WR1403: Business Waste Prevention Evidence Review

L2m5-6 – Office-Based Services Sector

A report for
Defra

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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 in the Office-Based Services Sector.

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

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Contents

Glossary

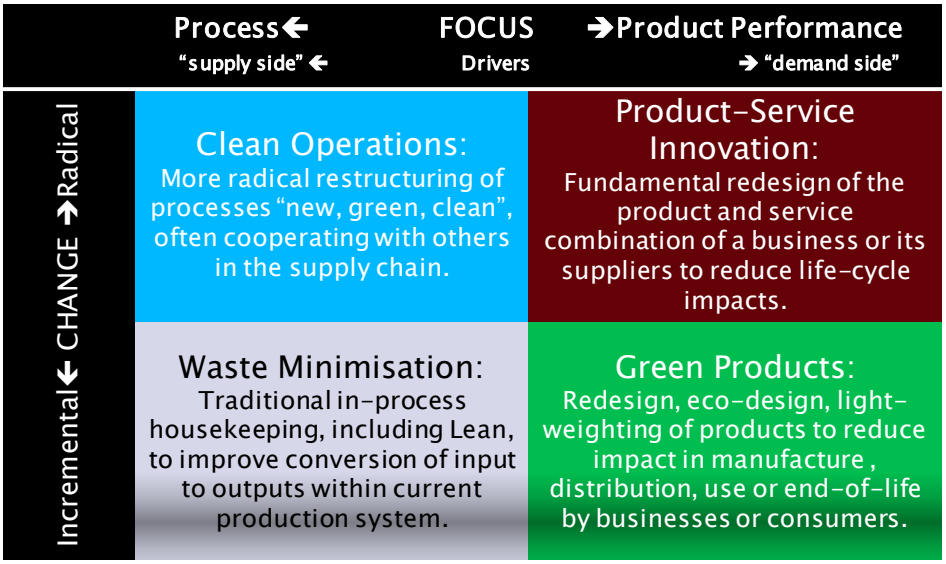
C&I	commercial and industrial (waste)	NISP	National Industrial Symbiosis Programme
COI	Central Office of Information	PSI	product/service innovation
CSR	corporate social responsibility	SIC	Standard Industrial Classification (code)
EMS	Environmental Management System	SME	small/medium-sized enterprise (EU definition)
ICT	information and communication technology	WEEE	waste electronic and electrical equipment
MFD	multi-function device	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, 1,000 kg}

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

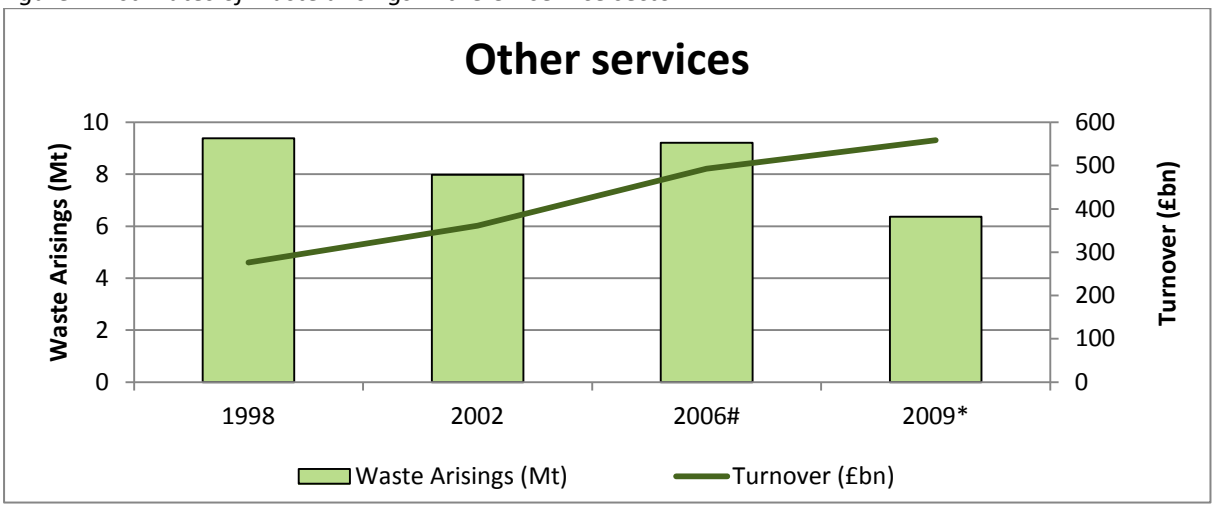
1 Office-Based Service Sector in Context

The UK service sector covers a diverse range of sub-sectors, including the retail and hospitality industries (see **L2m5-3: Hospitality** and **L2m5-4: Retail**), as well as business services, which are of primary interest in this section. The service sector in aggregate accounted for 41.1 million tonnes of waste generated in 2006, or 13.3% the UK total, although waste arisings for 2009 had fallen to 28.9 million tonnes.

Office-based services are not identified separately in official statistics so a proxy has been used here. The proxy can be thought of broadly as 'business services', which includes activities such as finance, professional and business services, real estate, computer related activities and travel agents.[a] Although not exhaustive, Table 1 gives some example Standard Industrial Classification (SIC) Codes for the office-based services sector. Some 60% of these activities are estimated to be office-based generating 5.5 million tonnes of waste in 2006 (of a total 9.2 million tonnes in the sector as a whole)[b] (1). Paper is thought to be the biggest waste stream (1). Just within the limited definition of office-based services used here, 1.15 million tonnes of waste in the sector in 2006 were reckoned to be white paper waste (1).

Changes to the UK SIC mean that comparable data are not available for the office-based component of business services as defined above. Instead, comparisons of C&I waste arisings for 2006 and 2009 can be made for a broader sector known as 'other services' of which the office-based component is not known.[c] This provides a broad indication only of waste trends for those types of activities most likely to be office-based. Waste arisings in 'other services' have decreased in recent years, even as turnover has increased (Figure 1). Latest estimates show annual waste arisings in the sector of 6.4 million tonnes in 2009, representing a 31% decline versus 2006, whereas turnover rose by 13% to £559bn (19% of the UK total).

