

Green choices

The rush to go eco-friendly may be driven by the moral imperative or legislation. Whatever, emerging solutions are benefiting the environment and the bottom line. Brian Wall reports

More and more organisations are hoisting the environmental flag and flying it proudly over their businesses as the move to greater corporate responsibility – and potentially punitive legislation – takes a tighter hold on industry's thinking.

There's just no getting away from the increasingly powerful pincer movement driving companies to seek not only better technologies and equipment, but new methodologies and ideas that will enable them to adopt a cleaner and more environmentally sustainable approach. And that's in everything from: emissions monitoring and online analysers to water and waste treatment systems; and from wind farms and vehicle utilisation to green systems for power generation.

Just look at the 'eco-friendly' schemes being launched. On the retail side, there's Walkers labelling scheme, developed in partnership with the Carbon Trust, to reveal the carbon footprint of each packet of crisps it produces. The scheme commits companies to reducing their carbon footprint over a two-year period, or risk having the label withdrawn.

Green thinking

Marks & Spencer is another demonstrating a new zeal for corporate social responsibility. It talks of 100 commitments to tackling climate change, including action to ensure sustainability of its supply chain. "For every tonne of carbon from our stores, there is another 10 tonnes from our suppliers and factories around the world," observes Mike Barry, head of corporate social responsibility. This is not just green thinking; this is M&S green thinking.

Then there's banking giant HSBC, announcing an investment of £100m over five years to combat global warming... The list goes on. In short, the commercial world has rarely been so unified, and – whether you believe there's more than a little opportunism here or not – organisations clearly feel under increasing pressure to make demonstrable changes.

What matters to plant engineers in particular is

that, in almost every case, we are the ones in pole position to make these changes happen and to keep them running. And that's across the broadest range of initiatives imaginable.

Scottish & Southern Energy, for example, gave the go-ahead recently for the first ever ash separation plant at Fiddler's Ferry, Cheshire. Its revolutionary technology, installed and maintained by plant engineers, will result in ash products arising from electricity generation being sold on as cement substitutes and industrial minerals. The plant will be able to process up to 800,000 tonnes of ash annually, helping to cut carbon emissions by around

Fuelling a better future

Hull-based generator set manufacturer JS Power recently delivered its first 100% rapeseed methyl ester (RME) fuelled Scania-powered system. Rated at 250 kVA, the Scania 9-litre diesel engine-driven set will generate a primary 415V mains supply for a West Yorkshire manufacturer of wooden furniture.

"This generator set has gone to a customer with a long-standing and firm commitment to the environment," says JS Power managing director Jonathan Searby. "Our customer is now able to generate its own electricity without the use of fossil fuels. Moreover, RME is tax-exempt, making it a viable alternative fuel for this purpose."

Notwithstanding rising prices of bio-fuels, this project could point to a future for many plant users. As Searby reports: "Operationally, our trials have found RME to be an efficient fuel, with consumption comparable to that of diesel. It also has excellent lubricative qualities and, in the event of a spillage, is completely bio-degradable."

What's more, all modern Scania diesel engines with unit injectors are capable of operating on 100% RME, which complies with the European EN14214 standard without any modifications. The only down sides: RME-fuelled engines require shorter oil change intervals and, while there is a reduction in the amount of carbon dioxide and particulates produced, NOx emissions and fuel are slightly inferior compared to an engine running on diesel.



“This involves analysis, transformations, aggregations and evaluations reflective of the requirements and site-specific conditions.”

But the challenge today is for plants to do all that in real time, both to improve controls and to ensure accurate and consistent records, while minimising manual intervention, corrections, rework – and penalties. Installing and maintaining real-time emissions monitoring systems bring significant benefits, notably: real-time compliance and emissions information to prevent non-compliance and avoid fines; a sustainable, accessible and auditable system of record to mitigate environmental risk; and a foundation for new emission requirements and trading.

All of which is now feasible with this company’s, and others’, plant monitoring systems. “No longer does emissions management and environmental compliance need to be such a costly and daunting task,” insists Hart. “Technology advancements have now opened up new opportunities, not only to have a positive impact on the environment, but on the bottom-line.”



Myths and facts of green power

Wind power, solar power and ‘innovations’ for facilities heating and cooling are among technologies on the green bandwagon – and while some have merit, it’s worth getting a healthy perspective.

Installing a small wind turbine on the roof of a house or factory in a built-up urban environment, for example, is likely to achieve very little. Peter Osborne, managing director of FutureEnergy, says his company’s small turbines are aimed at use on windswept farms, where they can provide 1kW at a wind speed of 12m/sec, or 210W at the UK average wind speed of 5.6m/sec – ideal for providing power for water pumps or keeping tractor batteries charged.

He notes that, on an urban roof top, average wind speed is only 1.7m/sec – meaning that, since power output is roughly proportional to the cube of wind speed, useful power output is in fact practically negligible, but the risk to roof structures can be substantial. That said, at remote locations, turbines are still the cheapest way to generate power, coming out at about half the cost per watt of solar photovoltaics, provided there is wind and it is possible to erect a suitable mast.

What about solar power? At current prices, photovoltaics are simply not economically viable, except, as with wind power, at relatively remote locations – although, in this case, primarily where it is prohibitively expensive to lay power lines.

On the other hand, solar-heated hot water has been in widespread use in Japan for decades, and also in South Africa,

where home owners erect black-painted water tanks on poles.

