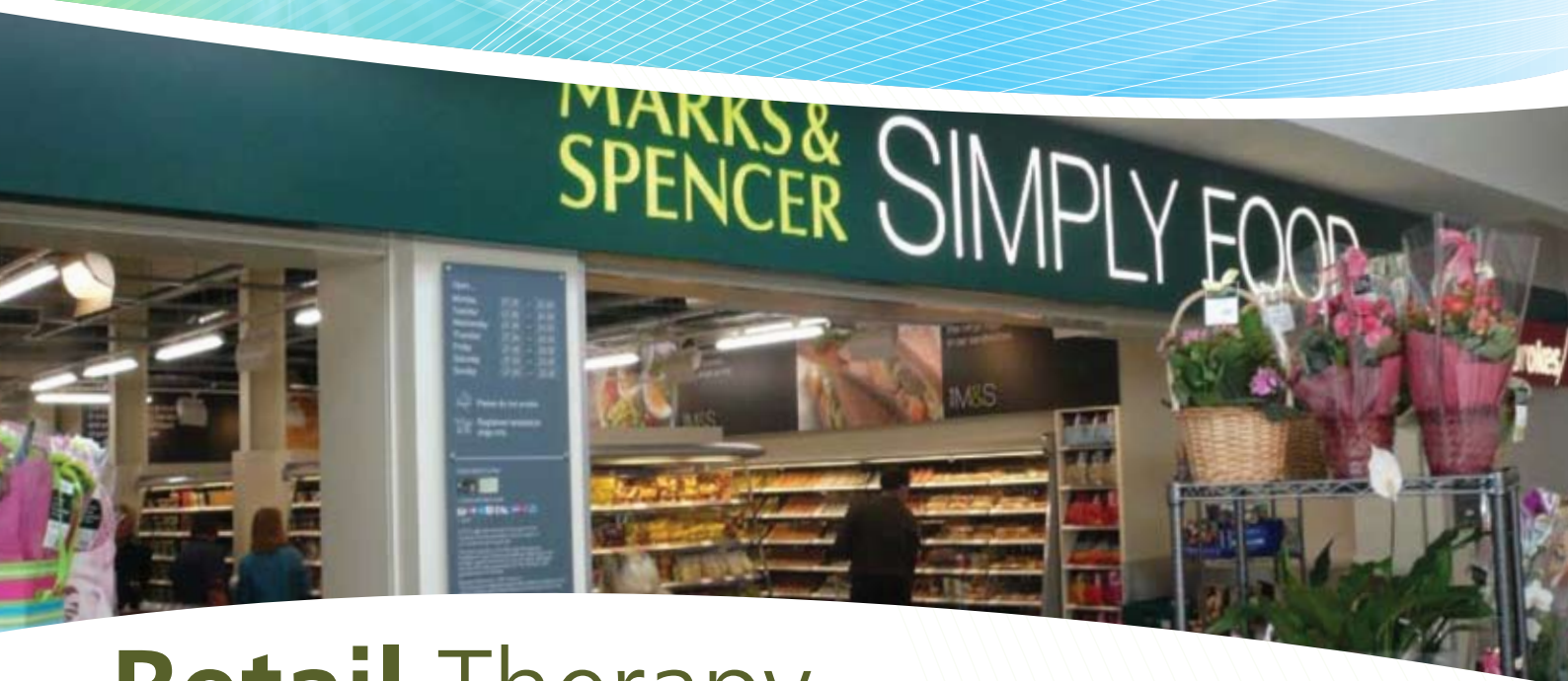


OAKDENE HOLLINS

RESEARCH & CONSULTING



PROJECT UPDATE 2008



Retail Therapy

Marks & Spencer has turned to Oakdene Hollins to advise on how best to achieve a key element of its Plan A.

The leading retailer's eco-plan addresses a host of environmental and social issues affected by its business. An important goal is that by 2012 none of the waste arising from company operations should go to landfill, and M&S commissioned Oakdene Hollins to advise on how to deliver this bold ambition.

"We were asked to quantify the current state of recycling in M&S and to offer an independent view on waste management options," says technical consultant Steve Slater. Stores and distribution centres across the M&S network were visited to ensure their individual requirements were considered within the recommendations.

Focus was placed on assessing the systems by which paper, plastic and other waste streams are currently handled.

Tackling unavoidable food waste is a key objective for M&S. "A bewildering variety of competing technologies

is emerging for processing food waste, such as composting, anaerobic digestion and thermal treatments," says Steve. "Our recommendations highlight the uncertainty in the market and the importance of remaining flexible."

