WR1403: Business Waste Prevention Evidence Review

L2m4-6 – Incentives

A report for
Defra

November 2011

This report has been prepared by:	Ben Walsh, Peter Willis
Checked as a final copy by:	Katie Deegan
Reviewed by:	David Fitzsimons
Date:	20 October 2011
Contact:	peter.willis@oakdenehollins.co.uk
File reference number:	WR1403-L2-m4-6-Incentives.docx

Context of Project WR1403

Waste prevention is at the top of the waste hierarchy. A major priority of the coalition government is to move towards a zero waste economy, and an important element of this will be to encourage and increase waste prevention. This review aims to map and collate the available evidence on business waste prevention. It will help inform the preparation of England's National Waste Prevention Programme as required under the revised EU Waste Framework Directive (2008).

The focus is on aspects of waste prevention that are influenced directly or indirectly by businesses - it complements a previous evidence review, WR1204, which focused on household waste prevention. The definition of the term 'waste prevention' used here is that in the revised Waste Framework Directive:

'Prevention' means measures taken before a substance, material or product has become waste, that reduce:

- *a) the quantity of waste, including through the re-use of products or the extension of the life span of products;*
- *a) the adverse impacts of the generated waste on the environment and human health; or*
- *b) the content of harmful substances in materials and products.*

Recycling activities or their promotion are outside the scope of this review.

Context of this module

This module is one of a number of Level 2 modules that contain analyses of Approaches, Interventions, Sector Issues and other aspects of the review. This module deals specifically with the aspect of waste prevention using the Intervention mechanism of Incentives.

A full map of the modular reporting structure can be found within **L1m2: Report Index**.

(Empty page)

Contents

Glossary

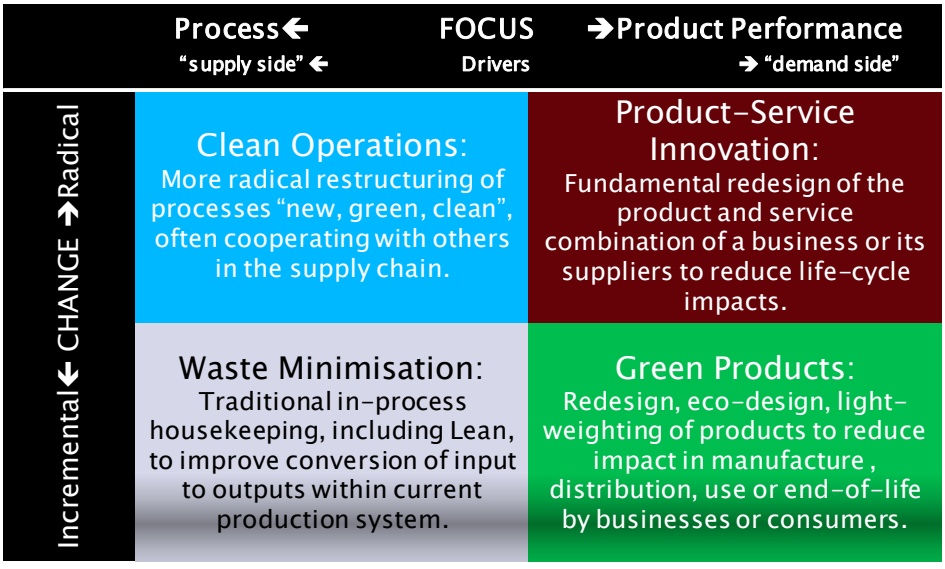
BREW	Business Resource Efficiency and Waste	NGO	non-governmental organisation
C&I	commercial and industrial (waste)	OECD	Organisation for Economic Co-operation & Development
DRS	deposit-return system	PRN	Packaging (waste) Recovery Note
DTI	(former) Department for Trade and Industry	PSI	product/service innovation
EA	Environment Agency	R&D	research and development
EFfA	Effizienz-Agentur NRW (German organisation)	SME	small/medium enterprise (EU definition)
EMS	environmental management system	STI	Sustainable Technologies Initiative (LINK programme)
EPR	extended producer responsibility	TSB	Technology Strategy Board
GDP	gross domestic product	VAT	value-added tax
HMRC	HM Revenue and Customs	VOC	volatile organic chemical
NAO	National Audit Office	WRAP	Waste & Resources Action Programme

Units Conventional SI units and prefixes used throughout: {k, kilo, 1,000} {M, mega, 1,000,000} {G, giga, 10^9} {kg, kilogramme, unit mass} {t, metric tonne, 1,000kg}

Language used in this report

This report has used a framework for evaluating both the actions a business takes to prevent waste (the Approaches), and the mechanisms that have catalysed the actions (the Interventions). The detailed description of Approaches and Interventions may be found within the respective modules **L2m2: Approaches** and **L2m4-0: Interventions Introduction**, but a brief reference outline to the Approaches is given here:

Positioning of approaches in response to business drivers including waste



Source: Oakdene Hollins/Brook Lyndhurst

1 Incentives and How they Address Waste Prevention

Incentives are defined within this report as external rewards or pressures that encourage waste prevention. These can be in the guise of support to enable waste prevention (positive incentives such as grants or soft loans) or as a disincentive to continue with a behaviour that is deemed more wasteful than an alternative (negative incentives such as taxes and levies). Whilst much of the evidence within this report relates to incentives induced by policy and legislation, it is worth remembering that market competition and price signals often provide sufficient incentives for waste prevention. This becomes less likely where associated value is low, and where the environmental impact is high, such that intervention may be desirable (1).

Certain types of intervention are specifically excluded from this report on the basis that they do not provide incentives as such, but rather represent a regulatory 'hurdle' which businesses must overcome; such as interventions that ban the production or disposal of different substances. However, mandatory schemes can offer inducements for waste prevention activities that go beyond mere compliance. A good example of such a mandatory intervention might be a producer responsibility scheme that incentivises weight reduction in order to reduce future compliance costs. A key distinction that can be drawn between the two types of intervention is the extent to which continuous innovation is encouraged.

Incentives do not need to be based on financial reward; prestige being the most common alternative, awards in environmental excellence being an example. Industry awards are organised and run by industry groups and NGOs as well as by government organisations. Although many examples of awards were found, the effect of these schemes on encouraging waste prevention was less-well evidenced.

Incentives can also be used within organisations to encourage company employees to take-up best practice in minimising waste in return for recognition within the company, although the effect of these types of incentives is not well documented. Further research may help in understanding these effects better.

A possible downside of incentives is that their removal can undermine internal motivations for engaging in an activity, leading to lower overall effect (2). Furthermore, overly generous incentives can generate a culture of dependence, making market change or innovation less likely (2).

2 The Nature of the Evidence

Evidence for the impact of incentives largely falls within two categories:

1. Inferred evidence on a reduction in waste arisings from the introduction of a particular incentive.
2. Business attitude towards a particular incentive and inferred effects based on that incentive.

A wide range of government-led incentives has been applied with relevance to the waste prevention agenda, if only indirectly. These include tax rises and tax breaks, but also are manifest in subsidies or penalties such as: materials recovery compliance schemes (e.g. Packaging Recovery Notes (PRNs)); grants for R&D investment in novel, low impact technologies; and more widely in a host of broad extended producer responsibility (EPR)-type schemes.