In general, solar hot water heaters for domestic and industrial use – involving glazed structures and fluid pumped through pipes – work well, and perform best with electronic controls that only run the circulation pumps if the temperature in the collecting panels is significantly higher than that in the hot water tanks. These facts have recently been rediscovered by Viridian Solar, a small company based near Cambridge, which went into commercial production earlier this year.

Another idea that has been in use for decades, particularly in less affluent parts of the Middle East and US, is to draw warm air into buildings through water-saturated filter pads. This incurs about 25% of the capital cost and 15% of the running costs of refrigeration cycle cooled air conditioning. EcoCooling, based in Sandbach, is now offering product based on the principle. In the UK, where hot weather tends to coincide with low relative humidity, the technique works well, delivering air no hotter than 22C.

In cool conditions, the coolers operate in ventilation mode and, in hot conditions, in cooling mode. The coolers can be mounted on roofs, on outside walls or inside. They also meet the requirements of the Carbon Trust Interest Free Loan Scheme and, when a unit is switched off, it drains automatically, meaning no stagnant water in the coolers, so no related health risk.

Water temperature rarely exceeds 20C, even when ambient air temperature exceeds 35C. Legionella is not a risk with water temperatures less than 20C, but those worried about micro-organisms can have water supplied to coolers treated to 0.5ppm bromine from a brominator. A control system can automatically set fan speed to minimise electricity consumption.

Above: Metronet now recycles more of its used ballast, thanks to a risk assessment by Wardell Armstrong
Left: wind turbines of limited value in suburban locations
Far left: FTIR analysis on plant

Environment Agency to step up stack emissions sampling

Companies in the environmental monitoring sector are reporting significant growth. Quantitech, for example, which supplies gas testing and analytical equipment, has seen its business double in the last two years, while environmental instruments hire firm Ashtead Technology Rentals reports a tenfold growth over the same period.

The Environment Agency's monitoring certification scheme MCERTS is having a considerable impact, with this year's MCERTS conference covering changes in legislation, standards and monitoring technologies – as well as important news for plant users. For example, at the event, the agency announced an increased level of policing for manual stack sampling.

Other news from the conference: YSI Hydrodata reports significant orders from the water industry. "Our multi-parameter instruments are now finding application in the water sector, because of a need to reduce costs – and instruments that can be left unattended for longer periods contribute towards this aim," says YSI's Ian Thompson. "For example, we have developed a new water intake protection system, HydroSAM, which exploits the benefits of both advanced sensor and communications technologies."

As for Ashtead Technology Rentals, the company's James Carlyle believes that more businesses are turning to hiring plant "because environmental market growth is driving competition which, in turn, is driving innovation". He points out that renting "provides access to the latest equipment without the financial burden of ownership".

The MCERTS events were created to provide a forum for the exchange of information relating to the Environment Agency's monitoring certification scheme. However, they have grown into events for anyone involved with air quality, including process operators, regulators, local authorities, instrument manufacturers, test houses, contractors, consultants, researchers and plant engineers. MCERTS now covers the testing of both soil and water monitoring equipment, and the next event for water – WWEM 2008 – takes place in Telford from 5 to 6 November 2008.

500,000 tonnes a year.

Then there's wind energy. With the government's seal of approval now dry on the construction of two major offshore wind farms in the Thames Estuary, again it's grist to the mill for plant engineers. The London Array and Thanet schemes will together generate 1.3GW of green electricity, enough to power a third of London's three million households when fully operational, and making a significant contribution to the Government's ambition – set out in the Energy Review – to deliver a five-fold increase in renewable energy by 2020.

The London Array will consist of a staggering 341 turbines, each raising 3 to 7MW, with five offshore sub-stations and four meteorological masts. They will rise from the sea 20km off the Kent and Essex coasts, and occupy an area of 232km² between Margate and Clacton. Meanwhile, the Thanet wind farm's 100 turbines will occupy an area of 35km². Led by developer Warwick Energy, that project is being fast-tracked for delivery during 2008 and should provide



electricity for around 240,000 homes.

Back on terra firma, attention is peaking on the impact of HGVs on the environment. In March this year, managers and drivers of some 9,000 goods vehicles distributing food and drink for British consumers were monitoring performance of their trucks, as operators of more than 100 commercial fleets participated in a survey for the DfT. The results of the Key Performance Indicators Survey, conducted by SCALA Consulting, will provide better insights into how efficiently vehicles are operating currently – with measures of utilisation, empty running, and the effect of traffic and loading or unloading delays.

Rail recycling

Meanwhile Metronet, the company renewing two thirds of the London Underground network, is set to increase massively the amount of railway ballast it recycles, as part of its 'Green Matters' initiative. After about 40 years, sometimes less, ballast loses the engineering properties that hold the track in place. So, each year, as part of its track renewal programme, Metronet replaces 50 to 100 tonnes of ballast. New licences covering Metronet's Ruislip and Acton depots will now enable the company to increase the volume of ballast it recycles for secondary aggregates from 50 to 80%, while cutting the quantity of used ballast sent to landfill from about half to 5%.

The new licences follow the development of a risk assessment carried out on behalf of Metronet by engineering and environmental consultancy Wardell Armstrong. Engineers revealed that ballast used on the network is significantly less contaminated than that used on the national rail network. "The Tube ballast is subjected to fewer chemicals," explains Paul Taylor, Wardell Armstrong associate director. "The Underground uses electric power, not diesel, and is not affected by coal and other raw materials carried on the national network. Contamination was neither as widespread, nor serious, as had been thought."

Finally, consider process plant and emissions monitoring and control. All operating companies today need to monitor emissions performance to ensure they are adhering to tighter environmental regulations. As Don Hart, marketing director at systems developer Pavilion Technologies, says: