm sector. Funding from the DfES, the Rural Recovery and Farmers Fund has enabled the organisation to evolve into a resource used by farmers from as far away as Zimbabwe and the Falkland Islands with maps, information, weather reports and information about integrating e-commerce into their own business.

The Pentalk Network were presented with a cheque for £8,000 by Stephen Timms, the Minister of State for Energy, E-Commerce and Postal Services. Stephen Timms Commented: "The UK has developed one of the best e-commerce environments in the world, and is ready to exploit the developing benefits that technology offers. "But we must keep improving our use of ICT if we are to become world leaders in e-business. We can do this by ensuring the quality of advice businesses get is second to none and making sure we have the right skills to use the technology. "(The) winners are an outstanding showcase of the UK's e-business capabilities. All of the participating organisations are excellent examples of why the UK is amongst the best in the world. But companies like the Pentalk Network are also role models who can encourage other businesses, local communities and professional bodies to take up the challenge and reap the benefits that e-business has to offer."

The overall national winner of the E-Commerce Awards 2003 and recipient of the grand prize of £30,000 was Response Maintenance and Building services, a construction service company that has improved job management and building supply delivery by creating a mobile workforce. The Wolverhampton based company also won the Mobile and Wireless category.

The E-Commerce Awards are open to any organisation with less than 250 employees and recognise and reward innovation in the application of Internet and information and communication technologies to transform small businesses in the UK. This year's E-Commerce Awards saw a record number of 2,945 firms entering, nearly twice as many as last year. For the third year running, the E-Commerce Awards have been sponsored nationally by the Royal Bank of Scotland Group and Cisco Systems.

MORE INFORMATION

Further details on the region's winners and short-listed companies can be found at the web site at www.ecommerce-awards.co.uk

RESEARCH AND DEVELOPMENT

The breakfast of the future is served in Australia

Australia's strong R&D record has received another major boost with one of the world's largest companies moving its entire R&D division to Australia. The Kellogg's Company is relocating its research and development headquarters from the USA to Sydney, Australia. The move will see Kellogg's treble its investment in product innovation with the development of up to 30 new products per year for the UK, US, Asian and South Pacific markets.

Historically all Kellogg's R&D work had been conducted at the group's Michigan headquarters in the USA. The move to Sydney is the first for the company. "Most companies in the food industry are contracting or not investing. We're doing the opposite," explained Kellogg's Australia Managing Director, Michael Bracka. "Kellogg's has recognised that markets are different, consumers are different and business are different. We can take knowledge from around the world and implement it here."

Kellogg's has recognised the many advantages in conducting R&D in Australia, including an abundance of natural resources, and flexible and skilled workforce, which in some industries make the Australian environment 50% more cost effective than the USA. Currently new products make up eight percent of Kellogg's sales, up from five percent last year, and it is expected that the Sydney plant will be the driving force behind increasing the share of new products to 20 percent of total sales. This will be done on the back of Kellogg's stated aim to triple R&D expenditure from 2001 to 2004.

"We are delighted that Kellogg's Company has brought their R&D to Sydney", an Invest Australia spokesman said. "They will benefit from the innovative culture and the highly skilled workforce in Australia." The move reinforces Australia's strong record in attracting foreign direct investment.

In 2002, global foreign direct investment (FDI) inflows to Australia more than tripled to US$13.9 billion. This outstanding performance was all the more remarkable against a seventeen percent decline in global FDI flows to countries involved with the Organisation for Economic Co-operation and Development (OECD). Australia not only recorded the fastest growth rate (250% last year) of FDI inflows among all OECD countries, but also one of the largest in terms of percentage of Gross Domestic Product among all major economies, increasing to around three percent over the period.

INNOVATION

New weapon in war on scramblers

A clever new device is speeding up a bid to stop scramblers terrorising the countryside, damaging farmers' crops and destroying the enjoyment of ramblers and residents.

The 'K Barrier', a unique steel structure, was designed by Sheffield conservationist Keith Barraclough and developed with the assistance of engineers from Sheffield Hallam University. It has been designed to put a stop to off-road motor-bikers forcing their way onto countryside trails and causing damage to rural areas. The barrier's innovative shape and adjustable design allows pedestrians, wheelchair users and pushchairs to easily access the countryside, but restricts the passage of motorcycles. Its steel construction is robust and, unlike stiles or kissing gates currently used, it has a high resistance to vandalism and can be easily adapted to accommodate visually impaired users and people with disabilities.

Three prototypes of the barrier are currently on test with Councils across South Yorkshire, at Kendray, Barnsley, Sandall Beat Wood, Doncaster and Parkin Wood, Chapeltown, Sheffield. A further prototype is soon to be installed at the former Treeton pit site in Rotherham, before the barrier goes into production in the next few months.

The 'K Barrier' is the brainchild of Keith Barraclough, who has spent over 30 years in the Sheet Metal and Fabricating Industry. As a keen conservationist and volunteer with a number of countryside projects and wildlife groups, Keith was concerned about the damage scramblers were causing to the countryside, trails and parks they use. After hearing complaints from wheelchair users about the lack of access for disabled people on countryside trails, Keith designed his first barrier, the Three Valleys Access Barrier in 1996. In spite of the barrier's success, concerns around visually impaired users, canopied mobility scooters, double pushchairs and some of the more enterprising motorcyclists, led him to design the new 'K Barrier'.