These measures have often been taken together, such as with the introduction of packaging EPR in parallel with increases in Landfill Tax. Although both measures have run concurrently for several years making assessment of individual effects problematic, a trend of waste reduction has become apparent over time. (It is beyond the scope of this work to apply statistical methods to decouple such effects; we simply report positive or negative changes and suggest that further analysis may be required.)

Several industry-focused surveys have also been performed to gauge attitudes to various interventions. These give insight into the likelihood of success of a particular incentive, but rarely give any indication of the magnitude of that impact.

There are many examples of industry-award incentives, but we found little evidence of their impact or even their intended effect within the scope of our research.

Where the evidence on the use of incentives for waste prevention is sparse, non waste prevention examples have been included (recycling, energy etc.) to illustrate successful incentives, although we acknowledge they do not represent waste prevention *per se*.

The evidence search was conducted primarily in the English language. As a result, sources from UK, the Commonwealth, US and the EU feature heavily, although with native German speakers on the team, an equivalent German keyword search was conducted in parallel.

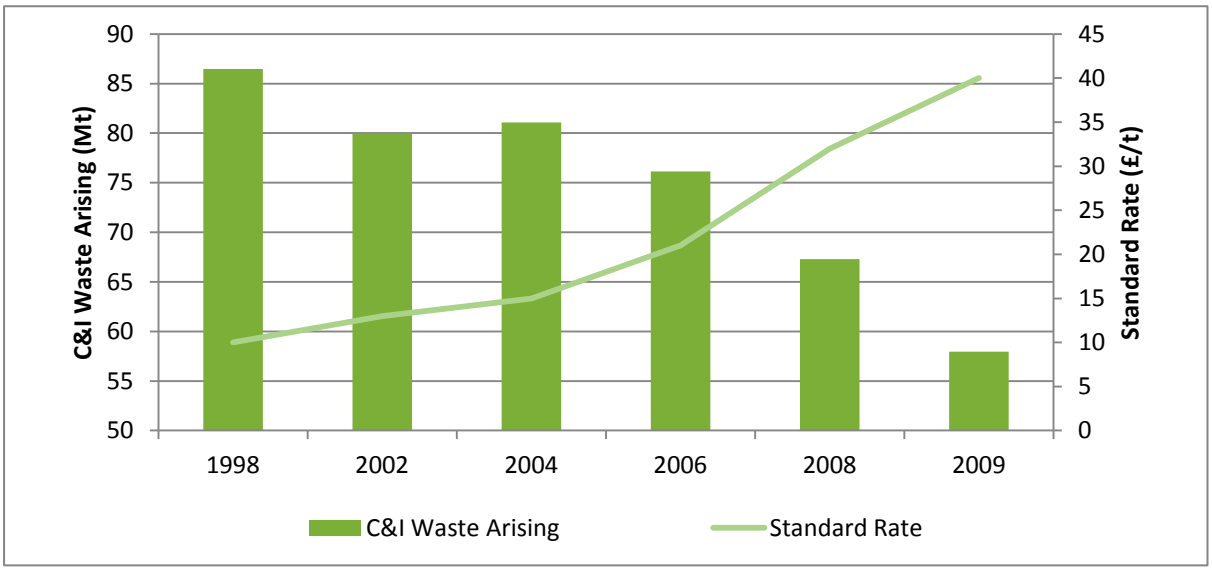
3 Evidence of Waste Prevention

3.1 Waste Minimisation

Landfill Tax was introduced on 1st October 1996 and applies to all licensed landfill sites in the UK. The tax is charged by weight at two rates: a standard rate, and a lower rate for inert or inactive waste; although some material is exempt from the tax (dredgings from water, mining and quarrying waste, from reclamation of contaminated land etc.). As of 2010/11, the tax stands at £48 per tonne for active waste. However, in the 2007 Budget the Chancellor announced that the Landfill Tax would increase more quickly and to a higher level than previously planned, with increases of £8 per tonne per year for active waste announced from 2008/09 to at least 2013/14.[a] For inert waste a lower rate of £2.50 per tonne is applied.

The aim of the Landfill Tax is to encourage waste producers to produce less waste, recover more value from waste, for example through recycling or composting, and to use more environmentally friendly methods of waste disposal.[b] The effects of the Landfill Tax on landfill volumes have been well observed and it is widely acknowledged that this policy is closely linked to reduction of waste disposal. For example: between 1998 and 2009 total waste landfilled fell by 52%, and the correlation of the standard rate of Landfill Tax and landfill volumes is very strong at -0.99 (3). The Landfill Tax escalator is considered a positive driver of investment in waste management; however, results from interviews with SMEs are less conclusive, suggesting that this financial pressure was not particularly effective (4). The relationship between the Landfill Tax and C&I waste arisings, also appears convincing. Figure 1 plots C&I waste arisings - for the years where data are available - against the standard rate levied for the Landfill Tax. This shows a steady decline in waste arisings as the tax rate increased, although it is important to realise that the degree of causality is less straightforward than with landfill volumes, with some of the effect attributable to other policies and the effects of the current economic downturn. However, surveys conducted by the National Audit Office (NAO) showed that approximately 30% of respondents cited the tax as very important in waste considerations and resource efficiency (5).

Figure 1: C&I waste arisings plotted against standard Landfill Tax rate (1998-2009)



Sources: Defra, EA & Eurostat for C&I waste arisings; HMRC September 2010, Landfill Tax Bulletin

a Defra website available at URL: http://www.defra.gov.uk/environment/waste/strategy/factsheets/landfilltax.htm [accessed 14/02/11]

b HMRC Website, Landfill Tax, available at URL: http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&id=HMCE_CL_001206&propertyType=document [accessed 14/02/11]

Internationally, positive incentives to prevent waste generation include government subsidies to encourage the uptake of environmental management systems (EMSs). The most common is by not charging registration fees, but a range of other benefits - such as subsidies and funding programs - may also be offered as inducement to sign up. This has resulted in proportionally more companies, particularly SMEs, holding EMSs in countries where such schemes have been implemented (not, for example, the UK)(6). There is evidence that this is important for waste prevention. Further discussion on the role of EMSs is presented in module **L2m4-1: Standards**, which indicates that they reduce waste generation (and by inference improve waste prevention) within companies.

There are other benefits for organisations that have an EMS: The majority of EU Member States favour organisations with an EMS in their public procurement decisions, by awarding additional points to registered organisations in the process of assessing tenders against specific criteria (7).

Internal incentives have also reduced waste. Although focusing on recycling, Ernst & Young developed a competition which rewarded the department which recycled the most waste per head in a month, with free fruit for the next month (see Box below). It was used as an incentive and a further opportunity to reinforce waste reduction messages (8). KPMG introduced a campaign that focused on encouraging reduced paper consumption through promising any savings to charity. This led to £260,000 in donations in two years, and between 2001 and 2009 £1.1m was saved on paper procurement (9).

Box 1: Ernst & Young's UK waste reduction programme

Ernst & Young is one of the world's largest professional services firms. In 2004, the UK division, which has 430 partners and 8,600 staff based in 22 cities, established a corporate responsibility (CR) team. Following a benchmarking exercise and consultation with internal and external stakeholders, the team reviewed and reinforced the existing environment management strategy. The CR team championed both waste recycling and prevention. The team increased the efficiency of paper use by switching machines to default double-side printing and kept staff informed of the company's monthly paper use and the equivalent in trees. In addition, the easy availability of stationery items was reduced while bins were removed from under employee desks.

