



Update 2011

SUSTAINABILITY AND ZERO WASTE PROJECTS

Critical Materials: a Period of Adjustment

Everyone understands the importance of iron, aluminium and copper in manufacture, but more obscure elements such as neodymium and tellurium are becoming just as crucial. Known as 'critical materials', they're used in many emerging green technologies including electric vehicles, solar panels and wind turbines. Concerns about access to these materials are reflected in surging prices for some. But exactly how critical are these substances? Can alternatives be found and, if not, can they be recycled? These are questions addressed by Oakdene Hollins in several major projects for clients across Europe.

One report focused on 'rare earths' - metals used to make magnets and rechargeable batteries for electric vehicles. Most currently come from China which is now restricting its exports, and Oakdene Hollins confirmed a short-term supply problem. But for others, substitutes are available, while new mines outside China will also increase the flow. "The report has been well received by all who have read it," says Matthew White of the UK Department for Transport who funded the research. "We now have a clear picture of the global supply and demand situation concerning lanthanides – a key issue in relation to the potential electrification of road transport."

Similar conclusions are reached in our work for the EU's Joint Research Centre, conducted with the Hague Centre for Strategic Studies, which evaluates supply risks for metals used in low-carbon energy generation. "Europe wants a rapid expansion in green energy and worries about a shortage of certain materials like tellurium," says Nick Morley, director of sustainable innovation. "We believe policy goals can still be achieved as the risks are modest and substitute systems exist. That said, individual companies whose business models centre on a specific material may experience problems."

Meanwhile, our study for the European Pathway to Zero Waste assesses options for recovering critical materials from end-of-life products. "Although many elements can be recycled," says Nick, "the short term contribution of recycling to materials availability may be limited because of the long lifetime of many products prior to disposal combined with the rapid growth in green technologies. In the longer term we expect new recycling techniques to be developed to address the problem of small quantities dispersed in individual products combined with better design for disassembly."

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Food for Thought

Signified by the flower logo, the European Ecolabel helps consumers choose products and services that are kinder to the environment. The Ecolabel, which was established in 1992, is carried on many product groups including detergents, textiles, lubricants and tourist accommodation. The European Commission asked Oakdene Hollins to lead an international consortium assessing the feasibility of extending the Ecolabel to food, drink and feed products.

"It's not a straightforward task," explains principal consultant Paul Vaughan. "The food labelling landscape is already quite congested so the Ecolabel mustn't confuse shoppers further. The European Commission is particularly concerned that any Food Ecolabel would not conflict or damage the 'Leaf', the EU's own organic food label."



Working with the University of Göttingen in Germany and the Swiss Research Institute of Organic Agriculture, Oakdene Hollins - already part of the UK Ecolabel Delivery Team - is evaluating environmental impacts of food products including the complex issue of food miles, identifying gaps in coverage by existing labelling schemes and canvassing public and industry opinion.

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Drinks Map



Studies indicate that the manufacture of soft and alcoholic drinks is responsible for about a fifth of all waste produced by the UK food and beverage sector. Little is known, though, about where in supply chains the waste occurs, which products account for most of the arisings and how the waste is managed. Research conducted by Oakdene Hollins in partnership with the industry is now shedding some light on these issues.

"Manufacturers would normally be wary of divulging operational data but they've been very cooperative. Our work is seen as a chance to identify key resource saving opportunities," says principal consultant Dr Peter Lee. Working closely with the British Beer and Pub Association, the British Soft Drink Association and other relevant trade bodies, Peter's team is mapping waste and water arisings at each stage of the supply chain for a dozen different product categories encompassing beer, cider, spirits and soft drinks.

Although still on-going, some interesting results are already emerging from the study, which is funded by WRAP (Waste & Resources Action Programme). "Regardless of the specific drinks product or size of manufacturer, we're finding that most arisings are now being diverted from landfill either as a by-product to animal feed or some form of biofuel," says Peter, who nevertheless stresses that waste prevention remains the best environmental option.

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Not Just Waste Prevention

Oakdene Hollins recently advised Marks & Spencer on how to achieve zero waste to landfill from its operations by 2012 – a crucial sustainability target under Plan A, the leading retailer's pioneering eco-strategy. With M&S already diverting some 92% of waste for recycling, it has now asked Oakdene Hollins to assist with the implementation of a major waste services contract.

"I think Marks & Spencer sees us as a safe pair of hands," says principal consultant Steve Slater who is advising on the appointment of a contractor to provide cleaning and waste management services across all fifteen of the retailer's general merchandise distribution centres (GMDCs) in the UK and Ireland.