Keith secured a DTI SMART grant, with the aid of Business Link South Yorkshire, to help fund the design and development work and then approached the product development team with his concept. The Hallam team worked the concept up, refining and improving aspects of the design into technical CAD drawings that have been used to manufacture the prototypes.

WILDLIFE CONSERVATION

Biodiversity and the '*Bombus*' buzz

There's a buzz of excitement in the fields of a South Warwickshire farm this summer. Ecologists have discovered two very rare species of long-tongued bumblebee on Lord Willoughby de Broke's Ditchford Farm, in wildflower field margins specially planted under Defra's Countryside Stewardship Scheme.

Bombus rudereatus – also known as the large garden bumblebee – is one of the largest bees in Britain, with queen bees more than an inch long. A century ago they were common across lowland Britain, but over the last 100 years there has been a population decline of 95%, mainly because the deep flowered plants they prefer, such as comfrey and trefoils, have become increasingly scarce.
Bumblebees need very flower-rich landscapes, and today only six out of 19 species are easily found in lowland Britain, with five listed as priority species on the UK Biodiversity Action Plan.

The Countryside Stewardship Scheme aims to redress this balance by managing land for the benefit of wildlife, including insects. At Lord Willoughby's farm near Shipston-on-Stour, wide margins around fields have been planted with a variety of grass and wildflowers designed to provide a mix of nectar sources beneficial to all sorts of bees and other wildlife.

The *Bombus* genus is unusual amongst British bumblebees, because some of its queens, workers and drones are entirely black – the type known as Bombus Harrisellus, which has also been sighted and photographed at Ditchford Farm by Defra Entomologist Mike Edwards and Steven Falk, Senior Keeper of Natural History at Warwickshire Museum. Steven Falk said: "When I first saw some *rudereatus* queens at Ditchford in the 1990s it was like seeing a ghost – the previous Warwickshire record was from the 1920s and I had assumed it was long extinct here. Now thanks to the managed wildflower margins, we can see not only the typical white-tailed and yellow-banded workers, but also the rare all-black *harrisellus* – which I'd never seen before.

"It has been the most delightful discovery to see these bees back in Warwickshire, and I really hope we can secure their long-term future here."

Sam Somers of Defra's Rural Development Service added: "Bumble bees are a very good indicator of a healthy environment. Being larger and heavier than other types of bee they need to feed more, so their presence is tied in to a readily available supply of food. This also means they can stay in flight for longer and cover greater distances, which makes them excellent pollinators of crops and a real boon to farmers.

"Research carried out for Defra by the Centre for Ecology and Hydrology has identified the particular plant species bumble bees prefer, so we can tailor options under Countryside Stewardship to suit those preferences and support the bee population. "It's tremendously encouraging to get evidence of this sort that the scheme is making a difference."

Lord Willoughy is now using his Stewardship agreement to extend the wildflower areas and experiment with different grass mixes, as well as planting 725 metres of new hedgerows and restoring a further 1,300 metres of older hedges through laying and coppicing.

WOODLAND RETURNS

Forestry's billion pound boost to Britain

Forestry brings social and environmental benefits worth over £1 billion a year to people in Britain, according to a major new report from the Forestry Commission. The pioneering study, carried out by a team of environmental economists led by Newcastle University, is the first to provide a comprehensive picture of the economic benefits provided by forestry in this country.

The Government has welcomed the study as a valuable tool illuminating some of the main factors underpinning its support for forestry. The research found recreation and biodiversity were the most highly valued benefits of woodlands, each making up almost 40% of the total. The average value of recreational visits to woodlands in the study was estimated at £1.66 per visit. Trees were also shown to play a key role in enhancing landscapes and in reducing atmospheric carbon dioxide.

Forestry Minister Ben Bradshaw said: "Well managed forests are a vital resource in providing wide-ranging benefits in addition to the value of woodland products such as timber. The findings of this study confirm that society places a huge value on these benefits. "Professor Ken Willis who led the research team added: "The study examined a wide range of services and benefits provided by forests and woodland, including wildlife, recreation, landscape, carbon sequestration and air quality. This is the first time that this broad range of benefits has been analysed in one study and the results have given us a clearer picture of the full economic value of forestry."

MORE INFORMATION

Copies of the report can be obtained from the Forestry Commission. Tel: 0131 314 6171. E-mail: jackie.harper@forestry.gsi.gov.uk Web: www.forestry.gov.uk/economics

FORESTRY STRATEGY

Social agenda for forestry in England emerging

"New language and new priorities have emerged which place the social dimension at the heart of forestry policy," the Forestry Commission in England's new Director, Paul Hill-Tout, announced.

Paul Hill-Tout explained how the Forestry Commission is ensuring that the four programmes of the England Forestry Strategy fit in with the new broadening social agenda: "The Forestry Commission is undergoing a cultural change. We have been learning how to embrace the new language and how best to demonstrate to other Government departments and agencies what woodlands and forests, managed in a sustainable way, can do in relation to their agendas".