Figure 1: Estimates of waste arisings in the UK service sector



Source: Defra
 # Interpolation of Service Sector
** Extrapolation of England survey*

[a] SIC 2003 J & K.

[b] The proxy definition used here does not include education, public or community services, many of which will also have large office-based components; neither does it include the office-based activities of manufacturing or construction companies. The sizing of the sector above is therefore an indicative estimate which in reality will be much larger.

[c] In addition to most of the business services noted above, this broader sector now excludes some computer related services but includes miscellaneous services and arts, entertainment and recreation. The office-based component of the latter is unknown but is likely to be less than 60%.

Table 1: Example SIC Codes (2007) for the office-based services sector

SIC Code		Description
Division	**Group**	
62	All	**Computer programming, consultancy and related activities**
64		**Financial service activities, except insurance and pension funding**
	64.1	Monetary intermediation
	64.2	Activities of holding companies
	64.3	Trusts, funds and similar financial entities
	64.9	Other financial service activities, except insurance and pension funding
65		**Insurance, reinsurance and pension funding, except compulsory social security**
	65.1	Insurance
	65.2	Reinsurance
	65.3	Pension funding
68		**Real estate activities**
	68.1	Buying and selling of own real estate
	68.2	Renting and operating of own or leased real estate
	68.3	Real estate activities on a fee or contract basis
69		**Legal and accounting activities**
	69.1	Legal activities
	69.2	Accounting, bookkeeping and auditing activities; tax consultancy
	70	**Activities of head offices; management consultancy activities**
	70.1	Activities of head offices
	70.2	Management consultancy activity
79		**Travel agency, tour operator and other reservation service and related activities**
	79.1	Travel agency and tour operator activities
	79.9	Other reservation service and related activities
82		**Office administrative, office support and other business support activities**
	82.1	Office administrative and support activities
	82.2	Activities of call centres
	82.3	Organisation of conventions and trade shows
	82.9	Business support service activities n.e.c

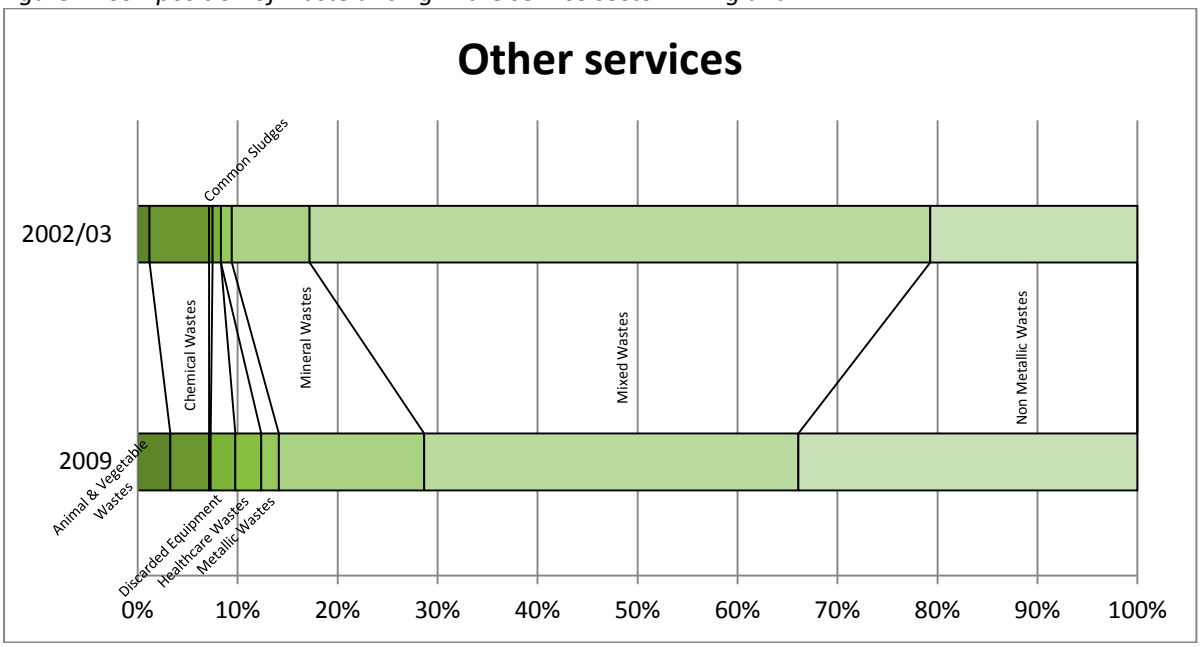
Source: www.statistics.gov.uk

Much of the waste generated in office-based service companies is of a similar type to domestic waste, generated at each site on a relatively modest scale (1). Typical waste materials include (2):

- paper/board
- printer and toner cartridges
- waste electronic and electrical equipment waste (WEEE)
- office furniture
- packaging
- employee waste (food, glass bottles and packaging from lunches)
- stationery.

As Figure 1 shows, mixed wastes (37%) make up the bulk of the waste stream within the 'other service sector' in England, followed by non-metallic wastes (34%), which include paper/board, glass, rubber, plastic, wood, textiles. Discarded equipment (i.e. used cartridges and parts of WEEE) are classified as hazardous waste. In 2009, this waste stream made up 2% of the total.

Figure 1: Composition of waste arising in the service sector in England



Source: Defra

The recent C&I Waste Survey estimates that about 50% of the sector's waste is currently recycled, with a further 25% going to land disposal or land recovery. It should be noted again that these figures cover the whole of 'other services' and it is not possible to disaggregate the office-based component separately without further detailed analysis of the original source data.

What the published evidence does tell us is that within the office-based service sector paper is likely to be the biggest waste stream (1). Estimates on paper use suggest that between 20% (1) and 50% (2) of total office waste is paper based.

The biggest cause of paper waste is printing. Research undertaken for Kyocera in 2010 suggests office workers on average print 10,000 sheets a year, or 45 per day. Of these on average 6,800 sheets of paper can be considered as wasted. Around a third of this can be attributed to printing single-sided rather than double-sided (3). Lexmark, in (1), report that the UK throws away approximately 33% of all printed paper each day compared to only 8% in Spain. Therefore, contrary to the expected trend towards the 'paperless office', first mooted in the 1970s, the UK continues to consume around 13.5 million tonnes of paper and board.[a]

According to the Centre for Reuse and Remanufacture, approximately 165,000 tonnes of office furniture are thrown away yearly from British businesses. Some of this will be the result of wear and tear, but the majority is believed to be in perfect working order with its disposal largely due to changes in fashion, variations in staff levels, or whole office moves. It is estimated that over 50% of office furniture sent to landfill each year is reusable.[b]

Based on the 2006 data analysis by Oakdene Hollins, a total of £233 million of no-cost, low-cost waste opportunities are estimated to be available in the office-based services sector (as defined above). £166 million of this is estimated to come from white paper reduction (1).[c] Beyond 'business services', a further £70 million of no-cost, low-cost waste savings is estimated to be available from public, community and other miscellaneous services, though the proportion of savings that arise from office-based activities in these sectors is not estimated (1).

[a] http://www.defra.gov.uk/environment/waste/strategy/strategy07/documents/waste07-annex-d.pdf
[b] http://www.remanufacturing.org.uk/furniture/
[c] Assuming that 20% waste is made up of paper, a 12% reduction in white paper can be achieved and based on an average ream of paper costing £3 and weighing 2.5 kg

The most significant short term resource efficiency savings opportunity at company level involves diverting waste from landfill (4). Specific waste interventions highlighted in Urban Mines (2010) (5) to improve resource efficiency in the service sector include implementing a waste segregation scheme to include: paper, glass, batteries, aluminium, plastic cups, furniture and toner.

2 The Nature of the Evidence

The literature search revealed highly fragmented and limited evidence that had a direct focus on waste prevention activity in office-based services as defined here. No evaluation studies or synthesis reports were found that were relevant, and much of the material in this module has therefore been pieced together from case studies and a small number of surveys. Some of these were very brief and were developed by their authors for information rather than evaluative purposes.

Since a sizeable proportion of SMEs is to be found in commercial office-based services, it was hoped at the start of the review that focusing on this sector would reveal useful evidence about waste prevention in these kinds of SME. That did not prove to be the case and much of the evidence here is derived from large company examples. There is a moderately large body of SME-focused literature, which has been captured in the study as a whole, but few authors have broken down their findings by sector. Much of the SME literature examines motivations and barriers to waste prevention (or more often resource use and environmental management) and this is covered extensively in module **L2m3: Attitudes & Behaviours.**

Much of the evidence available for review on waste prevention concerns large corporates and has been published by bodies such as WRAP and Envirowise, which understandably focus on the positive exemplars in their mission to encourage other participants and demonstrate progress.

Based on the evidence included in the review it is not possible fully to assess the impacts of the approaches being taken in the office-based service sector to address waste prevention. This should not be taken as a suggestion of limited activity in this sector and there are a number of reasons why little evidence of waste prevention can be found:

- Firstly, the wide range of activities that involve the delivery of 'office-based services' do not stand out easily as a 'sector' in the same way as construction or food and drink, for example. In addition, and reflecting the scope for waste savings across different sectors, there has been a strong emphasis in resource efficiency programmes on manufacturing and construction and perhaps less so on business and professional services.

- Secondly, those companies that are undertaking waste prevention may not be reporting it publicly: office-based service companies appear to consider waste prevention as part of wider corporate social responsibility (CSR) initiatives that often do not differentiate between prevention, recycling and diversion from landfill. While the literature search identified a number of CSR case studies, it did not identify any systematic review of waste prevention activities being undertaken as a result of CSR. In our judgement, to do that would require primary data collection through desk research of a large sample of company CSR reports, which was outside the scope of this evidence review. The same is true of 'eco-champions' initiatives in offices; systematic and robust evaluations of such approaches are rarely reported.

- Finally, there appears to have been relatively little academic interest in waste or resource efficiency in commercial office-based services.

In the light of the caveats above, the following should therefore be taken as indicative findings and general messages of relevance. Further primary research (desk and field) would most likely be required to substantiate in a systematic way the opportunities for waste prevention in office-based services.

Similarly, we are aware there may be more 'real world' examples of the re-design of products and/or services in the supply of office equipment or furniture but these are not well represented in the formal literature (as defined in the scope of this review). Much of the current evidence on product/service innovation (PSI) comes from suppliers rather than from the demand side. No evidence was found within the scope of this review on purchasers' perspectives on aspects such as longer-life products or PSI within office-based service companies.

3 Evidence of Waste Prevention

3.1 Introduction

Waste minimisation and clean operations are the two approaches of most relevance to the delivery of services in the office-based service sector. Green products (if applicable) and product/service innovation are primarily relevant in relation to the procurement of products and services to improve cleaner operations (for example, ICT equipment or office furniture). Product/service innovation can also be considered in relation to the way in which services are offered to customers (for example, a move to paperless billing).

The guidance from the Waste & Resource Action Programme (WRAP) in 2009 on operational waste management in office buildings lists a number of measures for encouraging waste prevention activities which focus largely on 'green housekeeping' measures (6); however, no evaluation data have been found that would allow assessment of the prevalence of these initiatives in the office-based sector. Nevertheless, some evidence of waste prevention behaviours in the office-based services sector has been found, primarily as part of corporate sustainability initiatives in large organisations. The evidence is therefore skewed towards large organisations.

In line with the definitions of the approaches set out in this research project, waste prevention activity in the office-based service sector can be split into three broad categories:

- **Waste minimisation**: Actions to raise awareness of waste prevention and incentivise behaviours in relation to simple housekeeping measures (Section 3.2).
- **Clean operations**: Actions to introduce new technologies or products to regulate waste prevention behaviours, often in collaboration with suppliers (Section 3.3).
- **Product/service innovation**: Actions to redesign customer services and thereby minimise life-cycle waste impacts (Section 3.5).

The green products approach (Section 3.4) is not relevant to waste prevention in the office-based service sector.