"The Oakdene Hollins research gave us the confidence and evidence we needed to prioritise our options on how we could improve recycling rates," says Rowland Hill, Corporate Social Responsibility & Sustainability Manager for M&S. "The recommendations have acted as a platform for the development of more detailed proposals."

"Oakdene Hollins gave us the confidence and evidence we needed"

Oakdene Hollins is now engaged in further work with M&S.

Contact: Steve Slater
steve.slater@oakdenehollins.co.uk

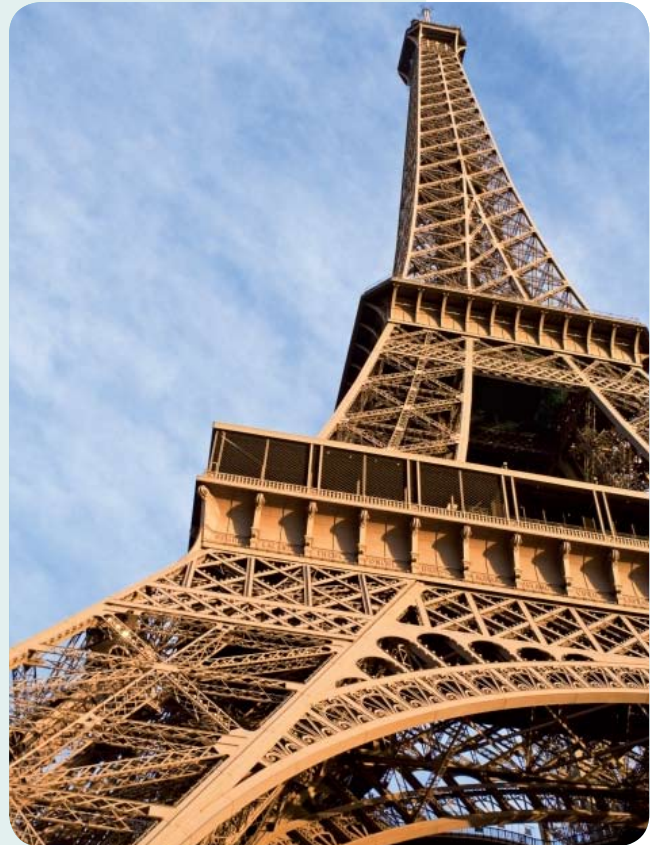
www.oakdenehollins.co.uk

Paris in the Spring

Business leaders from around the world joined senior government officials and top academics to discuss resource efficiency at a recent high-profile conference co-sponsored by Oakdene Hollins.

Procter and Gamble, Siemens, Caterpillar and Nokia were among multinationals attending the three-day gathering in April at the Paris headquarters of the OECD (Organisation for Economic Cooperation and Development). The multi-stakeholder meeting, which reviewed the importance of improved resource efficiency in both developed and developing world contexts, concluded that only systemic change would deliver economic and environmental sustainability. "The key message is that recycling alone is insufficient, which resonates with what we've been saying for a while," says Nick Morley, Director of Sustainable Innovation at Oakdene Hollins. The outcomes of the event will be fed to forthcoming G8 and OECD Environment Ministers' meetings.

Contact: Nick Morley
nick.morley@oakdenehollins.co.uk



Taking the Lead

Some 400 million lead-acid batteries are produced every year worldwide, mostly for use in the automotive sector. When it comes to recycling, they are something of a success story. In many countries over 90% of the lead in end-of-life batteries is recovered and reused because the metal is now so valuable.

Unfortunately, established reprocessing techniques are energy-intensive. Oakdene Hollins is now investigating the potential of an alternative technology, invented at Cambridge University and supported by the East of England Development Agency, which may have lower environmental impacts.

"With their impressive knowledge of lead-metal and recycling markets, Oakdene Hollins is helping us understand the new technology"



"The new approach has the advantage that its outputs can be directly used to manufacture new batteries without further processing," says technical consultant Dan Eatherley. "Until now the Cambridge process has only been tested in the lab. We're exploring scale-up opportunities and the possibility of building a pilot plant."

Dr Zlatka Stoeva, Technology Associate at Cambridge Enterprise says, "This is a very exciting project for us. With their impressive professionalism and knowledge of domestic and international lead-metal and recycling markets, Oakdene Hollins is helping us understand better the technical and economic aspects of the new technology."

Contact: Dan Eatherley
dan.eatherley@oakdenehollins.co.uk

Precious Metals

Gold, rhodium and mercury top the list of metals likely to become increasingly scarce in the near future, according to a new study by Oakdene Hollins.

Unveiled at the House of Commons in April, 'Material Security: Ensuring resource availability for the UK economy' examines the complex factors impacting on the availability of a wide range of non-renewable resources. The report was written for the Resource Efficiency Knowledge Transfer Network (RE-KTN). It reveals that geological rarity need not be the main cause of scarcity of a raw material. Other factors such as market forces, oligopolistic industry structures and dependence on politically unstable countries often have a greater bearing.

"The report clearly sets out the agenda and raises interesting supply chain concepts"

Environmental considerations are also coming to the fore. "Mining, extraction and primary production of raw materials are thought to generate around 5% of global carbon dioxide emissions," says report author Nick Morley. "Growing concerns around climate change will probably

restrict extraction and refining activities sooner, and to a greater extent, than raw material availability is likely to."

RE-KTN Director Arnold Black, who commended Oakdene Hollins for delivering the study ahead of schedule, says, "Material scarcity is a difficult issue to get across without scaremongering. The report clearly sets out the agenda and raises some interesting supply chain concepts. We are confident this document will inform stakeholders and the general public."



Contact: Nick Morley
nick.morley@oakdenehollins.co.uk

Greener Bottles?

How we choose our wine depends on many factors such as price, grape variety, country of origin, or how well it might go with lamb. But are we also interested in the recycled content of the glass used to make the bottle?

"Yes," says a growing number of retailers who are looking to publish just this sort of information on bottle and jar labels. Unfortunately, calculating the recycled content

figure for glass containers is not straightforward, so Oakdene Hollins is helping the industry develop a standard approach.

The most convenient method relies on a national average. "For example, British companies could simply print 70% on all their green bottles based on our calculation for the typical recycled content of this colour glass in the UK," explains Director of Waste Economics David Fitzsimons. "Or they could be more specific, publishing the actual recycled content for each container type using data collected during manufacture."

David points out that "recycled content" should refer only to the contribution of post-consumer glass in container production. "Some manufacturers might also count the waste glass recycled internally during production, which could mislead consumers. Our guidelines will help avoid this."

Contact: David Fitzsimons
david.fitzsimons@oakdenehollins.co.uk

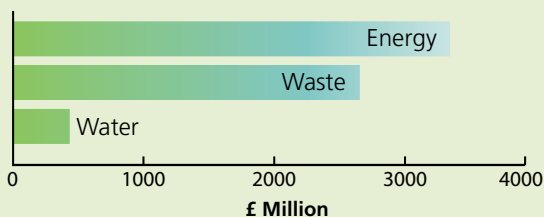
Business Benefits

UK businesses could save £6.5 billion a year by taking simple steps to streamline their resource use, according to major new work by Oakdene Hollins.

The report, co-written with consultants Grant Thornton for Defra (the Department for Environment, Food and Rural Affairs), quantifies low- and no-cost opportunities for reducing waste generation, minimizing energy use and lowering water consumption across the UK economy.

As expected, the greatest opportunities for quick wins lie in improving energy usage by transport, and reducing waste from the food and drink industry. Based largely on 1,800 case studies and site surveys undertaken by Envirowise and Enworks - two business environmental advisory services - as well as contacts with industry stakeholders, the study does throw up some surprises. "For example," says study co-author Dr Ben Walsh, "we discovered that public administration not only spends the most on water, but also has the greatest water saving opportunity."

Estimated savings opportunity in the UK



Contact: Ben Walsh
ben.walsh@oakdenehollins.co.uk

01296 423915



As Good as New

Why recycle a product when you can save three times as much energy by remanufacturing it?

This is the challenge being issued to key audiences by the Centre for Remanufacturing and Reuse (CRR) run by Oakdene Hollins.

"Used toner cartridges, washing machines, starter motors, jet engines and i-pods are just a few products which can be returned to as-new condition," says David Parker, head of the Defra-funded CRR, who views remanufacturing as a distinctive, profitable, high-quality operation.

Many multinationals already take remanufacturing seriously. "In 2005, our global remanufacturing reused 43 million tonnes of engineering materials," Caterpillar's Director of Government Affairs Richard Elsdon revealed during a seminar at the Associate Parliamentary Sustainable Resource Group.

The CRR is targeting tomorrow's designers and business leaders through workshops and courses. Technology management students at Wolverhampton University recently learned how to influence the reuse of end-of-life products. "We've been trying to incorporate this thinking for some time," says course director Chike Oduoza, "but the CRR crystallised the concepts with case studies and hands-on redesign tasks based on Sony's PS2." Other universities have also registered an interest.