"Undertaking research, gathering evidence and setting up demonstration projects and pilot schemes are all new priorities. Just talking about what could be done is not enough. We need to take practical action and create demonstration sites to show what can be achieved within a woodland setting. We have already undertaken some research to better quantify benefits, and the costs of addressing some of the social community priorities through woodlands."

The Forestry Commission is evolving the England Forestry Strategy with a particular emphasis on:

- providing more woodland close to where people live;
- ensuring woodland forms part of an integrated range of services provided by land management;
- greater community involvement;
- engaging with the health sector; and
- engaging with education & learning.

Mr Hill-Tout continued: "We need a better understanding of existing woodland provision. Last year we initiated a project with the Woodland Trust to collate data on accessible woodland, provided by the public sector or supported through grants from the Forestry Commission. The Woods for People project due to complete it's first phase later this month will enable us to plan with partners and communities where needs for access are the greatest and how these might be addressed.

"We need to invest in quality as well as quantity. We recognise that encouraging and managing public access is as complex as growing trees. We also need to understand the perspective of private woodland owners who account for the majority of woodlands.

"We launched a pilot grant scheme called Woodland Welcome in late 2002 in the South East of England. The pilot is looking at differential rates of grant aid for different types of public access; from highly intensive urban woodlands to more remote rural woods. Each providing access for different communities but requiring different levels of management. We are also looking at non-monetary support mechanisms such as advise on best practice, managing multiple objectives and coping with health and safety issues associated with public use.

"The Forestry Commission has supported a number of woodland initiatives which have worked at a local level with local people in all aspects of sustainable forestry. The Greenwood 2000 project was a three year programme of work centred on the three most deprived wards in Telford.

"The project aimed to introduce people from multiple disadvantaged neighbourhoods to natural woodland and use that experience and the teaching of woodland crafts as a vehicle to develop skills and self confidence. The project was reported as having provided, in some cases, a life-changing opportunity for the participants.

"As part of the work to engage with the health sector, we have just launched a pilot Woodland Improvement Grant (WIG) in the West Midlands to provide capital grant support for health walks in woods. Work is also underway with the rural agencies in the UK to look at commissioning an inter-agency study on health, wellbeing and the natural environment.

"Our work with education and learning too is progressing. The Forest Education Initiative (FEI) is broadening its reach and more networks are developing. The FEI co-ordinator for England is also now providing support for the growing Forest Schools network. A Forest School is the all-embracing term for using woodlands and the natural environment as a learning arena for all ages and abilities and we find they work particularly well with children who do not thrive within the traditional classroom environment."

Mr Hill-Tout concluded: "We will support our partners in taking the new agenda forward and ensuring that sustainable woodland management has a key role to play in the Government's wider social policies."

TRADE INITIATIVES

Bury St Edmunds company wins £120,000 contract from Africa

Bury St Edmunds-based Griffith Elder & Co Ltd have been awarded a contract worth £120,000 to manufacture and supply onion harvesting and storage machinery to a company in Niger, West Africa as a result of exhibiting at the 'Global Partnerships Initiatives' (GPI) Pavilion at this year's Royal Show.

The African company's consultants approached David Elder, director of Griffith Elder at the GPI Pavilion, which was organised by Trade Partners UK – the government body dedicated to providing UK companies with global expertise on international trade and investment.

David Elder said, "This year's GPI was very well planned and as a result has led to our contract in Africa. Since the show I have met with the consultants in France and representatives from the company in Niger to finalise arrangements and to discuss training local people to harvest and store onions.

"As well as the Niger contract, I received enquiries from a New Zealand company and a Polish company for our electronic weighing equipment which we also design and manufacture, enabling farmers to get precise production figures for their crops."

CONTACT

Web: www.tradepartners.gov.uk

FARM MACHINE SURVEY

Farmers' next major investment

A survey by the National Farm Research Unit (NFRU) reveals that in Great Britain over half of the 3,400 farmers interviewed were intending to buy a tractor, new or second hand, as their next major investment. This was followed by 20% of farmers intending to purchase machinery implements such as ploughs and drills, with only 8% planning to invest in combine harvesters and 3% in sprayers and in handling equipment.

"Specifically, smaller farms were investing more in tractors, either new or used, with 56% of farms with less than 100 hectares intending to purchase a tractor compared to 41% of farms with over 500 hectares. Smaller dairy farms also appeared to be investing more in tractors, as 59% of farms with up to 100 dairy head were intending to buy a tractor as their next investment but only 44% of farms with herds of over 200 head. With all the restructuring currently taking place in the industry, it is the smaller farms who are seeing the need to invest in a different type of tractor, new or used, for their own land management function. A smaller number of larger farms are investing in the bigger tractor units," comments Jim Williams, Marketing and Communications Director of the NFRU.

One in five farmers in Great Britain were investing in machinery implements such as ploughs and drills. Larger farms were investing more, with 23% of farms with over 500 hectares intending to make such a purchase and such large farms with managers also investing more than farm owners (24%). Nearly a quarter of the larger dairy farms (24%) were going to buy new implements, with an indication of some increased purchasing in 2003.

On average only 8% of farms nationally were intending to purchase a combine harvester between 2001 and 2003. Such capital investment appears to be increasing, with only 5% of farms reporting such an intention in 2001. There was a trend for larger farms with over 500 hectares to invest in combines, with 13% of farms in this category planning to buy a combine compared to only 4% of farms with up to 200 hectares. There appeared to be an early eagerness to purchase in 2003 with 15% of farms with over 500 hectares intending to do so this year.