3.2 Waste Minimisation

Waste minimisation, as defined in this research project (see **L2m2: Approaches)**, in the office-based service sector requires no - or only little - capital investment. Waste prevention activities identified in the literature fall into three broad categories:

- raising awareness and incentivising employees to reduce paper consumption
- modifying procedures – e.g. change printer settings to double-sided printing or removing bins
- reuse of stationery and other consumables.

Raising awareness and incentivising voluntary action

As part of its wider approach to CSR, Ernst & Young **Invalid source specified.** introduced a firm-wide long-term communication campaign. The campaign encouraged people to think about the amount of paper they print and how their paper consumption equates to environmental impact (e.g. number of trees). To ensure that the communications reached the maximum number of employees and to overcome initial reluctance to change from staff (discussed further in Section 4), the communications used a range of messages and every available channel (e.g. newsletter, intranet etc.).

Between 2004 and 2006 Ernst & Young saved 18% of paper following introduction of its waste reduction initiative (the amount in tonnes or financial savings is not given). The impact on employees was not fully measured; however, the company claimed that initial feedback from employees through the intranet suggested "a change in attitudes and positively affected their behaviour both in the office and at home" (7).

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.

For one company, KPMG (UK), employee engagement on paper consumption was focused around a 'Saving for Good' and 'Green Giving' campaign. This campaign, put in place as part of its environmental management system (EMS), encouraged all staff to donate money saved through paper procurement reductions to charity. In two years a reduction in paper use alone resulted in £260,000 being donated to the charity. Overall this saved KPMG £1.1 million from 2001 to 2009. The company found that "dispersing environmental responsibilities to all staff in this way helps to ensure that sustainability is embedded right through the business to bring operational change rather than as an add-on" (8).

Modified systems and procedures to regulate paper consumption

A small number of examples of modified procedures targeting paper consumption have been found. Ernst & Young (7), The Oxford Group (2) and Falkirk Council (9) (outside our core sector) and Cidon Construction (10) all changed to double-sided printing, although savings cannot be disaggregated from the other actions the organisations took. Ernst & Young and Defra (also outside our core sector) removed waste bins from under employee's desks to encourage further waste prevention and recycling behaviours, although the impact on paper consumption alone has not been reported (7) (11).

Reuse of stationery and other consumables

A few brief case studies of reuse of stationery and other consumables were found in the literature. To engage employees on their environmental impact, lawyers Wragge & Co created a network of 30 'eco-champions' to encourage staff to adopt more eco-friendly working practices. This involved re-using rail travel wallets, resulting in a 32% reduction in new purchases and saving £1,000 per year (12). Managing stationery use was mentioned in the Ernst & Young (7) and Falkirk Council (9) case studies but no data are available that would allow disaggregation of impacts from other activities.

Table 2: Evidence on waste minimisation

Category	Supported	Description	Outcomes	Ref ID
Raise awareness and staff incentives	No	Ernst & Young employees were encouraged to reduce waste by thinking before they print	18% of paper savings between 2004 and 2006 as part of wider paper reduction strategy	(7)
	No	KPMG introduced a campaign that focused on encouraging reduced paper consumption through promising any savings to charity	£260,000 saved (donated) in two years from reduced paper use. £1.1m saved on paper procurement 2001-09	(8)
Modifying procedures	No	Ernst & Young changed its printers to default-printing option at the same time as it introduced its awareness raising campaign (see above)	'immediate double digit reduction in paper consumption'	(7)
	No	Defra implemented a 'Bin the Bin' scheme across its estate in 2008/09, whereby individual bins at employee desks were removed and replaced by central recycling bins.	Recycling rates increased from an average of 69% in 07/08 to an average of 80% 08/09 (interim results as of 2009).	(11)
	Yes	Small consultancy firm The Oxford Group implemented a number of resource efficiency initiatives including double sided printing	£40,000 overall. Not possible to disaggregate from other actions	(2)
	Yes	Falkirk Council set all printers to double-sided printing	-	(9)
	Yes	Cidon introduced double sided printing and reuse of paper in fax machines	£25 per year	(10)
Stationery rational-isation and reuse	No	Law firm Wragge & Co introduced a network of 'eco-champions' to encourage more eco-friendly working practices, including reusing travel wallets	32% reduction in purchases saving £1,000 a year	(12)
	Yes	Falkirk Council introduced stationery amnesty days to encourage reuse of stationery as part of a wider programme to encourage resource efficiency	67% of waste diverted from landfill. Not possible to say what impact stationery amnesty had	(9)
	No	Ernst & Young reduced the number of office stationery items, and placed boxes for no longer needed stationery items on all floors	-	(7)

Sources: Collated by Oakdene Hollins/Brook Lyndhurst

3.3 Clean Operations

Cleaner production activities in the office-based service sector involve the introduction of new technologies or products to regulate waste prevention behaviour. This may involve collaboration with others in the supply chain. Activities identified in the literature can be broadly split into three categories:

- reducing employee waste
- ICT, consumables and packaging
- furniture reuse and remanufacture (use of).

This part of the review focused on actions that office-based companies are taking to prevent waste through changes in the way they run their businesses and procure from suppliers. There appears to be a considerable body of evidence on environmental and economic savings to be had from designing and supplying green products and services. However, we found little evidence on the resulting impact on waste of the take-up of such measures in office-based service companies or their motivations for choosing these options. Since manufacturers and distributors of office equipment or furniture were not included as a sector in their own right in the review, it is possible that some specific examples of product or product-service innovation may not have been identified.[a]

Reducing employee waste
Employee waste (e.g. packaging and food from lunches) is generally tackled through activities aimed at increasing recycling rates. That said, we found one example of a company introducing new products and procedures to prevent employee generated wastes in the first place. Law firm Wragge & Co introduced on-site filtering and bottling of drinking water, thereby reducing the waste associated with plastic bottles. In addition plastic cups and spoons in kitchen areas were replaced with metal spoons and glasses. On-site water bottling reduced use by 8,000 bottles per year and saved approximately £10,000, while plastic spoons reduced by 100% from 15,000 per year to zero. No further evidence on the specific steps taken, challenges that had to be overcome, or investment required is given in this case study (12). The evidence does not allow assessment of the contribution of this type of waste prevention to the overall waste arisings in the sector, or the opportunities to be had through focusing further action in this area.[b]

ICT, consumables and packaging
Some limited evidence was found of companies introducing new ICT to tackle paper waste. Cidon Construction (10) invested in a new intranet system and moved to an electronic purchasing and invoicing system, which resulted in cost savings of £3,000 per year (10). In the other case studies reviewed e.g. (9) and (12), automating printing and moving to electronic filing was generally introduced in conjunction with other waste minimisation activities. The evidence is not strong enough to assess the impact of this activity alone on waste arisings in the office-based service sector.