Business Benefits

- Between 2004 and 2006 Ernst & Young reduced its paper consumption by 18% through the introduction of default duplex printing. The financial savings which resulted are unknown but likely to be substantial.
- The waste reduction programme created a high level of interest among employees, challenging their attitudes to the environment and changing behaviour both in the office and at home. This in turn might demonstrate to stakeholders that staff share Ernst & Young's environmental values.

Drivers

- Corporate responsibility was the main driver. Although Ernst & Young's environmental impacts are small relative to those of businesses in other sectors, the company realised that employees, clients, communities and other stakeholders expected to see action. This meant going beyond mere compliance with regulations and stimulated the 2004 establishment of the CR team.

Key Elements for Success

- The CR team played a vital role in raising awareness, conveying the need for change and for establishing new behavioural norms.
- Senior management commitment and endorsement was key to waste prevention activity by Ernst & Young.
- Waste prevention efforts were boosted through the frequent, clear and tailored messages delivered at the right place and time: some audiences responded better to environmental messages while for others the potential to save costs was the main 'hook'. A variety of communications were used including intranet and plasma screen messaging.

3.2 Clean Operations

Incentives to develop clean operations play a role in developing or procuring new process equipment or redesigning processes. In the UK, much of the research activities are undertaken either by the Technology Strategy Board (TSB) or through WRAP/Defra. Most of these activities cut across several different approaches to waste prevention and are therefore discussed in detail in Section 3.5. There are many examples of nationally-led and EU-level grant schemes to invest in either new equipment or new processes to reduce waste. Several instances are given below.

There are examples of waste prevention activities from the EFfA, a German government sponsored organisation that provides funding for research into new sustainable technologies. They provided funding to a number of SMEs from the hardware and automotive supply industry to develop and implement new ways of forming metal sheets. The outcome reduced the amount of lubricant needed by 80% and scrap rate by 80%; it also increased productivity by 50% and the payback for the new equipment was within 12 months (10).

HazRed was a three-year EU-funded project delivered between December 2004 and November 2007. Its main focus was to reduce hazardous material generation in SMEs from six priority sectors (see Box 2, over). Approximately 1,200 tonnes of hazardous waste were diverted from landfill, and savings to business totalled more than £440,000. Two given examples are:

- Ashton & Moore Ltd provides protective finishes on metal components for the aerospace sector; it developed new chrome-free treatments and alternatives to cyanide-based paint stripper.
- Greenhouse Graphics, which offers in-house commercial design and print facilities, invested in a new printing press that cut isopropyl alcohol use by up to 75%. They also switched to non-VOC solvents for cleaning the press, reducing hazardous emissions (11).

Grants are also available to enable consultants to audit a company's environmental performance. In 2006, the Cold Storage Association and the Food and Drink Association secured £150,000 in matched funding from the Carbon Trust to carry out energy audits of the refrigeration within breweries. F-gas phase-out was recommended to enable reduced energy consumption (12).

In Canada, a scheme enabled SMEs to undergo a waste prevention assessment by a specialist consultant with up to 50% funding towards the cost. The assessment involved "characterization of the facility's operations, processes, and products to identify the root causes of priority pollutants and waste" using process flow diagrams, and resulted in "recommendations to institute process improvements in operating practices, technologies, and input materials where appropriate". Results indicated that the second most important reason for participation was the offer of 50% cost share. As of January 2005, 42 SME manufacturing facilities were participating from a variety of sectors including: auto-parts, chemicals, circuit boards, credit cards, electronics, food processing, metal finishing, packaging, paint stripping, and printing. Based on 33 assessments, a reduction of 1,300 tonnes in process waste and of over 550 tonnes of hazardous waste was recorded. The capital cost of implementing the recommendations stood at C$2.1 million, with an average of 11 months return on investment (13).

Internal incentives have also been reported. ASDA, a signatory to the Carrier Bag Commitments, combined communications with incentives to promote its reusable bags: stores with the highest and most improved bag reductions were rewarded (14). The types of rewards were not disclosed.

Box 2: The Carrier Bag Commitment

Twenty-one leading retailers committed in 2007 to reduce by 25% the environmental impact of their carrier bags. WRAP monitored the agreement which was made between businesses and the Government. The target, to be met by the end of 2008 against a 2006 baseline, was exceeded with a 40% reduction. The number of carrier bags issued was cut by 26%, their recycled content was increased and their average weight reduced. Seven supermarket chains entered into a further agreement to halve the number of single-use carrier bags issued by spring 2009, against a 2006 baseline. The second target was only narrowly missed - a 48% reduction was achieved. However, the overall weight of single use bags was cut by 56%, while virgin polymer content fell by 65%. Specific actions taken by signatories include charging for single-use bags, removing them from view, selling 'bags for life' to customers and offering bagless home deliveries via online shopping.

Business Benefits

- Data on the financial benefits from issuing fewer bags are strictly confidential but retailers are likely to have made significant savings.
- The 'CSR value' of being seen to help customers help the environmental is a less tangible but important benefit.

Drivers

- The retail sector felt that signing up to the Commitment would avoid the alternative of the UK Government introducing a ban or taxation as in other countries (e.g. Ireland).
- The opportunity to reduce costs through avoided landfill tax was also a motivator.

Key Elements for Success

- Support for the Carrier Bag Commitment from two trade bodies, the British Retail Consortium and the Packaging and Film Association, was important.
- While progress towards the global targets was monitored and published by WRAP, individual retailer performance was kept strictly confidential.
- In-store materials, slogans and loyalty schemes devised by signatories engaged customers to reuse carrier bags.
- Signatories trained their staff to discuss the issue of carrier bags with customers.

3.3 Green Products

In common with clean operations, a number of UK-based incentives for green products are provided by the TSB-led collaborative research funding (see Section 3.5 for more details). An international example of a green products scheme is Japan's *Top Runner* programme. The scheme is designed to stimulate continuous improvement of the energy efficiency of the in-use phase of a product's lifetime (see Box 3).

On a regular basis, testing of currently available products is performed to determine the most energy-efficient model. This then forms the new baseline which all models must aspire to meet, thus driving efficiency standards as models compete to be the 'top runner'. This in turn means that the next time officials set standards, the best available products will be even more efficient. The *Top Runner* scheme is largely focused on energy efficiency but there is scope to adapt it to encourage waste prevention. The idea to adopt a similar scheme in the UK was discussed as part of the Lords Select Committee on waste reduction in 2008. The committee recommended: "The Government must engage with industry and provide the assurances and certainty required to enable businesses to invest in waste reduction strategies. In order to encourage innovation, we recommend that the Government adopt the "top runner" approach wherever possible. This strategy should involve the use of standards and choice editing, pre-selecting the most sustainable products, to drive continued improvements in sustainability" (15).

Box 3: Japan's Top Runner programme

Introduced in 1999 and administered by Japan's Agency for Natural Resources and Energy, the Top Runner programme aims to reduce energy consumption in the civil and transportation sectors by stimulating the continuous improvement in energy efficiency of products. Currently, 23 product classes are covered ranging from passenger vehicles and air conditioners to vending machines and even electric toilet seats! Rather than targeting retailers or end-users, Top Runner focuses on the supply-side, with manufacturers and importers required to meet minimum environmental standards. Appliances are tested, with the best performing model serving as a baseline for other manufacturers to meet or exceed. The next time officials set standards, the best available models will thus be even more efficient. In this way, standards are ratcheted up and energy conservation advances through the replacement of machinery and equipment by consumers. The European Union has adopted a similar mechanism to phase out non-energy efficient light bulbs. Although focused on energy efficiency, the Top Runner scheme might equally well be applied to waste prevention.

Business Benefits

- The Top Runner scheme has improved many appliances and products. For instance, between 2001 and 2007, the energy efficiency of computers and magnetic disk units increased by 80.8% and 85.7%, respectively, surpassing expectations. These improvements will give Japanese manufacturers a competitive edge in the international marketplace.

Drivers

- Japan's scheme works because although businesses realise they will one day have to comply with new more stringent and legally-binding standard (the hidden 'stick'), innovation is driven primarily by the 'carrot' of competitive advantage. It should be noted, however, that the scheme has been criticised for rewarding incremental rather than transformative change.
- As part of a voluntary "e-Mark" programme, certain products within the Top Runner scheme which meet the latest minimum requirements can display a label communicating this to retailers and consumers.

Key Elements for Success

- The Top Runner scheme is a non-confrontational approach to environmental protection. Although minimum standards once established become compulsory, the voluntary nature of progress towards better environmental performance harnesses businesses' own in-house expertise.
- Primary stakeholders are themselves involved in setting targets so awareness and commitment levels are high, while targets are not overly ambitious. Moreover, Japan has a culture of close cooperation between business and regulators.
- The scheme's iterative and flexible nature allows failures to be addressed and remedied.
- The "free-rider effect" is an advantage because businesses already performing well at the start of a cycle become free-riders in needing to invest less additional effort during the subsequent compliance period.
- Name-and-shame sanctions are effective deterrents in Japan.

Sources
http://www.asiaeec-col.eccj.or.jp/top_runner/index.html ;
http://www.enecho.meti.go.jp/policy/saveenergy/toprunner2010.03en.pdf
http://www.aid-ee.org/documents/018TopRunner-Japan.PDF

3.4 Product/Service Innovation

Although we have not found evidence of incentives that directly contribute to PSI activities, some discussion of the role of leasing and, in particular, the benefits – intended or otherwise – from the accounting treatment of operating and finance leases is pertinent. For perspective, in 1965 new business assets acquired by means of leasing totalled £52 million. Within 20 years this had grown to £5 billion.

The leasing of assets provides a platform from which companies can specialize in the centralized ownership of many classes of business asset. Such centralized ownership allows them to identify and develop secondary use markets for these assets and, in some cases, for product life extension through

their repair and remanufacture. If businesses purchased them outright the additional costs of identifying secondary markets would undoubtedly reduce the market opportunities for product life extension.

Incentives given to businesses through the tax system are not specifically designed to encourage PSI outcomes. However, the spill-over benefits of these incentives to existing companies that offer product/ service combinations deserve recognition. Looked at in this light, there may be further opportunities to improve the current lease-related incentives for business adjustments to the tax system or through the promotion of any relevant under-utilised features.

3.5 Mixed Approaches

R&D grant schemes targeting environmental benefits
Innovation funding in the UK is largely channelled through the Technology Strategy Board (TSB), an arm's-length agency setup to administer funds for near-commercial research with UK businesses. Several different research initiatives (from £30 million of Defra-provided BREW funding) have targeted waste prevention including:

- Waste Management & Minimisation – reducing hazards or eliminate waste in their production processes, or develop new products from waste.
- Zero Emissions Enterprise (1 & 2) – developing cleaner processes and services, co-operating along the supply chain, for a low emission economy.
- Sustainable Products – developing products with a lower environmental impact.
- Contaminated Land – developing new processes to reduce hazard associated with contaminated land.

Based on data provided by the TSB, Table 1 shows the projected annual savings and the total attributable savings (the total amount of money generated from the use of a commercial product) from the investment and then commercialisation of the research. It should be noted that these are estimates of benefit before actual commercialisation. Those savings listed as 'Raw Material Avoidance' and 'Hazardous Waste Avoidance' could be thought of as addressing waste prevention. A breakdown of the projected savings for each of the TSB programmes can be found in **Note: The id numbers at the end of the bibliographic** references refer to the source file id number stored at www.infinifile.org.uk. You can access these sources for free, using project id 246 in conjunction with the file id when prompted. Requires registration. The adjacent QR code will take you to the site if you have the smart-phone QR reader app (many are free).

Appendix L2m4-6-A: A Breakdown of the Impact of TSB-Collaborative Funding**.**

Table 1: Summary of the savings projected though collaborative research grants awarded by the TSB

Impact	Annual attributed benefit	Total attributable over lifetime including further uptake
Landfill Diversion (kt)	500	24,930
Raw Material Avoidance (kt)	362	10,977
Carbon Savings (kt)	908	17,894
Hazardous Waste Avoidance (kt)	372	11,477
Cost Savings (£M)	44	3,641

Source: (16)

A full breakdown of the these figures is given in ***Note: The id numbers at the end of the bibliographic*** *references refer to the source file id number stored at www.infinifile.org.uk. You can access these sources for free, using project id 246 in conjunction with the file id when prompted. Requires registration. The adjacent QR code will take you to the site if you have the smart-phone QR reader app (many are free).*

Appendix L2m4-6-A: A Breakdown of the Impact of TSB-Collaborative Funding

The Sustainable Technologies Initiative was conceived by the DTI as a collaborative R&D programme which addressed the need to build sustainability into product- and process-development. Funded by a number of research councils and Defra, the programme granted £10.6 million between 2000 and 2007. The scheme saved an estimated 10,000 tonnes of raw material being used and generated £94 million of new business (17).

A collaborative research fund between European countries was established under the ERA-NET Sustainable Enterprise programme (SUSPRISE) initiative. The fund had a remit to finance international research into sustainable projects (18). The majority of projects focused on resource efficiency activities such as reduction in raw material use and reduction in the use of hazardous materials (19). A quantitative analysis of the savings from this fund was not completed. The programme was also used as an international networking tool for organisations researching in sustainability. Although significant activity has occurred in this area, the majority of outputs are generally commercially sensitive and therefore not available for review. An example of the success of collaborative innovation project can be illustrated by a project which involved Carillion testing a 500-litre bulk paint containers. Working with ICI, it reduced packaging waste by 96% compared to standard containers (20). Trials were being undertaken but information is unavailable on the continued use of this process innovation.

Extended Producer Responsibility

EPR is an environmental policy approach where a producer becomes physically or financially responsible for the post-consumer phase of a product's life cycle. If designed well, EPR can provide producers with incentives for product redesign and stimulate innovation. The OECD gives four principal goals for EPR (1):

- source reduction (i.e. natural resource conservation/materials conservation)
- waste prevention
- design of more environmentally compatible products
- closure of material loops to promote sustainable development.

There are numerous possible objectives of an EPR scheme (around 20 separate ones are listed by the OECD), but in the EPR design stage policymakers should be clear about the precise environmental objectives they are trying to achieve, and carefully consider the specifics of the market in which they are intervening (whether it be used oil, electronics, batteries, packaging, automotive). To that end there are many different instruments that are encompassed within EPR; each with differing impacts and offering differing incentives, which makes EPR a mixed approach. Table 2 summarises each of the EPR instruments and their main influences.

Table 2: EPR instruments and type/degree of innovation

Type	Instrument	No product innovation	Incremental product innovation	Radical product redesign	Modified material use	Managerial/ organisation change	Consumer behaviour change
Regu-latory	Take-back requirements			X	X	X	X
Economic	Deposit/refund systems	X			X		X
	Advance disposal fees	X					
	Materials taxes		X		X		
	Product charges		X		X		X
	Subsidies		X	X			
	Tax/subsidy schemes	X					
	Leasing		X			X	

Other	Product standards – **L2m4-1**		X		X		
	Labelling – **L2m4-2**		X				X
	Voluntary schemes – **L2m4-4**		X		X	X	

Source: (21) *Note this table is indicative, e.g.it could be argued that deposit/refund systems do require product innovation and managerial / organisational change*

Much of the direct effect of EPR schemes to date has been to incentivise greater recycling, and thus this evidence lies out of scope of this report. This is not to say that EPR schemes cannot influence reuse or waste prevention, only that much of the activity seems to have focused on aspects such as increasing collection and recycling rates or recycled content. This is a point raised by the Green Alliance in their review of EPR, commenting that "little work has been done to understand the proper limits of reuse" and "aspirations towards waste prevention have not been fulfilled" (22). For example under the Essential Requirements of the Packaging Directive, which includes an obligation for producers to 'minimise' waste, only three successful prosecutions have been brought. This has also caused some dissatisfaction in Finland where the main effect of EPR for packaging has been to intensify recovery of waste (23). With that in mind, the following paragraphs summarise the available evidence on the effect of EPR on waste prevention. (Note that evidence for product standards is covered in **L2m4-1: Standards,** labelling in **L2m4-2: Labelling** and voluntary schemes in **L2m4-4: Commitments**).

A number of packaging regulations, many with mandatory participation, are of interest in terms of providing incentives for waste prevention. In Germany the Packaging Ordinance was introduced in 1991 with the main aim of decoupling the trend between rising GDP and packaging use by stipulating that manufacturers had to organise packaging take-back and arrange for its reuse or recycling. The costs of the system were met by licence fees levied according to the kind of material and the weight, ranging from DM0.15/kg for glass up to DM2.95/kg for plastics (determined by the actual costs of collecting, sorting and recycling)(1). The design of the scheme therefore incentivised producers to reduce their packaging and shift towards materials with lower licence fees in order to lower their obligations. The effect of the programme on packaging use between 1991 and 2000 (compared to a hypothetical trend based upon GDP growth and population increases) has been a reduction of 1.6 million tonnes of packaging material over the period, which corresponds to an 18% reduction (21). Noteworthy outcomes in terms of waste prevention within the top-line results include an elimination of "useless packaging" such as wrapping, lighter and smaller packaging; and a trend towards reusable transit packaging for furniture, food, pharmaceutical products and bicycles (1).

In France packaging regulations have had similar objectives; also charging differing fees according to the materials. The results in France were that household packaging was kept stable over an eight year period, despite rising GDP and the population increasing by about two million. In all, the number of individual packaging used rose by about 10%, indicating significant waste prevention activity occurring (21). Austria, the Netherlands and Japan also have EPR packaging schemes, although their results in terms of waste prevention were not found in the literature included within this review.

In the UK the scheme adopted for packaging is controlled through the issuing of Packaging Recovery Notes (PRNs) which are generated by recyclers when they recycle packaging. PRNs can then be traded to enable producers to meet their obligations. A primary function of EPR is the transfer of the costs and/or physical responsibility (full or partial) of waste management away from local government authorities and the general taxpayer to that of the producer.[a] The system is based on weight of packaging and weight of material recycled and therefore provides incentives for light-weighting and packaging removal because any reduction in packaging lowers the recycling obligation, requiring fewer PRNs. With this in mind, there is evidence that changes in some packaging have occurred in response to EPR (24). For example, there

[a] http://www.sita.co.uk/downloads/SITA%20UK%20response%20to%20review%20of%20waste%20policies-1010-web.pdf

has been a switch from single-use cardboard containers at supermarkets to reusable plastic pallets and crates.

Deposit-return systems (DRSs) are another type of incentive scheme with widespread implementation for beverages, and are aimed at encouraging bottle refilling. In continental Europe deposits tend to be large at around 15-30p and have a high return rate at 90% or above, which in these cases justify the costs of collecting, sorting, washing and checking(25).

A further area of EPR to discuss is the role of taxation, with a number of countries within Europe having implemented product taxes on packaging, carrier bags and batteries. The taxes relating to packaging have generally been aimed at increasing refillable beverage containers. The experience of Belgium, Denmark, Finland and Norway in this area has been mixed, with a number of legal challenges and diverse refillable rates (26). For carrier bags, Ireland implemented a €0.22 levy on the consumption of plastic bags resulting in 90% drop in their consumption, although it appears that sales of paper bags, bin liners and nappy bags have increased (26). Belgium has taken a more comprehensive approach by taxing a number of disposable items including plastic bags, cling film, disposable cutlery and aluminium foil. On batteries, taxes have been levied to encourage greater collection and recycling or levied only on NiCd batteries to encourage substitution by other types of batteries.

In the UK there has been some debate about using differentiated rates of VAT, graduated by environmental impact (26) or providing lower rates for sustainable products (15). A study by EC DG-Environment investigated the possible role of differentiated VAT in promoting energy saving (boilers, household appliances, insulation, energy, meat and dairy products) and concluded that significant reductions in greenhouse gas emissions are possible by introducing differential rates of VAT, by lowering the payback periods associated with the selected products. Among a number of learning points, they point out that differentiated VAT rates (27):

- require clear and unambiguous distinctions between 'green' and 'non-green' products and could lead to legal disputes or fraud in border-line cases
- may not be passed on in full to consumers, limiting the demand responses
- may not be enough to bridge price differences between products
- would imply a non-negligible increase in administrative and compliance costs.

This means that differential VAT rates to promote waste prevention would need careful consideration in their design, as well as being compared to other policy options that may be more effective.[a]

Company awards schemes

Awards such as those offered by trade bodies or associated media could promote good practice and raise the profile of winning companies, possibly resulting in greater business. From the literature, we found little clear statement that the goal of environmental awards is to prevent waste generation nor, more importantly, any evidence of their effectiveness in it. The following sections outline some awards with related objectives.

Environmentawards.net, a searchable website that details awards for environmental excellence, identifies 141 waste-oriented awards (the majority of which are UK-based). Although some are not related to waste prevention, a significant number highlight waste prevention good practice. Funding streams for the awards are from both public and private sector.

The awards cover a range of different aspects of waste prevention including green products, developing new, clean operations and waste minimisation. Interestingly, awards such as Barclays Green Leaders in Business use "innovative ways of doing business or developing and marketing new goods and services

[a] HM Treasury Presentation (December 2009), HM Treasury Approach to Environment Tax Policy

that will help us to build a sustainable economy" as a key criterion. This can be interpreted to include the promotion of product/service innovation.

Other mechanisms such as green banking and soft loans could have an effect on waste prevention, but we were unable to locate evidence of their role in this area.

4 Behavioural Aspects

4.1 Motivators

Provided they are given financial support or incentives, firms managed by individuals who think that environmental deterioration is a costly but solvable problem are generally more likely to show pro-environmental intentions compared to those that do not see the environment as a problem or a solvable problem (28). Careful targeting of incentives is needed to reach and influence the appropriate groups and companies.

Research has shown it is important to understand how people perceive changes in costs and benefits, rather than just thinking about what those costs and benefits are. The way costs and benefits are processed can influence behaviour and outcomes. For example, evidence from behavioural economics shows that highlighting the extra running costs of an inefficient product will have a greater impact on purchase behaviour than describing the savings from running the more efficient alternative product (29). Communication of any incentives is important in the implementation of the incentive to deliver the desired waste prevention savings.

Organisations can focus their environmental efforts by offering incentives to employees to bring their good environmental practice into the workplace. Schemes to promote environmental responsibility can provide either a financial or personal incentive, such as 'energy savings profit sharing' or a change in working contracts, to encourage more flexible working practices and a better work life balance. In addition to these findings it is also suggested that government could look to using more 'carrots' in corporate and personal tax liabilities to encourage this behaviour (30).

4.2 Barriers

Although there is evidence that Landfill Tax has reduced waste generation (see Section 3.1), one academic study questions the effect of these market-based incentives on SMEs in the construction industry. Interviews with owner-managers suggested: "Landfill Tax doesn't work much, with the cost simply passed on to the customer. In a sense the barrier to the success of these tax-based systems seems to be the capacity of the building sector to pay any more, as well as their ability to pass the cost on very easily" (31).

However the additional cost (£2.50 per tonne for inert waste as of 2008) imposed by the Landfill Tax is deliberately intended to signal through the supply chain to whichever point is most induced to respond. The test is how those signals have translated into businesses behaviour in diverting waste away from landfill. The evidence for this suggests the opposite to the above quote, since inert waste sent to landfill has fallen by 83% between 1998 and 2009[a]. This implies that the Landfill Tax has – at least – provided sufficient incentives for waste management techniques other than disposal. It is noteworthy that the relatively modest tax of £2.50 per tonne of inert waste has corresponded with such a large decrease in the waste arisings from construction. There was no explanation within the cited evidence to explain this effect.

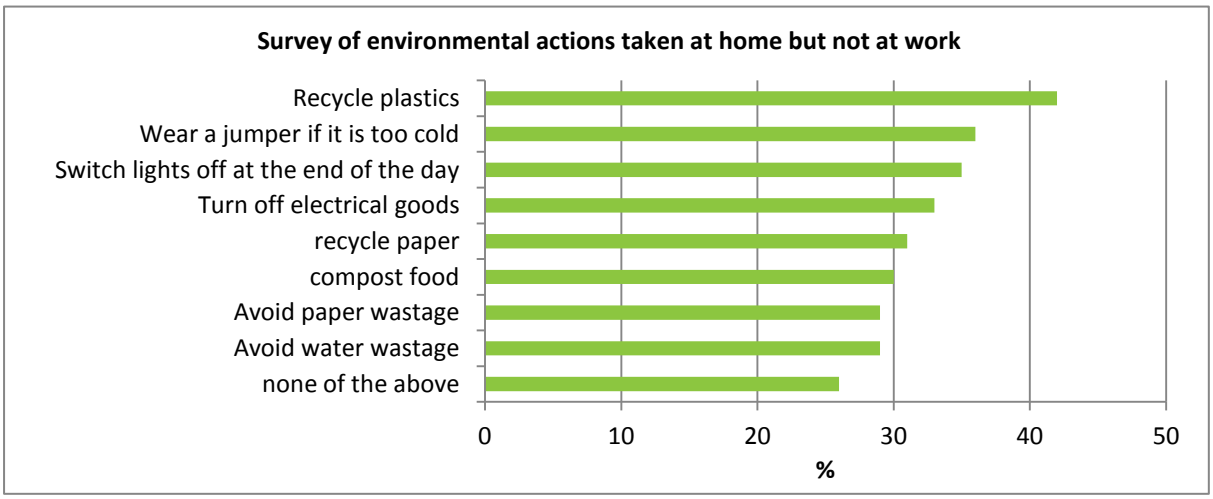
There is evidence that financial penalties (such as taxes) are an intervention which can encourage SMEs with low environmental commitment to engage in environmental improvement. For example, SMEs in high energy consumption industries can be encouraged to reduce energy use if policies are introduced which result in increased energy costs. In a review of the literature, most research found that financial penalties (such as landfill taxes and fees) have been ineffective because practices which cause

[a] HM Revenue and Customs (September 2010), Landfill Tax Bulletin

environmental harm are cheaper than environmental improvement. The result of this is that penalties typically do not change the environmental commitment for firms which solely focus on compliance or their bottom line (32).

At an employee level, there is a difference between the actions individuals take at home and at work. Figure 2 reports on work by Opinion Matters which shows that 29-41% of employees engage in environmentally sustainable activities at home, but not at work (33).

Figure 2: The difference between the activities employees undertake in their home environment that they do not perform at work



Source: Opinion Matters Mattsson et al. (33)

Such differences in attitudes between work and home may be due to the fact that just under half (43.3%) of all those surveyed believed their employer only pays lip-service to environmental issues, or is simply not interested in them at all (30).

4.3 Enablers

According to *A review of interventions to encourage SMEs to make environmental improvements* (32) SMEs believe that financial support such as subsidies, grants, soft loans, and tax concessions would encourage them to use energy efficiency measures because of the cost savings which might accrue. This study found that SMEs rejected loans as an incentive, possibly because of concerns about paying them back. Table 3 summarises when financial penalties and support are most and least effective. The supporting research also stated that individual interventions are not effective and that a suite of different approaches is needed to achieve the required benefits.

Table 3: An overview of when financial incentives are most effective

Intervention	Effective when	Ineffective when
Financial penalties	• Linked to regulatory framework • Makes bad practice unviable	• Penalty too small to be noticed • No viable penalty possible
Financial support	• Promoted clearly/directly to SMEs • Simple to apply for • Offset regulation compliance costs	• Too difficult to apply for • Criteria are too restrictive • Only a temporary measure

Source: Adapted from reference (32); more details are provided in ***Appendix L2m4-6-B: A List of Interventions and When They Are Most Effective***

5 Conclusions

5.1 Learning

- **There is strong evidence that Landfill Tax has reduced landfill volumes and waste generation.** The relationship between C&I waste arisings and the standard rate of Landfill Tax also appears convincing even if the causality is less straightforward, with some of the effect attributable to other policies.

- **There is a significant body of evidence of the actual and potential financial savings achieved by businesses through providing R&D grants.** In the UK, grants that target waste prevention activities have been shown to divert 2.4 million tonnes of waste from landfill and saved 2.1 million tonnes of raw materials through resource efficiency savings; however, there is less direct evidence of waste prevention.

- **Extended producer responsibility has provided incentives to increase recycling of packaging and to minimise and light-weight packaging.** However, there is little evidence on their effective use in encouraging reuse activity with the aim of waste prevention.

5.2 Insights

Financial incentives and penalties are most effective in achieving their intended environmental goal if the firm is already engaged and responsive to the issue being addressed. If the company does not recognise - or is disinterested in - the issues, financial rewards are unlikely to change the company's behaviour. A reason given for this is that the benefits or penalties may have a relatively minor impact on the overall operation of the business.

There are good continental European examples of using capital grants to reduce waste or hazardous waste generation. It may be possible to imitate these types of intervention to prevent waste in the UK.

The *Top Runner* scheme in Japan has been showcased as a successful programme for highlighting environmentally sustainable products (largely focusing on energy efficiency). It may be possible to adopt a similar scheme in the UK that addresses waste prevention.

5.3 Research Gaps

The following three gaps were identified:

- Environmental awards highlight environmentally sustainable features and companies, but **as yet there is little evidence that the award enables waste prevention.** Further research into the effect of these types of incentives would be beneficial.

- Product-specific VAT changes have been discussed and recommended by a number of organisations to differentiate 'green products'. **Research has been undertaken** by EC DG-Environment **for energy saving products**, which highlighted its potential but also some problems. **Equivalent research in the area of waste prevention could be undertaken.**

- **Further investigation of whether amendments to or promotion of relevant features of the tax system could incentivise product life extension as it has leasing.**

6 Bibliography

1. **OECD.** *Extended Producer Responsibility: A GUIDANCE MANUAL FOR GOVERNMENTS.* Paris : OECD, 2001. id 954.

2. *Encouraging industry to assess and implement cleaner production measures.* **Taylor, B.** 2006, Journal of Cleaner Production, Vol. 14, pp. 601-609. id 421.

3. **Lee, P., Willis, P. and MacGregor, A.** *Further Benefits of Business Resource Efficiency.* London : Defra, 2011. id 946.

4. *Environmental Responsibility in SMEs - Does it Deliver Competitive Advantage?* **Simpson, M., Taylor, N. and Barker, K.** 2004, Business Strategy and the Environment, Vol. 13, pp. 156–171. id 75.

5. **Defra.** *Reducing the impact of business waste through the Business Resource Efficiency and Waste Programme.* London : National Audit Office, 2010. id 50.

6. *On the effectiveness in implementing a waste-management-plan method in construction.* **Tam, Vivian W.Y.** 2008, Waste Management, Vol. 28, pp. 1072–1080. id 473.

7. **Vernon, J., et al.** *Study on the Costs and Benefits of EMAS to Registered Organisations.* Brussels : Milieu Ltd and Risk and Policy Analysis Ltd, 2009. id 948.

8. **Article 13 and CBI.** *CSR Case Studies - Ernst and Young.* s.l. : Article 13, 2006. id 634.

9. **Business in the Community (BITC).** KPMG LLP (UK): influencing environmental change. *BITC.* [Online] [Cited: 19 November 2010.] http://www.bitc.org.uk/resources/case_studies/afe_2735.html. id 838.

10. **Effizienz-Agentur NRW.** *Neue Schmierstoffanwendungen in der Blechumformung.* Duisburg : EFA, 2007. id 583.

11. **HAZRED.** *HAZRED-Working with small Businesses to reduce hazardous Waste.* s.l. : HAZRED. id 569.

12. **British Beer and Pub Association.** *The British Brewing Industry - Thirty years of environmental improvement 1976-2006.* London : British Beer and Pub Association, 2006. id 346.

13. *The Toronto Region Sustainability Program: insights on the adoption of pollution prevention practices by small to medium-sized manufacturers in the Greater Toronto Area (GTA).* **Granek, F. and Hassanali, M.** 2006, Journal of Cleaner Production, Vol. 14, pp. 572-579. id 312.

14. **WRAP.** *Carrier Bag Case Studies.* Banbury : WRAP. id 241.

15. **House of Lords.** *Waste Reduction- Volume I: Report.* London : House of Lords, 2008. id 397.

16. **TSB.** *Unpublished internal evaluation of TSB BREW-funded Projects 2007/08, provided by TSB.* id 932.

17. **Morley, N.** *Co-ordinator's Report on the Sustainable Technologies Initiative.* s.l. : Department for Business, Enterprise and Regulatory Reform, 2008. id 88.

18. **Hauschild, M. et al.** *SUSPRISE: Summary Database and Cluster Analysis.* Utrecht : ERA-NET/SUSPRISE/SenterNovem, 2006. id 950.

19. **List, S., Ganglberger, E. and Fielitz, J.** *SUSPRISE: Evaluation of the Joint Call.* Utrecht : ERA-NET/SUSPRISE/SenterNovem, 2008. id 949.

20. **Action Sustainability.** Carillion PLC Case Study. *Action Sustainability.* [Online] 2010. [Cited: 9 November 2010.] http://www.actionsustainability.com/resources/2/Carillion-PLC/. id 667.

21. **Various.** *Economic Aspects of Extended Producer Responsibility.* Paris : OECD, 2004. id 953.

22. **Hill, J. and Shaw, B.** *Return to Sender: Producer Responsibility and Product Policy.* London : Green Alliance, 2005. id 955.

23. *Finnish waste policy—effects and effectiveness.* **Melanen M., et al.** 2002, Resources, Conservation and Recycling, Vol. 35, pp. 1–15. id 306.

24. **Walls, M.** *Extended Producer Responsibility and Product Design, Economic Theory and Selected Case Studies.* Paris : OECD, 2006. id 952.

25. **Fitzsimons, D., et al.** *Deposit Return Systems for Packaging: Applying International Experience to the UK.* Aylesbury : Oakdene Hollins Ltd., 2005. id 958.

26. **Hill, J., Hislop, H. and Bégin, A-M.** *Good Product, Bad Product? Making the case for Product Levies.* London : Green Alliance, 2008. id 956.

27. **Oosterhuis, F. et al.** *The use of differential VAT rates to promote changes in consumption and innovation.* Amsterdam : Institute for Environmental Studies et al., 2008. id 957.

28. *Environmental management intentions: An empirical investigation of Argentina's polluting firms.* **Vazquez-Brust, D. A. and Liston-Heyes, C.** 2010, Journal of Environmental Management, Vol. 91, pp. 1111–1122. id 471.

29. **Jarvis, A. et al.** *Behavioural economics & energy using products: scoping research on discounting behaviour and consumer reference points.* London : Defra, 2010. id 704.

30. **The Logicalis Group.** *Lack of Incentives Prevent Employees Going Green at Work.* s.l. : Datatec Limited (DTC). id 46.

31. **Revell, A. and Blackburn, R.** *SMEs and Their Response to Environmental Issues in the UK.* s.l. : Kingston University, 2004. id 60.

32. *A review of interventions to encourage SMEs to make environmental improvements.* **Parker, C.M., Redmond, J. and Simpson, M.** 2009, Environment and Planning, Vol. 27, pp. 279-301. id 56.

33. **Opinion Matters.** *Resource Efficiency.* s.l. : The Central Office of Information , 2009. id 55.

Note: The id numbers at the end of the bibliographic references refer to the source file id number stored at www.infinifile.org.uk. You can access these sources for free, using project id 246 in conjunction with the file id when prompted. Requires registration. The adjacent QR code will take you to the site if you have the smart-phone QR reader app (many are free).