The intended purchase of sprayers had also increased to 3% of all farms, with the larger farms and those owner occupied being at least twice as likely to buy such equipment (6% and 7% of farms respectively).

HEALTH AND SAFETY

Practical solutions to tackle stress at work

New research reports on stress prevention and rehabilitation have been published by The Health and Safety Executive (HSE).

'Beacons of Excellence in Stress Prevention' outlines criteria for best practice in stress prevention. These criteria were developed from a literature review of recent research in this area and through expert opinion. The criteria were used to identify organisations that could be considered examples of best practice in various aspects of stress prevention.

Best practice in rehabilitating employees following absence due to work-related stress clarifies criteria of current best practice in rehabilitation. The report provides clear and practical steps employers can put in place to encourage employees to return to work and to prevent a recurrence of the initial stress. The case studies in this report cover England, Scotland and Wales, and there is also a section providing specific advice for small and medium sized companies.

The case studies contained within these research reports will be used, in conjunction with other examples of good practice gathered by HSE's Stress Priority Programme Team, to develop guidance to support managers in implementing HSE's Management Standards, by outlining practical solutions to help them tackle stress at work.

Professor Colin Mackay, Principal Psychologist in HSE's Human Factors Unit said, "These research projects have provided us with some excellent case studies in both stress prevention and rehabilitation of employees following stress-related absence. "Our feedback from employers dealing with stress is that while they are largely confident that they are able to identify the main sources of stress within their organisations, they find it difficult to know what interventions to put in place to manage them. The new guidance will be a valuable resource for both managers and health and safety professionals."

Elizabeth Gyngell, Head of HSE's Better Working Environment Division said, "The Management Standards and supporting information, such as this new guidance, build on HSE guidance available to managers. For example, if managers follow the advice in HSE's 2001 publication '*Tackling work-related stress*' then they will be on track to meet the Standards when they are introduced fully next year."

These research reports will provide further background for a new guidance booklet, to complement current HSE guidance.

MORE INFORMATION

Beacons of excellence in stress prevention, RR133, ISBN 0 7176 2709 8, price £20, and Best practice in rehabilitating employees following absence due to work-related stress, RR138, ISBN 0 7176 27152, price £20 are available in hard copy from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA. Tel: 01787 881165. Fax: 01787 313995. Web: www.hse-books.co.uk

CROP SPRAYERS

A day's spraying in an hour and a quarter

•102.6 ha sprayed in an hour and a quarter
• Spra-Coupe high speed/low volume application key to success
•Application rate of 16 litre/ha at 1.6 bar pressure
•TeeJet XR80015VS nozzles provided coverage of 60 - 90 droplets/cm^2 (average of 72 droplets/cm^2)
•Spraying speed between 28 km/h to 37 km/h with 28 m wide boom provides workrates of 1.38 ha/min
•Low volume technique reduced drift, saved chemical, increased penetration and improved chemical adherence to target
•Improved chemical efficacy with overall saving in time, chemical cost
Saving in fuel consumption - 30 litres for 102.6 ha or 0.3 litres/ha actual fuel consumption in record.

World record spraying times; 102.6 ha sprayed in 1 h 14 mins and 14 secs using the Ag-Chem Spra-Coupe 4640

In just 1 hour 14 minutes and 14 seconds an AGCO Ag-Chem Spra-Coupe 4640 sprayed 102 ha, just before dawn, on Tuesday August 19th at Champrond farm, St Hilaire, near Etampes in France. This is believed to be a new world record and was overseen by an independent adjudicator. The efficacy of the application will be checked by the same verifier three weeks after the application.

Operating at speeds between 28 km/h to 37 km/h, the completely unmodified Spra-Coupe, equipped with a 28 m wide aluminium boom, applied a herbicide and adjuvant mix at a rate of 16 litres/ha at a pressure of 1.6 bar.

While the workrate of 1.3 ha/min is quite remarkable, it clearly demonstrates the Spra-Coupe's ability to cover the ground far faster, using lower volumes than is possible with conventional machines.

Indeed the record bid was carried out under entirely normal commercial conditions and set up by Ag-Chem, Teejet, Agridyne and the four French Spra-Coupe distributors to illustrate the machine's high speed, low volume application technique. The French distributors are:

- Agri Santerre (north);
- Group Methivier (central);
- Techmagri (east); and
- Saso (south).

"While the area covered at 16 litres/ha is extreme, it clearly shows the benefits of high speed, low volume applications. However, even working at the more normal French Spra-Coupe 35 litres/ha application rate, this is still two thirds less than using conventional techniques," says Wim Vervoort, who is responsible for Ag-Chem Spra-Coupe sales in Europe, Africa and the Middle East.

The higher operating speed imparts 'dynamic energy' into the spray droplets and this improves penetration because the droplets hit the target at an angle, rather than being sprayed down vertically from above.

Drift is also reduced because the speed allows applications to be carried out at lower application pressures and with nozzles producing bigger droplets than is possible with conventional, slower machines. The efficiency of the whole operation is also improved, with less time spent travelling and refilling the machine's 1576 litre capacity tank and, therefore, more time is spent on productive spraying.

High output Spra-Coupe applications also allow operators to take full advantage of every spraying opportunity. By working just before dawn, like in the record attempt, the low volume technique allows, for example, 80 ha to be covered in one hour rather than dragging on for two or three hours in less favourable conditions.

"Low water volumes, with increased concentrations of active ingredients and the use of adjuvants, also provides an enormous increase in chemical performance. Spra-Coupe users use much less chemical, saving money for them and, importantly, reducing environmental impact," adds Mr Vervoort.

To ensure the correct size droplets were produced and match the flowrates required, TeeJet, a partner in the record attempt, supplied its XR80015VS stainless steel tips. These 80º angle jets produce medium droplets at usual Spra-

Spraying record facts including breakdown of spray application

Spray record facts	Measurements
Total area sprayed	102.6 ha
Workrate	1.38 ha/min
Time taken	1 h 14 min and 14 sec
Average speed	32.5 km/h
Application rate	16 litres/ha
Nozzles utilised	TeeJet XR80015VS (80º)
Pressure	1.6 bar
Coverage	60 - 90 droplets/cm² (average 72 drops/cm²)
Fuel consumption	0.3 litres/ha
Spray application facts	**Measurements**
Application rate	16 litres/ha
Application consists of: 1.65 litre/ha Cheminova Astéroïde (glyphosate) 0.55 litre/ha Stantox 66 (2.4-D hormone herbicide) 0.17 litre/ha Agridyne Li 700 (drift retardant/penetrant)	

Coupe operating pressures between 1 - 2.5 bar.

TeeJet also supplied the record bid with the LH Agro Swath XL guidance lightbar, linked to a GPS system using Omnistar correction signals. This system was used before the attempt to set marks for the operator to follow in 20 ha and 80 ha fields where the tramlines were either the wrong distance apart, or had been eradicated by cultivations. During the attempt, which started while it was still dark, the lightbar display helped the operator drive accurately at high speeds.

This guidance technology is particularly suited to this spraying technique, where users tend to spray in the early morning, before light, in ideal spraying conditions. The record attempt started at about 06.22 a.m. on Tuesday 19th August, just as dawn was breaking. The morning was absolutely still, with no measurable wind speed. The relative humidity was 75% and the temperature 18.4ºC. An hour later the humidity had risen to 90%, but the temperature fell to 15.3ºC. These are absolutely optimum conditions for spraying, and by using the low volume application at high speed, users can make the best use of limited opportunities. Moreover, other benefits come from spraying early in the morning, explains Bernard Domaine, one of France's low volume pioneers who provided agronomic advice to the record bid. His chemical mix recommendation (see Table) was based on experience with working with low volumes.

"Spraying in the early morning," he adds, "will mean more of the liquid hits the target and increases efficacy. This is because there is:

- no wind therefore reduced drift;
- less evaporation in cooler temperatures;
- better adherence to the leaf; and
- dew on the leaf which helps to distribute the spray.

Another essential component in the efficacy of the treatment is an effective adjuvant to aid penetration and leaf adherence of the chemical. Agridyne, a partner in the record, supplied its Li 700 agent to help reduce drift and improve the coverage of the chemical on the plant leaf.

In France, which currently has the most users of the low volume technique in Europe, about half the Spra-Coupe fleet is already operating at about 25 - 35 litre/ha application rates. The other half is using a maximum of 60 litre/ha.

Most of the users will be calling on advice from experts such as Mr Domaine for specialist agronomic advice. However, all of them will, without exception, be using an Ag-Chem Spra-Coupe. No other machine is able to provide the combination of speed, power to weight ratio, suspension and spraying equipment that is essential for success at low volumes.

A powerful, high torque Perkins 82 kW engine combines with the Spra-Coupe's operating weight of just 6115 kg to provide an unrivalled power to weight ratio of 74.5 kg/kW. The lightweight not only improves performance but also reduces ground compaction. Standard tyres are 9 x 24 at the front and 12.4 x 24 on the rear. In addition, with low ground pressure tyres, the Spra-Coupe can operate at pressures of 1.8 bar and 0.8 bar, respectively.

The simple, robust Spra-Coupe uses a four-speed automatic gearbox, with standard cruise control, to further ease operation and increase output. Fully independent suspension, using springs at the front and heavy duty springs and dampers at the rear, also allow the Spra-Coupe to work much faster than conventional sprayers.

The machine is designed specifically to cover more ground, faster and with lower water volumes - enabling users to exploit each and every spraying opportunity. Central to the spraying system is a high capacity centrifugal pump, supplying a maximum flow of 250 litre/min at 8 bar. A Raven spray controller is standard. This controller automatically adjusts the flowrate to maintain the exact application, regardless of forward speed.

The standard 1576 litre capacity tanks hold enough to cover from 26 ha at 60 litre/ha up to 52 ha at 30 litre/ha.

CONTACT

Ag-Chem Europe B.V. specialises in the development, production, sales and service of agricultural machines for the application of organic and inorganic fertilizers and chemicals. Ag-Chem is the worldwide brand of the AGCO Corporation.
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BATTERY CHECK

State-of-the-art testers for spiral batteries

Two new battery testers which represent state of the art technology have been designed by Midtronics, to meet the growth in demand for testing spiral type batteries which are gaining popularity in the agricultural market.