Steve's team has been working closely with procurement managers and legal advisors at M&S to develop the necessary Service Level Agreements and Key Performance Indicators. "Following our advice dry recyclables such as paper, cardboard and plastic which arise in the stores are now being backhauled to the GMDCs," says Steve. "Part of our role is ensuring that when the material arrives it will be processed alongside other recyclables and properly segregated by the new contractor for effective recycling."

As well as preparing formal tender documents, Oakdene Hollins conducted site visits and coordinated presentations by shortlisted contractors, and assisted in the selection of the preferred bidder. "We chose Oakdene Hollins because of their expert waste knowledge and the previous excellent work with our team," says Mandy Keepax, head of facilities management at M&S. "They have provided us with the best in project management which will contribute towards our Plan A commitment of delivering zero waste to landfill."

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Drawing Knowledge from Data

Around 18.4 million tonnes of waste - with an associated economic cost of £17 billion - are generated every year across the UK's food and drink supply chain according to important research for WRAP (Waste & Resources Action Programme) by Oakdene Hollins.

"Good information was already available on the amount of food and packaging wastage in households, but less was known about arisings from manufacturing, distribution and retail companies," says technical consultant Peter Willis. "We developed a comprehensive picture of wastage across the entire supply chain using previous work for WRAP by DHL Exel Supply Chain and other existing datasets."

The report shows that, after households, manufacturing accounts for the greatest share of waste in the supply chain with some 5 million tonnes arising annually as a result of product damage, incorrect demand forecasting, over-packaging and other factors. "If this unnecessary waste had been avoided, £5 billion - equivalent to 2% of turnover - could be saved annually in the UK food and drink supply chain," says Peter. He nevertheless praises the success of recent sector-wide initiatives aimed at waste prevention such as Phase 1 of the Courtauld Commitment.

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Profiling SRF

Burning solid recovered fuel (SRF) offers the potential to reduce the volume of waste sent to landfill while generating renewable energy, and is of growing interest to governments keen to hit greenhouse gas reduction targets. Derived from the non-recyclable fraction of municipal solid waste, SRF is largely composed of paper, plastic, textiles and wood. But given the complex nature of household waste, critics are concerned that other less benign components can find their way into the material. A leading UK waste management company has asked Oakdene Hollins to look into the problem.

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"Our client is thinking about investing considerable sums in a new plant designed to produce SRF and wanted to know how levels of lead, chlorine and other contaminants in residual waste might vary in the future," says director of zero waste projects David Fitzsimons. "We modelled likely arisings of products such as vinyl flooring, electrical cabling and television sets and other product sources of pollutants in the waste stream."

The project team had to account for recent changes in consumer behaviour, as well as new legislation and voluntary industry agreements, which can determine whether specific chemicals end up contaminating waste and, potentially, SRF. For instance, even though cathode ray tubes from old computer monitors and televisions are now banned from non-hazardous landfills, illegal disposal means they continue to contaminate the waste stream with lead. "But sales of new products containing CRTs largely ended in 2006, so we expect lead levels to have fallen significantly in a few years' time," points out David. The complex study provided a profile for the client to project forward their 2011 composition analysis. This provided clarity on where changes could be needed during a long term contract to maintain the quality of SRF.

Tool for Life

Few of us would choose to replace our refrigerator for a newer model, especially if the existing one has worked fine for years. But carrying on with an old fridge until it eventually goes wrong may not always be the best environmental option. When different impacts such as carbon emissions, energy, water and resource use are factored in, there comes a point when you might be better off trading in your appliance for a more efficient replacement. Oakdene Hollins has developed an ingenious tool which simplifies such decisions.

"It's called the lifetime optimisation tool," says technical consultant Dr Adrian Chapman who, with colleagues, created an Excel-based model which allows users to explore the options available for a specific product coming to the end of its designed life. "It helps you decide whether it's time to replace the product with a new one or try to extend its life through refurbishment."

Funded by WRAP (Waste & Resources Action Programme) and based on lifecycle stages derived from published data, the model works for ten different electrical products including fridge freezers, laptop computers and mobile phones. "Our tool is aimed at manufacturers, retailers, buyers and anyone else wanting to know the optimum life of their products," says Adrian.

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Small World

Nanotechnology, the study and manipulation of materials a thousand times thinner than human hair, offers the possibility of developing new and improved products and processes in many areas of modern life. But comparing the potential value of nanotech applications with existing approaches is difficult. Oakdene Hollins has developed a new methodology which evaluates the claims made for new nanotechnology applications.

"Much research is on-going, both in the UK and abroad, to understand the risks of nanotechnology," says senior consultant Dr Ben Walsh. "But little is known about the potential economic benefits of nano-enabled products." Ben's team has now created a tool which allows policymakers and research funders to perform a full cost-benefit analysis of new nanotechnologies, comparing them against incumbent technologies.