As mentioned above, we found no evidence of direct waste impacts within the office-based service sector following a switch to green products or services. That said, we found two examples of suppliers taking action to minimise their own waste as well as that of their customers. The first is equipment manufacturer Xerox who reported to a House of Lords inquiry into waste minimisation that they had developed a novel way to make toner which led to a lower mass being used per page and thus resulted in less toner waste (13 p. 111). Moreover, for specific types of printer, the company had developed solid ink colour technology which eliminated the need for cartridges or other consumable items and generated around 90% less waste. Moreover, based on a life-cycle analysis and penetration of remanufactured cartridges in the market, the carbon savings for monochrome toner cartridges is estimated at 11,600 tonnes of CO_2e per year (14).

[a] A recent project undertaken by consultants ERM on longer product lifetimes (EVO445) may provide further insights in the issue of carpets; however this report was not available at the time of the review.

[b] Products to facilitate a shift from using bottled water – such as plumbed in water coolers - are widely available and advertised (e.g. on the London Underground) but no evidence was identified within the scope of the review of levels of demand for, or waste impacts from using, such systems.

Xerox also runs return programmes for their equipment and consumables. In the US Xerox's cartridge return programme for mid- and high-volume machines enabled 65% of eligible cartridges to be returned for remanufacturing (15). In the UK, the company noted that where ownership of the product had shifted to the consumer, encouraging return was a challenge (13).

Box 2: Waste prevention by Xerox

Founded in 1906 and today employing 130,000 people in 160 countries with a $22 billion turnover, Xerox is one of the world's largest suppliers of business technology. The company is tackling waste prevention on several fronts. Green Products approaches include the development of a new toner requiring less toner mass per page which results in reduced toner waste. For certain printers, Xerox has also invented 'ColorQube' a solid ink colour technology eliminating the need for cartridges or other consumable items. In addition, Xerox is a pioneer of Product-Service Innovations such as leasing equipment and consumables enabling its reuse or remanufacture rather than disposal at end-of-life. The company operates numerous 'take back' schemes.

Business Benefits

- Xerox's new solid ink cartridges generate 90% less toner waste than conventional counterparts.
- In the US, Xerox's cartridge return programme for mid- and high-volume machines enabled 65% of eligible cartridges to be returned for remanufacturing. In 2009 more than 2.2 million cartridges and toner containers were returned. Reuse of leftover toner in cartridges saves Xerox several million dollars in raw material costs each year.
- Using its considerable procurement power, Xerox can effect significant change in the supply chain. For example, when Xerox (USA) asked suppliers to switch to returnable transit packaging this led to annual savings of $1.5m.

Drivers

- Although many of Xerox's initiatives appear voluntary, new regulations in territories where it does business serve as additional motivators. For example, it is working to comply with the EU's Waste Electrical and Electronic Equipment Directive and participates in countries' individual collection and recycling programs.

Key Elements for Success

- In parts of the world where Xerox exercises direct control over the end-of-life management of equipment, return rates are high. For instance, 95% of equipment sold through direct channels in the US is returned to Xerox.
- Xerox maximizes the end-of-life potential of products and components by considering reuse in the design process. Machines are designed for easy disassembly and contain fewer and more durable parts. Up to 70-90% of machine components can be reused in remanufactured equipment.
- Xerox works hard to challenge negative consumer perceptions of the quality of equipment made with reused or recycled components.

Sources
http://www.xerox.com/corporate-citizenship-2010/sustainability/waste-prevention.html

The other example, a very brief case study, is from a supplier of office printing equipment and solutions, Danwood Group. With help from Envirowise, the company eliminated its plastics packaging and reduced its cardboard packaging, leading to savings of £9,300. In addition to cost savings for the company, "it reduced the amount of waste that had to be disposed of by its customers" (16); however, direct savings from the users' perspective are not quantified. Given these activities by manufacturers and distributors

of ICT equipment, quantifying the impacts of product use in the office-based service sector may be an area for further research.[a]

Box 3: Manchester United and Danwood

In 2005, Manchester United Football Club (MUFC) asked Danwood, its main supplier of office printing equipment and document management solutions, to help reduce its waste impacts. Danwood conducted a thorough print audit across the Manchester United campus and discovered that two-thirds of its customer's 150 printers and photocopiers could be removed through the deployment of multifunctional products able to scan, email, fax, photocopy and duplex print. Danwood's business model was based on a fixed price per print backed up with a single quarterly invoice. Danwood also provided the club with a used toner cartridge recycling service.

Business Benefits

- MUFC saw a 15% year on year cost saving despite an increase in printing activity.
- Much of the benefit came in the form of energy efficiency savings, but waste was also prevented through a significant reduction in the number of appliances which needed to be disposed of.

Drivers

- As a high-profile business, MUFC first developed a CSR policy in 1989, and its work with Danwood is just one of many efforts to mitigate its environmental impacts.
- The football club's philosophy of being "the best, both off and on the field" was applied to its environmental performance.

Key Elements forSuccess

- MUFC's membership of Envirowise's Supply Chain Partnership Forum added impetus to the initiative. The objective of the Forum, which operated from 2002 to 2007, was to drive down waste in supply chains by engaging with leading British brands. Other members included Boots, CenterParcs and Halfords.
- As part of the Supply Chain Partnership Forum Envirowise provided free consultancy support to Danwood. The delivery body estimated that as well as streamlining MUFC's printing operations, Danwooditself could save more than £9,300 per annum by eliminating or reducing plastic and cardboard packaging.
- A close working relationship between MUFC and Danwood is important.

Sources:
http://www.danwood.co.uk/documents/3020%20manchester%20united%20case%20study[1].pdf

Furniture reuse and remanufacture

No studies were found that have attempted to quantify or characterise the office equipment and furniture reuse sectors in the UK in aggregate. The following examples are derived from guidance documents and case studies to indicate potential opportunities.

According to Envirowise (17), renovating furniture rather than buying new can save up to 50% of the costs of new products, while office furniture remanufacturer Kentwood claims that 30%-50% savings are achievable.[b] Neither provides details on how these estimates have been reached.

[a] See previous comment regarding a current research project undertaken by ERM for Defra which may address many of these issues.

[b] http://www.remanufacturing.org.uk/pdf/crr_kentwood_report.pdf

We found no examples of waste-saving impacts of office furniture reuse within the office-based service sector, as defined here. The following two case studies are from organisations outside our core sector (i.e. in public services).

The first example relates to the remanufacture of existing stocks of furniture used for the office refit of Perth and Kinross Council offices. The project involved a NISP-facilitated partnership between Ogilvie Ross, an organisation dealing in office furniture reuse and ethical disposal, and the Council. The project produced direct cost savings of 73% to the Council; however no other impact data are provided (18).

The second example was again a NISP-facilitated partnership, this time between business consultancy group Scott Wilson and Park Road Baptist Church. Reusing Scott Wilson's office furniture extended the product's life and saved the Church £1,940 (19). It should be noted that the latter example would be defined as a waste exchange (and hence lies outside of the scope of our project) from the perspective of the consultancy.
That said, the case studies highlight potential opportunities through forming partnerships with charities and other organisations to extend product lifetimes and achieve shared benefits. Green-Works, a not-for-profit organisation that supplies reused and refurbished office furniture at discounted prices, is active in this market. However, no published evidence has been found within the scope and time of this project and this may be an area that could benefit from further research to assess the waste prevention impacts of such activity on office-based companies.

Table 3: Evidence on cleaner operations

Category	Supported	Description	Outcomes	Ref ID
Furniture reuse/ remanufacture	Yes	Perth and Kinross Council partnered with Ogilvie Ross to remanufacture existing furniture for its office retrofit	73% of cost savings compared to new furniture	(18)
	Yes	Scott Wilson Consultancy group partnered with Baptist Church to reuse office furniture	£1,940 for church in reduced costs; no impact data for Scott Wilson	(19)
	-	The refurbishment of a Barclays bank retail branch and an office in London involved reuse and reconditioning of furniture, e.g. doors, desks, countertops and chairs	£36,000 savings	(20)
ICT & consumables	No	Xerox have developed low toner waste print cartridges	90% less waste	(13); (15)
	Yes	Falkirk Council replaced traditional printers, scanners and faxes with multi-functional devices (MFDs)	-	(9)
	No	UK law firm Wragge & Co introduced e-filing and an electronic fax distribution system to reduce its paper consumption	-	(12)
	Yes	Cidon invested in a new intranet system and moved to an electronic purchasing and invoicing system	-	(10)
Packaging	Yes	Danwood Group office supplies worked with customers to reduce packaging	£9,300 savings for Danwood	(16)
Employee waste	No	UK law firm Wragge & Co introduced on-site filtering and bottling of water, and changed cutlery and glasses to reusable.	£10,000 saved through on-site filtering.	(12)

Sources: Collated by Oakdene Hollins/Brook Lyndhurst

3.4 Green Products

The green products approach is not relevant in the context of the office-based service sector.

3.5 Product/Service Innovation

For the purpose of this project, PSI in the office-based service sector is defined as the redesign of service offerings to reduce customer waste. While the service sector has limited opportunity to reduce the waste impact of its products, it does play a role in terms of the materials that companies use for customer services and marketing. Financial institutions send out numerous correspondences to their customers and a recent report by Javelin Strategy and Research suggests that there may be a growing trend away from paper towards online correspondence (21).[a] While it is well known that a number of financial institutions and other companies are moving to paperless billing, we found only one evidenced example of this measure being taken up within the scope and timing of this evidence review.

Box 4: Standard Life goes paperless

In order to achieve its target of halving paper consumption by 2012, the financial services company Standard Life introduced its 'Go Paperless' campaign in 2006. Similar strategies have been adopted in recent years by many other businesses in financial, utility and related sectors. Standard Life's Go Paperless facility is now available to all of the company's 30,000 life and pension customers who can choose to receive statements by e-communications rather than as 'hard copies' in the post.

Business Benefits

- How much waste paper has been saved by Standard Life's campaign is unknown but the company claims a 23% reduction in the carbon footprint associated with paper consumption between 2006 and 2008.
- The company saved £32,000 by using less paper, despite rising paper costs.
- Employee satisfaction on Standard Life's approach to environment has increased.

Drivers

- Standard Life took their decision voluntarily hoping both to reduce operating costs and to improve its brand reputation among stakeholders – employees, shareholders, suppliers and customers - who felt the company was over-consuming paper.

Key Elements for Success

- Excellent nationwide internet coverage and widespread access to IT equipment among its customers was essential to the success of Standard Life's initiative.
- Standard Life introduced a new document centre on a secure website ensuring a safe channel to customers.
- Standard Life's paper strategy focuses on communications and engagement, technology and efficiency changes, and sustainable sourcing.

As part of a wider paper strategy, insurance company Standard Life introduced an innovative 'Go Paperless' campaign for its customers in 2006. According to Standard Life, this enabled 30,000 of its customers to receive their statements by e-communications. No data are provided to assess waste savings, but the company claims to have achieved a 23% reduction in the carbon footprint associated with paper consumption between 2006 and 2008. In addition, the company saved £32,000 by using less paper, despite rising paper costs (22). The impetus for Standard Life was voluntary, combining a desire to

[a] No information on sample size and approach is given. Data is from a press release of a consultant report available for purchase but not acquired for this review.

reduce operating costs and at the same time manage reputational risks with stakeholders from being perceived to 'over-consume' paper. Anecdotally, we are aware of other large office-based companies managing reputational risks through CSR and environmental management systems (EMSs), but have found no other evidenced examples.