The 405 XL and 505 XL models both have a mode to provide a fast and safe test of spiral batteries which are being used more and more in the agricultural market.
Midtronics produce a range of hand-held battery testers which will give an accurate picture of the state of health of a battery, whether on a tractor or a combine harvester.

CONTACT

Contact: Midtronics, P.O. Box 3188, Walsall, WS4 IZY. Tel: +44 (0)1922 691683 Fax: +44 (0)1922 691687 Email: nsmith@midtronics.com Website: www.midtronics.com

New battery tester for spiral type batteries which are gaining in popularity in the agricultural market

CROP DISEASE PREVENTION

Integrated application for potato store protection

Potatoes are susceptible to a wide range of fungal and bacterial diseases which may start in the field and be carried into store on tubers and adhering soil. Once in store, they spread rapidly and destroy tubers and reduce market value. Potato storage diseases include the all-consuming dry and wet rots such as gangrene, late blight and bacterial wet (soft) rots and superficial skin blemishing fungal diseases such as silver scurf, black scurf and skin spot.

Wet and dry necrosis (rot) causes the complete loss of potatoes while skin blemishing rules out entry into the lucrative supermarket 'washed and bagged' trade. If infected tubers are subsequently used for seed, diseases like tuber blight (late blight), black scurf (stem canker) and bacterial soft rot (black leg) develop on new sprouts (shoots) in the field to continue the disease cycle.

Some diseases cause specific problems for export seed potatoes. Seed potatoes are traditionally produced in cool temperate countries like the United Kingdom where conditions are conducive to production of healthy seed tubers. However, they are regularly exported to warm climate countries in the Middle East and Africa. Latent infections of diseases such as 'Blackleg' which lay dormant in the 'eyes' (dormant buds) of the potatoes, can present huge field disease problems when the tubers are planted in these countries.

Though designated as a root crop the potato tuber is actually a dormant stem. Stored tubers and particularly those earmarked for seed may run into stem and shoot related problems that require chemical treatment. Sprout suppression with chemicals can be used to maintain the physical and nutritional integrity of tubers and to ensure shoot development is at the right stage at the right time for planting. In addition, the eyes and sprouts may become infested with aphids.

Disease and pest free stores, tuber protection and maintenance, carried out during loading and maintained thereafter, is the secret of success for safe storage of potato tubers. This in turn requires custom designed spray application equipment to deliver liquid fungicide or sprout suppressant on to clean tubers conveyed into store, without surface wetness problems. Farmers and growers additionally require application machinery that can deliver disinfectants, pesticides and sprout suppressants in very small and mobile droplets to cover the inside of stores.

The Allman potato storage applicator in action

E. Allman & Company based in Chichester, West Sussex offers an integrated package of easy, economic to operate, equipment for the protection of potato storage facilities. They are designed to meet all requirements and to ensure tubers emerge from storage in excellent physical, physiological and nutritional condition.

The 'Allman Potato Storage Applicator' is custom designed for application of liquid products to potatoes loaded into store on conveyors. At the heart of this floor standing, portable unit is a viton diaphragm pump, driven by a single phase electric motor. It can deliver liquid chemicals over a wide range of consistently steady flow rates ranging from 0 - 200 litres/h maximum.

Liquid product is placed in the 20 litre hopper and drawn into the suction hose (3 m). It is consistently pumped through 10 m of delivery hose to the trio of swivel nozzles mounted on a dry boom above the potato conveyer.

Smooth, continuous mixing and flow of product is ensured by the return hose (3 m) and an agitator installed in the hopper for extra viscous formulations. The unit is also equipped with an in-line filter, pressure gauge and one of several different calibrated flow meters. This ensures quick and easy calibration of the unit and use of very slow or faster flow rates as required. Customers are asked to specify the flow rates required and Allman supply a flow meter of a specification to suit their need. Incorporation of a flow meter and pressure gauge means that the operator is immediately alerted if the system or nozzle becomes blocked, when the flow meter immediately drops back to zero.

The boom mounting bracket is secured to a simple scaffold erected over and above the conveyor belt. Operators choose from the range of small sized flat fan nozzles to ensure a uniform screen of spray across the conveyed potato tubers. The unit is easy to move around (using a carrying handle), and re-site with a minimum of disruption and fuss.

Allman also market a range of small and highly portable thermal foggers, including the Swingfog SN51, SN81 and SN101 models, used for disinfection and disinfestation of

empty potato stores, stacks of boxes and for the continued protection of potatoes in store.

These 'hot' fogging machines may be carried by the operator or set to run unattended in automatic mode for application of broad spectrum disinfectants to empty stores and stacks of trays and boxes. For example, modern disinfectants that work on the 'Peroxygen Principle' will rid these of most fungal and bacterial pathogens responsible for potato storage diseases.

Thermal foggers can be set up outside potato stores to deliver fungicide, insecticide or sprout suppressant into the ducting system. Once in the ducting system, tiny (10 microns or less) fogged droplets permeate the store and protect the entire load of potato tubers inside.

Use of pesticides in storage situations is particularly hazardous, especially when using machinery that generates small and highly mobile droplets. Recommended and stipulated protective clothing and safety equipment, including face masks, face shields, goggles and respirators, must be used when handling, mixing and applying all types of agrochemical and agrichemical in any situation.

Through their 'Allclear' protection product range, E. Allman & Co. market the full complement of protective safety equipment and disposable and short life clothing, required during potato storage protection, to ensure the safe use of their pesticide application equipment.

CONTACT

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PILLOW TANK

Barn Owl Sensing and Control System's new and improved grain quality and storage

New practical features have been added to the Martin Lishman Barn Owl Sensing and Control System, a system that makes crop storage measurement and control simpler, safer and more effective.

Barn Owl uses a single digital cable to send continuous readings from multiple crop sensors to a personal computer (PC) up to 750 m away. In a new development it is now possible to monitor the readings using mini display screens located in the grain store. This means, as well as keeping a constant computer record of grain temperature and other quality indicators, users can make a simple check on the in-store display while 'doing the rounds' each evening.

The changing face of crop storage requirements has also seen Barn Owl going through the new 'Health and Safety Protection: Explosive Atmospheres (ATEX) directive certification process. ATEX, is to establish minimum requirements for the safety and health protection of workers potentially at risk from explosive atmospheres. Barn Owl now conforms to the ATEX explosion prevention requirements, where electrical equipment is used in enclosed dusty environments such as grain silos. It is the first system of its kind to be certified as compatible for use in ATEX Zone 21 environments. With Barn Owl, it is also possible to incorporate alarms and a telephone alert system so that constant vigilance is possible at all times.

The new Barn Owl in-store display system (© Martin Lishman Ltd October 2003)

The Barn Owl range includes temperature, humidity and insect crop sensors, as well as rainfall gauges, wind speed and direction recording, weight measurement and soil moisture logging. Sensors can be mapped on the PC screen with a changeable colour scheme for fast identification of storage problems. The system can be further extended by sensors to measure the pressure in air, gas or liquid, the levels in tanks, hoppers and silos and much more.

Continuous logging with Barn Owl sensors gives a wide range of control possibilities, including fans, heaters, vents and pumps. Control programs for grain cooling and drying are available and custom applications can be incorporated very easily. Some of the emerging uses for Barn Owl include regulating compost production, controlling water use in strawberry growing and improving cattle housing conditions.

For remote locations, a Barn Owl temperature logger the size of a button can collect data for downloading into the Barn Owl database. This has found use in diversified farm businesses such as farm shop cool cabinets and specialist cheese makers' maturing rooms, where maintaining the correct temperature at all times is extremely important.

Barn Owl applications range from small grain stores to large industrial facilities. Its simplicity keeps the price very low. Complete systems to monitor grain temperature cost as low as 30p per tonne, making it the most cost-effective system of its kind.

New Barn Owl functions are being developed on a continuous basis and as user

CONTACT

For the latest update or to discuss how Barn Owl could help you, contact Martin Lishman, Unit 2B Roman Bank, Bourne, Lincs., PE10 9LA. Tel: +44 (0)1778 426600 Fax: +44 (0)1778 426555 E-mail: sales@martinlishman.com Website:

BALER

Smooth sailing with six knots

New Holland's BB range of balers; top notch bales that not only look better but are denser and easier to handle

New Holland's product development continues with a round of improvements for the BB range of balers, ensuring that it keeps the top position in the important big baler market. Increased number of knotters (on 1.20 m wide models), improved driveline and plunger action translate into better looking bales that are denser and easier to handle. Customer feedback is also reflected in a host of small improvements that shows New Holland's attention to detail, making life easier for contractors, straw dealers and large-scale farmers.

There are five models in the BB range. The three middle models are now designated BB940A, BB950A and BB960A, signifying the improvements undertaken, with the smaller BB920 and larger BB980, remaining unchanged.

The most significant change on the BB-A is the move from five to six knotters on the BB950A and BB960A. This results in the greater security of the bale, particularly during handling, stacking and hauling over long distances. Additionally the bale appearance is improved, especially when chopped silage bales are being made. Consistently higher density baling, up to 5%, is possible as the risk of twine breakage is minimised. The result is great looking bales that are dense and firm with smoother cleaner edges representing a consistent top and side fill, right to the corners.

The plunger and bale case design is also improved. The plunger is strengthened and adapted to take the extra knotter with the bearings and plunger support rails being moved away from the bale chamber walls. This gives a smoother crop flow, resulting in better bale top fill in difficult crop conditions, while smoother bale chamber walls improves bale appearance. The rail mark often seen on bale sides is significantly reduced. Fewer stoppages and increased density all equals improved daily output.

The BB-A now features the SuperFeed™ W-configuration rotor, offering superb capacity and feeding. Three rows of tines mounted in a 'W' format take crop off the pick-up and feed it evenly and directly into the bale chamber, giving a smooth positive crop flow in all crop conditions.

Adjustments in pick-up height and flotation settings are now made on one side of the balers. The weight is carried on an adjustable collar allowing changes to be made quickly, easily and accurately without the need for tools.

creased capacity is matched by improved reliability. Longer lubrication intervals reduces daily maintenance and ensures the BB-A spends more time working. Larger diameter clutches give a greater surface area from which to dissipate heat, absorbing momentary energy overloads.

Aimed at the large capacity user, the option of a printer to connect to the InfoView™ monitor means that individual baling job details can be personalised with such details as customer name, bale count total, and recorded both on paper and also electronically. InfoView, which controls and informs the operator of all the major baling functions from the tractor cab, is now ISOBUS compatible. The upgraded main controller incorporates a series of fuse blow indicators - a useful feature that shows the attention to detail.

A sturdy tubular bumperbar to protect the steps and rear of the baler completes an important upgrade that ensures New Holland's BB-A range continues to turn out the best bales, day after day.

MACHINERY AWARD

MAGKnife wins prestigious industry awards for Ransomes Jacobsen

'MagKnife' has won the Best New Sports Turf Product Award at IOG Saltex. MagKnife is the new magnetic bottom blade attachment system, from Ransomes Jacobsen Ltd, for attaching bottom blades to commercial mowers, revolutionising mower maintenance. Managing Director, Steve Chicken, received the award from Steven Farish, of Haymarket Professional Publications, publishers of 'Horticulture Week', the sponsors of the Awards.

Peter Weston, Editor of Horticulture Week said in his introduction as he announced the winner, "In the opinion of the judging panel this product will give Ransomes Jacobsen a very competitive edge and will set the standards for other manufacturers to follow."

Shortly after the presentation Steve Chicken was recalled to the podium to receive a second award, this time for Outstanding Overall Product at the Show.

Ever since Edward Budding invented the lawnmower back in 1832, the bottom blade has been held in place by screws. MagKnife uses powerful magnets together with special dowels to position and locate the bottom blade securely in position without the use of any screws. With no screws to remove or insert, the time required to replace worn or damaged bottom blades is reduced from hours to minutes with this new, patented technology.

The unique feature of the system is the strength of the magnets that exert a force in excess of 180 N across the bottom blade yet, by using a special removal tool, requires only minimal effort to break the hold to remove the blade.

Visitors to the Ransomes Jacobsen Stand were amazed with the new development and once the initial scepticism had been overcome they could see the enormous benefits that MagKnife offers.

Technicians and mechanics witnessed the ease and time-saving that can now be achieved when replacing bottom blades. Greenkeepers and course managers quickly appreciated the flexibility of the system, which allows blades to be changed almost at will, such as when top dressing or preparing for a tournament. In addition, the MagKnife is also a retro fit which means that there is no need to buy a new machine to take advantage of the new technology.

MagKnife was invented in Canada by Jeff Buchko, a former turf equipment dealer, developed in the US by Jacobsen Textron and tested and evaluated in the UK. It has involved international cooperation across two continents. Worldwide patents have been granted on both the magnetic system and the special removal tool.

IOG Saltex, the Institute of Groundsmanship's Sports, Amenities and Landscaping, Trade Exhibition is held annually at Windsor Racecourse. It is the largest European trade exhibition for the grounds' care industry and is the showcase event where the industry's professionals can see the latest equipment, products and services.

Ransomes Jacobsen is a Textron company manufacturing a full range of turf maintenance equipment and vehicles for golf, turf, professional lawn care, municipal and industrial applications. Textron Inc. is an $11 billion multi-industry company with 49,000 employees in 40 countries.

New magnetic bottom blade attachment for commercial mowers racks up industry awards

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Land Use and the Environment - Delivering Solutions

Opening address - Baroness Young, CEO Environment Agency

Chaired by **Professor Brian Legg**, *Director of NIAB*
Morning plenary session speakers include:

- Professor Dick Godwin - *Cranfield University - Silsoe*
- Professor Christopher Wathes - *Silsoe Research Institute*
- Tim Rollinson - *Director Forestry Group - Forestry Commission*
- Chris Bourchier - *Head of Rural Estates - Crown Estates* - will sum up the morning session

The afternoon sessions (two each in parallel) will allow more detailed consideration of the solutions proposed. There will be three twenty minute papers in each session.

Parallel Session 1

- Livestock
- Forestry

Parallel Session 2

- Soil & Water/Mechanisation
- Amenity/Environment

Chairman

- **Prof Christopher Wathes**
- **Geoff Freedman**
- **Prof Dick Godwin**
- **Peter Redman**

IAgrE Annual Conference May 13th 2004

Venue:
Royal Agricultural College, Cirencester

***The Conference*:**

For most of the last century land use systems were focused on meeting the needs of society through the economic production of food, timber and other raw materials. During the closing decades there was an increasing realisation that this policy brought with it some negative consequences for the environment in all its forms.

However science, technology and engineering in particular have been used to both to alleviate and eliminate environmental damage through the development of new technologies and by informing improved practices.

This Conference aims to highlight the most significant of these developments as applied to the production of crops, livestock and forestry in the United Kingdom in response to the challenge from Baroness Young who will set out the areas of most concern in the opening address. Chris Bourchier will conclude the morning session by assessing the solutions proposed from the perspective of a major land owning interest.

In the afternoon delegates will be able to join more specialist groups to work on the concepts in more detail.

Under the chairmanship of Professor Brian Legg, Director NIAB, this conference will provide a unique opportunity to be informed about the full spectrum of developments and hear the reaction from a broad cross-section of interests and expertise. It will point the way forward to the most environmentally sensitive systems of production from the land and the technologies that can be used to create and enhance its amenity value.

IAgrE

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