Contact: David Parker
david.parker@oakdenehollins.co.uk

Centre for Remanufacturing & Reuse
www.remanufacturing.org.uk
01296 337165



Carriage Return

Few of us now wake to the sound of clinking bottles and the whirr of the electric milk float. The demise of the morning milk-round is the most obvious sign that, in the UK at least, refillable glass bottles are becoming a thing of the past.

“The last 30 years have seen a steep decline in the use of reusable glass containers in many countries,” confirms Dr Peter Lee, a senior consultant at Oakdene Hollins, who has reviewed refillable systems around the world. “Convenience is now a high priority for customers, and advances in single-use material formats such as plastic bottles, aluminium cans and cartons have all contributed to this decline.”

Peter’s research reveals that refillables continue to thrive in developing countries like South Africa, where small localised supply chains still exist. But in advanced economies, unless legislation is introduced, they are usually squeezed out in favour of non-returnable plastic bottles which can be manufactured in larger numbers and distributed more cheaply.

The report, produced for WRAP (the Waste & Resources



Action Programme), indicates that it is not all doom and gloom for the refillables market. “We found some great examples of innovation, albeit at niche level. Local sourcing strategies introduced by major supermarkets and moves towards carbon labelling of products could favour refillables,” says Peter. “But ultimately such systems must reduce environmental costs. Any regulation should be thought through carefully and not implemented based on the nostalgic memory of clinking milk bottles.”

Contact: Peter Lee
peter.lee@oakdenehollins.co.uk

Japanese Cut the Cloth

British clothing manufacturers and retailers looking to incorporate producer responsibility initiatives into their business activities could learn a thing or two from Japan.

So says Oakdene Hollins consultant Fiona Kelday after profiling textile recycling and reuse schemes at three Japanese companies with the support of the British Embassy in Tokyo.

Kurabo, a manufacturer of corporate clothing, operates a scheme whereby end-of-life textiles are collected and incinerated providing energy for one of its finishing and dyeing plants. “Almost 52 tonnes of discarded uniforms

have been diverted from landfill since 2002 reducing the company’s carbon footprint and saving energy costs,” says Fiona.

Takashimaya, a chain of prestigious department stores, has introduced a similar scheme encouraging customers to return used garments in-store for recycling into insulation felt for the automotive industry.

Meanwhile, leading retailer Uniqlo takes back thousands of its own-brand products every year, most of which are sent to the developing world for reuse. Uniqlo is also developing more recyclable products and is looking to reduce environmental impacts across its whole supply chain.

The UK still landfills around 1 million tonnes of clothing every year and Fiona believes we could pick up some valuable lessons from Japan, “We are starting to see some similar initiatives from the likes of Oxfam and Marks & Spencer which are a step in the right direction, but there is a lot more we could be doing to increase clothing recycling and reuse.”

Contact: Fiona Kelday
fiona.kelday@oakdenehollins.co.uk



Metal Beaters

The Guggenheim Museum in Bilbao, Spain incorporates titanium in its bold architectural design – but why is the metal not used more often?

It's a good question given that titanium is not only the fourth most common structural metal in the Earth's crust but is also resistant to corrosion and as strong as steel with only the two-thirds the weight. The problem is, producing titanium is not easy. The dominant extraction technology is complex and laborious so titanium is only cost-effective in aerospace and other niche applications. Oakdene Hollins is now assessing the economic viability of

a new process to extract the metal, developed by a spin-out company from Leeds University. "We are analyzing and comparing two existing technologies: the Kroll and the recently developed FFC_{CAMBRIDGE} processes," says technical consultant Dr Hudai Kara. "Our client will then benchmark these findings with the new technology for a possible investment decision."

Contact: Hudai Kara
hudai.kara@oakdenehollins.co.uk



Monitoring Success

Processing and stabilizing different waste types is not always straightforward. Plasma-arc furnace treatment and electrokinetic geo-osmosis are two of many new approaches now in development with UK government support. Research into these technologies is sponsored by the Department of Innovations, Universities and Skills, through the Technology Strategy Board.

Oakdene Hollins has been contracted to monitor the progress of these and a further 25 or so such projects with a total budget of about £50 million. "The knowledge and financial potential are massive," says technical consultant Dr Trevor Crichton – one of several involved in the monitoring work. "Many of the technologies I am seeing have truly international appeal. The revenue from even one success could see a hundred-fold return on the investment."

Contact: Trevor Crichton
trevor.crichton@oakdenehollins.co.uk

"Many of the technologies I am seeing have truly international appeal"



Oil Change

A new law governing the inland storage of oil in England should be extended to the domestic sector.

This is the key finding of a recent assessment by Oakdene Hollins into the impact of Oil Storage Regulations which aim to cut spillages by half.