Appendix L2m4-6-A: A Breakdown of the Impact of TSB-Collaborative Funding

The total spend was broadly the same across the five reported funding calls, meaning approximately £7 million was allocated to each call.

	Baseline (Yearly impact, first deployment)	Attributed (Benefit ascribed to assistance of funding)	Persistence (Net effect over lifetime of technology, numerous sites etc.)
Landfill Diversion [t]			
WM&M	502,000	127,320	15,708,600
ZEE1	726,595	169,567	1,758,230
Sustainable Products	402,520	103,547	738,815
Contaminated Land	474,040	49,116	6,082,160
ZEE2	328,060	50,023	641,981
All Programmes	**2,433,215**	**499,573**	**24,929,786**
Raw Material Avoidance [t]			
WM&M	416,068	112,174	3,282,340
ZEE1	339,446	70,188	690,315
Sustainable Products	513,520	83,388	767,080
Contaminated Land	459,040	44,616	5,564,160
ZEE2	386,571	51,719	673,049
All Programmes	**2,114,645**	**362,085**	**10,976,944**
Carbon Savings [t]			
WM&M	222,311	61,169	2,068,083
ZEE1	337,278	34,092	516,313
Sustainable Products	2,993,420	587,240	12,204,330
Contaminated Land	16,925	1,651	213,958
ZEE2	1,775,878	223,753	2,890,914
All Programmes	**5,345,812**	**907,904**	**17,893,597**
Water Savings [t]			
WM&M	1,013,805	404,521	22,595,000
ZEE1	702,775	87,168	1,434,180
Sustainable Products	362,150	37,260	732,500
Contaminated Land	7,500	2,800	15,000,000
ZEE2	27,502,115	4,120,740	41,207,848
All Programmes	**29,588,345**	**4,652,489**	**80,969,528**

(continued…)

(…continued)

	Baseline (Yearly impact, first deployment)	Attributed (Benefit ascribed to assistance of funding)	Persistence (Net effect over lifetime of technology, numerous sites etc.)
Hazardous Waste Avoidance [t]			
WM&M	634,600	231,435	5,107,600
ZEE1	27,064	13,083	142,411
Sustainable Products	162,402	21,133	212,647
Contaminated Land	453,502	43,776	5,383,508
ZEE2	65,003	62,721	630,821
All Programmes	**1,342,571**	**372,148**	**11,476,986**
Cost Savings [£]			
WM&M	14,507,000	4,015,550	654,261,750
ZEE1	18,826,000	3,990,115	85,738,700
Sustainable Products	13,357,500	5,172,200	300,898,750
Contaminated Land	75,770,000	23,948,700	408,974,500
ZEE2	37,800,000	7,024,500	2,191,350,000
All Programmes	**160,260,500**	**44,151,065**	**3,641,223,700**
New Business [£]			
WM&M	197,347,000	62,596,750	1,238,905,000
ZEE1	20,808,000	7,204,000	97,050,000
Sustainable Products	305,450,000	67,723,750	1,630,893,750
Contaminated Land	74,650,000	22,790,000	481,252,000
ZEE2	105,450,000	16,291,500	1,109,157,500
All Programmes	**703,705,000**	**176,606,000**	**4,557,258,250**

Source: Adapted by Oakdene Hollins from (16)

Appendix L2m4-6-B: A List of Interventions and When They Are Most Effective

Intervention	Effective when	Ineffective when	Most effective for
Voluntary regulations and standards	Driven by personal ethics External demand for compliance	No awareness of regulations Barriers are greater than Benefits No demand for compliance	Environmentally driven Advantage driven
Compulsory regulations	It is clearly communicated Proves equity for all firms Combined with financial penalties Financial support is provided	No awareness of regulations Perceived as a business threat Not monitored or enforced	Compliance driven Advantage driven
Financial penalties	Linked to regulatory framework Makes bad practice unviable	Penalty too small to be noticed No viable penalty possible	Compliance driven Profit driven
Financial support	Promoted clearly / directly to SMEs Simple to apply for Offset regulation compliance costs	Too difficult to apply for Criteria are too restrictive Only a temporary measure	Environment driven Advantage driven
Self directed and facilitated education	Linked to a regulatory framework Tailored to individual firm needs It has a specific problem focus Run by trusted / credible parties Promoted a change in attitude Encourages learner interaction It uses business language Helps firms gauge their progress Helps to identify opportunities Learning is actionable immediately Provided conveniently to firms Includes real examples / cases	Providers do not know SMEs Does not address specific needs Providers are not credible / trusted Too many information sources Lack of knowledge integration I uses sustainability language It is too expensive to attend	Environment driven Advantage driven Less likely: Compliance and profit driven
Audits and reviews	Used with education Identified short-term benefits Performed by trusted parties Their role is communicated to firms	Do not identify business benefits Performed by unknown parties Their roles / benefits are unclear	Environment driven Advantage driven
Business advice and help lines	Provided by existing / trusted parties Addresses specific needs of firms Relevant service is easy to find Focused short term benefits Availability is widely promoted Providers target firms proactively Providers are coordinated Advice services are free	Does not address specific needs Provided by unknown parties Relevant service is hard to find Firms not aware of existence Firms expected to seek advice Too many providers of advice Advice too general / generic	Environment driven Advantage driven Less likely: Compliance and profit driven

Source: (32)

Disclaimer:
Oakdene Hollins Ltd and Brook Lyndhurst Ltd believe the content of this report to be correct as at the date of writing. The opinions contained in this report, except where specifically attributed, are those of Oakdene Hollins Ltd and Brook Lyndhurst Ltd. They are based upon the information that was available to us at the time of writing. We are always pleased to receive updated information and opposing opinions about any of the contents.

The listing or featuring of a particular product or company does not constitute an endorsement by Oakdene Hollins or Brook Lyndhurst, and we cannot guarantee the performance of individual products or materials. This report must not be used to endorse, or suggest Oakdene Hollins' or Brook Lyndhurst's endorsement of, a commercial product or service.

All statements in this report (other than statements of historical facts) that address future market developments, government actions and events, may be deemed "forward-looking statements". Although Oakdene Hollins and Brook Lyndhurst believe the outcomes expressed in such forward-looking statements are based on reasonable assumptions, such statements are not guarantees of future performance: actual results or developments may differ materially. Factors that could cause such material differences include emergence of new technologies and applications, changes to regulations, and unforeseen general economic, market or business conditions.

We have prepared this report with all reasonable skill, care and diligence within the terms of the contract with the client. Although we have made every reasonable effort to ensure the accuracy of information presented in this report, neither Oakdene Hollins nor Brook Lyndhurst can expressly guarantee the accuracy and reliability of the estimates, forecasts and conclusions herein. Factors such as prices and regulatory requirements are subject to change, and users of the report should check the current situation. In addition, care should be taken in using any of the cost information provided as it is based upon specific assumptions (such as scale, location, context, etc.). Clients should satisfy themselves beforehand as to the adequacy of the information in this report before making any decisions based on it.

Oakdene Hollins Ltd
Pembroke Court
22-28 Cambridge Street
Aylesbury
Buckinghamshire
HP20 1RS

T: +44(0)1296 423915
E: admin@oakdenehollins.co.uk
www.oakdenehollins.co.uk
www.remanufacturing.org.uk

Registered in England No. 2937129