Whilst a large part of our evidence has suggested that consumer demand was not a key driver for waste prevention behaviour in business (see **L2m3: Attitudes and Behaviours**), according to Javelin Strategy and Research's 2008 survey (reviewed in (21)) a third of the surveyed banking consumers that had turned off their paper statements did so in order to reduce their environmental impact, while three years earlier only 21% of respondents gave this reason[a]. This indicates that consumer pressure could become a growing driver but further research would need to be undertaken to back up this hypothesis.

It should also be noted that while the use of reused and remanufactured items is a clean operation within the office-based service sectors, the provision of those goods is in fact an example of a PSI by another company not within the scope of this research project, i.e. the supplier of office furniture and equipment.

Table 4: Evidence on product/service innovation

Category	Supported	Description	Outcomes	Ref ID
Reducing customer paper	No	As part of a wider paper strategy Standard Life moved to 'paperless billing'	23% reduction in carbon footprint of paper use and saving of £32,000 through reduced paper use (2006-08)	(22)
Reducing customer paper	-	Small consultancy The Oxford Group introduced a 'Ban the Manual' campaign to encourage clients to receive manuals electronically	-	(10)

Sources: Collated by Oakdene Hollins/Brook Lyndhurst

3.6 Mixed Approaches

Some of the case studies above have shown that companies introduced a number of different approaches to reducing their waste. While it may be said that introducing these measures in tandem will increase effectiveness, the fact that different approaches require different actions/actors and the limited data on individual impacts may suggest that reporting on these approaches separately may be more useful going forward. To be able to be conclusive on the relative merits of either specifically focused or broad programmes, more detailed evidence is needed. Aspects that are not well documented in the existing literature include: how and why such initiatives were implemented; which specific behavioural activities or products are directly related to waste prevention (or resource efficiency) outcomes, and the key success factors and barriers for implementation.

[a] No information on sample size and approach is given. Data is from a press release of a consultant report available for purchase but not acquired for this review.

4 Behavioural Aspects

4.1 Attitudes

Evidence on the following attitudes and behaviours were found. Given the nature of the evidence, where evidence is wider than just waste prevention or covers wider sectors, this is mentioned.

The evidence suggests that companies in the service sector may generally be less aware of, or involved in, waste prevention activities. For example a 2009 survey of 2,001 businesses (95% of the sample was made up of SMEs) in the northwest of England found that the highest number of respondents from the 'business services' sector had placed low or no importance on resource efficiency (27%, compared to e.g. 15% in food and drink).

One explanation for this may be that the service sector is subject to lower raw material costs in relation to its operating costs and is considered to have limited environmental impacts compared to the more material intensive manufacturing sector (23). This also supports the conclusion of an earlier research project which noted that small companies in the service-based sector[a] are less aware of their environmental impacts than those in manufacturing or construction sectors (24). Overall, data on prevailing attitudes in the office-based service sector appears hidden within synthesis of larger data sets or non-existent. Further research may be needed in this area.

Conversely, the attitudes and behaviours of staff and managers appear to have been the focus of a number of recent research projects.

A 2009 survey of 832 UK workers by Opinion Matters for COI/Defra on employee attitudes towards resource efficiency found that 18% had no idea what the company's resource efficiency policy was or whether the company undertook any specific measures, while 14% thought that their company definitely did not undertake any measures. 11% thought the company was doing something but they did not participate personally as they considered it the responsibility of management, while 57% were aware of resource efficiency measures and actively participated (25). In answer to a separate question regarding whose responsibility resource efficiency was in the workplace, 87% said it was everyone in the company, 7% felt it was the individuals' (i.e. no need for policy), 4% thought it was the managers' and 3% thought it was no one's responsibility. The survey furthermore found that that 21% of workers admitted to regularly printing out emails when not needed.

A separate survey of 1,000 office workers and managers in IT departments in 2010 found that 78% of office workers considered reducing printing to be the individual's responsibility but that this perception did not translate into behaviour change (3)[b]. Interestingly, respondents generally considered themselves as more environmentally conscious than their employers, with 67% claiming to make environmentally conscious decisions at work. This did not appear to be borne out in practice: 40% of respondents described themselves as 'paper people' and a similar proportion (39%) admitted they could do more to reduce printing. Only a little more than a fifth (22%) claimed to have taken any action to reduce their printing, while 37% claimed to have increased the amount of printing that they do.

Similarly, the Opinion Matters survey found that 29% of office workers said they would avoid unnecessary paper wastage at home but not at work. This difference in home versus work behaviour was also found by Logicalis Group (26). The Logicalis Group's 2006 survey of 1,000 employees across the public and private sector found that employees appeared to behave in less 'environmentally friendly' ways in the workplace than at home. This supports Brook Lyndhurst who found that employees in SMEs

[a] The study included civil engineering, environmental consultancies, electrical contractors and plant hirers

[b] By Loudhouse Research for Kyocera. Stated coverage is "UK workplace printing attitudes" but no sampling details are given.

may not consider resource efficiency as being important because the costs associated with inefficient resource use in the workplace were not felt directly by them (27).

One explanation for this dichotomy of attitudes is that employees can be faced with moral struggles between their identities, on the one hand as employees working in formal and regulated structures, and on the other hand as citizens living in informal, normative, cultural structures (28). Hence employees may struggle to transfer pro-environmental behaviours from home to work when they do not feel that it fits within the corporate culture or shared norms within the company, i.e. they do not want to 'stick out'.

According to Logicalis Group the difference in attitudes may also exist because employees look to their employer to lead by example when it comes to being environmental responsible. 43.3% of respondents to this survey believed their employer only paid lip service to environmental issues, or were not interested at all (26). Despite a clear understanding of what steps they need to adopt, employees tended to want their employer to take the lead. 62% wanted their employer to offer incentives for being green in the workplace, while 57% would be encouraged to act greener if their employer 'led by example' (26).