The methodology has been tested with six key nanotechnologies, among them solar cells, packaging and anti-fouling paint for ships. The work suggests that these areas alone offer £11 billion to the UK economy. "Oakdene Hollins has delivered an excellent, ground-breaking tool which is generating a great deal of interest around the world," says Steve Morgan of Defra (Department for Environment, Food and Rural Affairs) who funded the work.

Ben believes the new methodology can easily be applied other areas of innovation, not just nanotechnology: "I can see it appealing particularly to high tech companies wanting to evaluate their intellectual property portfolio."

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Objects in the Rear View Mirror...

...may appear closer than they are. We tend to think of wind turbines and electric vehicles as modern ideas. But both are old technologies which have been revived. Motor cars powered by rechargeable batteries were, for example, common on the streets of Paris in the late nineteenth century. Oakdene Hollins is leading an exciting project to find out if other forgotten or abandoned ideas – especially those with a sustainability application – can be actively sought and 'reinvented.'

A key premise of the project, funded through the Innovation Research Initiative, is that the imperative to develop low carbon solutions is nothing new. "There have been times in the past when oil was in short supply and inventors had to come up with alternative technologies to cope with those conditions," says technical consultant Dr Adrian Chapman, pointing to the example of the Parisian electric cars. "We found that many other good ideas, developed in the past and then abandoned when times improved, are lying dormant in research archives and old scientific journals just waiting to be re-discovered."



Sure enough, when the team started taking a look, some hidden gems popped up such as the Flettner rotor, a spinning column used on ships in the 1920s as an alternative to sails, which is being trialled again as a fuel-saving measure on long-distance tankers. "Another of my favourites is Ventile, a finely woven cotton similar to Goretex but made from natural materials," says Adrian. "During the Second World War, it was used for pilot flight suits. Almost seventy years on it's being revived for use as a weather-proof cloth."

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Is it Spending or Investing?

How an organisation spends its money has environmental as well as financial implications. From choosing a light bulb to designing a building, every purchasing decision has an impact. Recognising its substantial spending power, albeit somewhat curtailed in recent times, the UK Government is leading the green procurement agenda and has asked Oakdene Hollins for advice.

"We are assisting the Government in setting new mandatory public procurement standards. These should help purchasers achieve value for money while influencing the supply chain," says senior consultant Dr Ben Walsh. "For instance, based on our recommendations, at least 5% of the furniture procured by Departments will be reused in-house rather than bought new, saving hundreds of thousands of pounds across Government."



In a separate project for the North East Improvement & Efficiency Partnership, Ben identified £3 million in savings through the increased procurement of remanufactured goods by local authorities. "The information we have gained here is extremely valuable," says Ben. "The findings can be readily applied to every public procurer in the country, saving tens of millions of pounds."

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Now You See It

Many manufacturers think consumers prefer food and drink to be packaged in colourless jars and bottles. Hoping to address the negative perception attached to green glass, WRAP has now funded trials at Sainsbury's stores. Four alcohol products currently sold in colourless bottles – white wine, whisky, vodka and brandy - were bottled in sample green containers, and shoppers' responses gathered through questionnaires and focus groups conducted by our subcontractor, market research firm *rdsi*.

"We were surprised at how readily consumers accepted the changes," director of zero waste projects David Fitzsimons. "In fact, only one out of the 644 customers interviewed even spotted that the bottles had gone green before it was pointed out."

The project's findings were presented at the London International Wine Fair at ExCeL.

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We Brits love wine. In fact, we love it so much we now import more bottles than any other nation in the world. Now a recent project managed by Oakdene Hollins with Sainsbury's and winemaker Australian Vintage may persuade manufacturers and brand-owners to question the assumption that consumers have to see a product through clear glass before they buy it.

Ezi Does it

A revolutionary new in-store refill system for detergent products, whose development was project managed by Oakdene Hollins, has been named 'Packaging Innovation of the Year'.

Invented by eziserv Ltd and trialled at five Asda Walmart supermarkets with funding from WRAP (Waste & Resources Action Programme), the new system incorporates an interface which allows customers to fill up reusable 1.5 litre pouches with liquid fabric conditioner. The product is piped to the dispenser from a bulk container situated at the back of the store. With the potential for pouches to be refilled up to ten times, packaging waste in this category of products could be reduced by an estimated 96%.

"This is a great example of a 'disruptive' technology," says principal consultant Dr Peter Lee who was the project manager for the supermarket trials and attended the prestigious 2010 UK Packaging Awards ceremony at London's Grosvenor House Hotel. "It drives transformative change at every stage of the supply chain from manufacture and retail through to consumer behaviour."

McBride supplied the liquid used in the trials, while Unilever offered advice from a brand owner's perspective.