“Oakdene Hollins presented a rational case for change”

The study shows that the current rules introduced fully in 2005 have resulted in only a 29% decline in oil spills. “We calculate that if the regulations were also applied to the heating oil stored by householders, spillages would be reduced by a further 10%,” explains senior consultant Dr Peter Lee, who also recommends extending the regulations to Wales.



“The work has moved the debate forward,” says Richard T. Martin, Policy Advisor at the Environment Agency who commissioned the project. “We are grateful that Oakdene Hollins looked at the proposed amendments in a balanced and neutral way, and presented a rational case for change.”

Contact: Peter Lee
peter.lee@oakdenehollins.co.uk

Retreading Steps

Oakdene Hollins has been working with WRAP to improve the market for the 50 million used tyres recovered annually in the UK.

Landfilling them is no longer an option since the practice was outlawed in 2006. This only adds to the pressure to find and promote new uses for old tyres. Currently many worn-out tyres are shredded to provide surfaces for equestrian activities and children’s playgrounds, or for use in street furniture such as bins, bollards and speed bumps. These ‘low tech’ uses are not ideal as lower value recyclates would be equally good in such applications. “It would be far better to use material recovered from old tyres to make new tyres,” explains project leader Steve Slater. “This could significantly reduce the demand for virgin rubber which is both economically and environmentally costly.”

“We are seeing interest from supermarket chains and home delivery retailers”

One step in the right direction is the practice of retreading, where worn-out tyres are resurfaced to restore their performance to the same legal standards expected of new products. In the UK, retreads are rarely found on small vehicle classes such as cars due to price competition from imports of new tyres, but they are

common on heavy lorries. According to Steve, retreads also make financial sense for those operating light trucks. “Many fleet managers didn’t realise that retreads were cheaper than buying new,” he says. “Now we are seeing interest from supermarket chains and home delivery retailers operating light truck fleets, which can only be good news for the environment”.

Contact: Steve Slater
steve.slater@oakdenehollins.co.uk



About Us

Oakdene Hollins Ltd has been providing public and private sector clients with authoritative technical and economic studies since 1994.

We offer objective advice on:

- waste management and resource efficiency
- sustainable innovation and clean technology
- environmental economics
- due diligence
- market interpretation
- strategy and policy

Our team includes experts in:

- manufacturing and retail systems
- chemistry and chemical engineering
- business development and management
- nanotechnology
- lifecycle analysis and carbon footprinting
- ecology and biodiversity

Oakdene Hollins is certified to ISO 9001:2000



Oakdene Hollins is committed to minimizing negative impacts on the planet:

Carbon Offsetting Every year, we calculate the financial cost of the carbon dioxide our activities generate, and spend the equivalent on bicycles and energy-saving devices for our staff.

Transport Our policy is where possible to use public transport on business. By choice many of us walk or cycle to work.

Office Equipment We use remanufactured copiers, printers, cartridges and other consumables.

Paper We avoid printing when we can, and use recycled paper when we can't.

Recycling We recycle our paper, glass, plastic and cardboard and compost any organic waste.

Fair Trade We choose ethically traded goods where possible.

Joining the Team



Hudai Kara

BSc MSc DPhil

A metallurgist by training, Hudai's key expertise lies in the techno-economic evaluation of sustainable technologies. Current clients include

WRAP, the Technology Strategy Board, Cambridge Enterprise and Defra.

Prior to joining Oakdene Hollins, he was a Senior Research Scientist at the Johnson Matthey Technology Centre, optimizing high temperature chemical processes. Hudai also ran projects for Anglo Platinum - the world's leading refiner of precious metals.

An author of numerous scientific papers, Hudai has higher degrees from Oxford University and Istanbul Technical University. He is a Member of the Institute of Materials, Minerals and Mining and is on the UK Materials Chemistry Committee. Hudai is also an Associate Member of the Institute of Metals.

hudai.kara@oakdenehollins.co.uk



Paul Vaughan

BA, MSc

Effecting behavioural change and improving efficiency are key areas of expertise for Paul. He joins us from WRAP where, as interim Head of Local

Authority Communications Support, he promoted public participation in recycling across the UK.

Paul has an MSc in Environmental Management for Business from Cranfield University. He is a Member of the Chartered Institute of Public Finance & Accountancy, and an Associate Member of the Institute of Environmental Management & Assessment. Paul has previously held senior management positions at Deloitte & Touche and the Office of Government Commerce among others.

Paul co-authored our report on Product Lightweighting for the Resource Efficiency – Knowledge Transfer Network and recently led a project for Envirowise identifying common metrics for organisations supplying resource efficiency services.

paul.vaughan@oakdenehollins.co.uk