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Material Evidence

The trade in used clothing is big business. For instance, SOEX, one of the world's largest textiles recyclers, employs 3,500 people worldwide and processes over a quarter of a million tonnes of material annually. However, determining when used textiles count as waste is proving a headache for EU policy-makers. The European Commission's prestigious Institute for Prospective Technological Studies (IPTS) therefore asked Oakdene Hollins to advise on the problem.

"When it comes to textiles, defining waste seems to be a matter of geography," says technical consultant Caroline Bartlett. "For example, if you put clothes in a textiles bank in Scotland they're classed as waste, but south of the border they'd be non-waste and would avoid strict regulations governing transport and storage." Caroline and her colleagues interviewed textile recyclers across Europe, noting similar inconsistencies in approach in many other EU Member States. In some cases the loopholes were allegedly being exploited by a few unscrupulous collectors.

With contributions from more than fifty stakeholder organisations, Oakdene Hollins also built up a much-needed and comprehensive market picture, estimating that some five million tonnes end-of-life textiles are collected each year for reuse and recycling in Europe. "We analysed trade within the EU and beyond and looked at the main sorting and treatment approaches for used textiles depending on type and condition. Environmental impacts were also evaluated," says Caroline, whose work feeds into the current revision of the EU Waste Framework Directive.

Acknowledging the challenges in delivering a report of this scale, Alejandro Villanueva of the IPTS praised Oakdene Hollins for producing a mature assessment: "We appreciate very much the quality effort made by the team for this project, a matter in which we know not much data is readily available."

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Joining the Team

Mary Miller

PhD BSc



Mary talks about how she came to join Oakdene Hollins in March 2011:

What's your background? "I'm a plant scientist by training, and was research project manager for the British Potato Council overseeing projects ranging from studies on potato diseases and damage, to the development of new starch-based materials."

So why Oakdene Hollins? "Well, through my own consultancy Sirius I co-ordinated projects involving universities, research institutions and the Potato Council, contributing research articles to the trade magazine Potato Review. And I had a similar project management role at venture capitalists Agricultural Genetics, Cambridge. I know mine's a bit of an unusual subject matter for Oakdene Hollins, but I've got the skills they were looking for and they've got the willingness to let me try them out in a new field."

And why Aylesbury? "I'm actively involved in the local community as a school governor and through church-based activities. I want to work for a company that allows me to have that 'work-life balance' everyone talks about but so few of us are lucky enough to enjoy."

So what's been your first task? "They've got me straight in on some major client projects concerned with food security, but as I've got expertise in quality management I'll be heading up the implementation of ISO 14001 in the office."

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Niels Sprong

MA MSc BA



A social scientist by training with an interest in environmental issues, Niels's core expertise lies in innovation studies. We asked him about his passions:

How do you think you'll fit into Oakdene Hollins? "Well, I met Oakdene Hollins staff through the Hague Centre

for Strategic Studies who were working with them on bottleneck materials for renewable energy technologies. I was as impressed by the quality of their research as they were with my talent for spotting a new angle. Oakdene Hollins has a reputation for innovative thinking and for questioning 'received wisdom', and I like that. There's a good fit."

How's it working out? "It's really important to me to be able to work with a bunch of guys who care about what they do. There's a good vibe. People here care about making a difference."

But they don't keep you at work all the time? "Luckily I still have time to volunteer at Peer 2 Peer University (p2pu.org) which I have been connected to since its pilot phase, creating and organising what you might call 'slightly experimental' courses. But Aylesbury's in easy reach of Oxford and London, so I also enjoy getting out and about."

We're pleased to report that Niels has hit the ground running, already contributing important work on critical materials and the feasibility of extending the EU Ecolabel to food; both projects are featured in this Project Update.

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About Us

Our Directors David Fitzsimons and Nick Morley first worked together at Shanks Group plc in the early 1990s where they combined their knowledge of chemistry and economics with an interest in sustainable innovation. They decided to set up Oakdene Hollins whilst in their mid thirties, and took over the lease of the Aylesbury head office of their old employers. "We both had young families and wanted to build our own team of people with science and economics qualifications to deliver sustainability projects," says David. The company works on projects in the food and drink, metals, and textiles sectors amongst others, and collaborates widely including with a

number of leading universities. "But much more of our work is now European rather than UK-based, and we like the mix of FTSE 100 and public sector clients," adds Nick.

Because we care about minimizing the negative impacts that businesses can have on our environment, we promote remanufacturing and reuse. We offer staff five days additional paid leave for voluntary community work, buy bicycles for staff, measure the CO₂ emissions of project staff and much else besides. Our detailed Sustainability Policy is available on our website.

Oakdene Hollins is certified to ISO 9001:2008 and in 2011 is working toward ISO 14001.