4.2 Motivations

The company-led initiatives highlighted in Section 3 suggest that the main motivators and drivers for waste prevention were corporate responsibility, environmental management systems, cost reduction, and stakeholder pressures. (More detail on barriers and motivations for business waste prevention across sectors can be found in **L2m3: Attitudes and Behaviours**.)

Corporate social responsibility (CSR) or formalised Environmental Management Systems (EMSs) appeared to be major drivers behind activities in larger office-based companies and operations (7) (8). The activity to implement an EMS was also the key driver for Cidon, a small company based on an industrial site. However the evidence is not strong enough to establish whether CSR and EMSs alone would drive waste prevention behaviour more generally in the office-based service sector, including in SMEs. It could be speculated that, given the limited uptake of CSR and EMS in SMEs, these initiatives may be less of a driver for small companies; no evidence to support this idea has been found. More detail on the impact and effectiveness of EMSs can be found in **L2m4-1: Standards**.

The opportunity to save costs was only mentioned by Standard Life (22) as a motivator for change.

Stakeholder pressure – from employees, clients and suppliers - appeared to be a major motivator in large office-based companies. Ernst & Young and Wragge & Co both also mentioned attracting and retaining talented individuals as motivation for action. Clients and customers were mentioned as drivers for waste prevention behaviour in the Ernst & Young and Standard Life case studies, which supports the survey results by Javelin Strategy and Research cited above in relation to 'paperless billing' (21) (7) (22). We found no evidence of suppliers having put direct pressure on office-based companies to reduce their waste; however, we found two examples where suppliers had provided solutions that enabled waste prevention in the office-based sector (13) (16). Further work would be needed to ascertain the importance of this driver on the office-based sector, in particular for SMEs.

4.3 Barriers

The evidence on factors preventing waste prevention in the office-based service sector is very limited. The few case studies reviewed that mentioned barriers suggest that a lack information and stakeholder (employees and customers) engagement can be barriers to waste prevention activity in the office-based service sector.

With regard to purchasing products with lower waste profiles, a manufacturer of office equipment and furniture (13) noted that the term 'remanufactured' could act as a potential barrier if customers associated it with 'reconditioned' or 'of lesser quality'. It was therefore important to make customers aware of the benefits of reused or remanufactured equipment.

A number of the case studies involved changing printing technologies or procedures, and lack of knowledge or understanding of the new procedures can act as a barrier to change. Whilst none of the case studies mentioned this, The Logicalis Group (26) found that three quarters of employees have access to double-sided printing and copying facilities, but only a quarter have been offered training in using the equipment and 37% said they would like further training.

The example from Ernst & Young (7) showed that internal resistance to change can be a key barrier when implementing a paper reduction strategy. This resistance may be explained by existing attitudes (see Section 4.1) or staff being set in routine behaviours such that changing these may require significant effort.

4.4 Enablers

A number of different behavioural factors relating to staff commitment and engagement were identified in the case studies highlighted above:

- **Senior management commitment and endorsement** was key to the success of waste prevention activity in Falkirk Council (9) and Ernst & Young (7). In addition the role of eco-teams and/or champions in communicating the need for change was mentioned in Ernst & Young, Wragge & Co and the Falkirk Council case studies (7) (12) (9).
- **Effective channels:** Similarly, the importance of clear channels of communications and consistent messages to raise awareness and establish a new behavioural norm was highlighted in the Ernst & Young case study (7).
- **How messages are pitched**: Ernst & Young found that different messages were needed for different people to gain support and engagement, i.e. some responded better to environmental messages, while others responded better to cost-saving messages.
- **Messenger:** In addition to the content of the message, the type of messenger is likely to be important when it comes to changing the attitudes of staff. We found no evidence on this, but existing evidence from the CSR literature may provide further insight into this.

The research team feels that, while they are useful, these examples provide only a superficial understanding of the motivations and enabling conditions for implementing successful waste prevention/ environmental programmes in office-based services, particularly in large companies. As regards SMEs, the evidence in module **L2m3: Attitudes & Behaviours** is directly relevant to office-based SMEs.

Intermediaries like Envirowise, NISP, Groundwork and CO_2Sense played an integral part in some of the examples above. Given the fact that they were case studies this may be of no surprise. In addition, the research team is aware of Green-Works as being active in this area but no evidence of impact on the office-based service sector was found within the scope and time of this research. More detail on the effectiveness of business support can be found in **L2m4-8: Business Support – Other** and **L2m4-7: Business Support - Waste Minimisation Clubs**.

5 Conclusions

5.1 Learning

Based on the evidence, the following are apparent:

- **Increasing awareness of and encouraging business to control unnecessary paper use could lead to further significant reduction in waste generation.** Possible savings from low-cost or no-cost paper reduction measures, such as through double-sided printing, multiple pages per side and employee-coded printing services, have been estimated at £165.6 million out of a total of £233 million waste savings available in the sector.

- Because waste prevention opportunities relate to everyday 'housekeeping' measures, **changing employee attitudes and behaviours will play a crucial role in determining the effectiveness of office-based initiatives.** A small number of case studies has demonstrated savings through such initiatives; however little robust or systematic evidence was found on how companies address the issue, what specific actions or behaviours have resulted in the cost or waste savings, and the reasons why employees did or did not participate.

- **There is some evidence that the introduction of green products (office furniture, ICT equipment and other fixtures) can provide waste and cost savings to businesses.** However, the published evidence appears skewed towards the producer and the environmental benefits of their products. No detailed and robust evidence was found from the perspective of office-based businesses as to why they switch to buying greener products, or have closer collaboration with suppliers[a], and what the costs and benefits are from the purchaser's angle.

- **No evidence was found of the reduction of the hazardousness of waste being considered or acted on by the sector.**

5.2 Insights

The limited evidence we reviewed suggests that efforts to reduce waste appear to focus primarily on landfill diversion and in particular recycling. Waste prevention behaviours may in fact be more prevalent than the evidence suggests, albeit being reported under wider CSR or sustainability initiatives, or not reported at all.

Despite self-reported high environmental awareness and accountability by employees when it comes to waste prevention, these attitudes do not necessarily translate into action on the ground. There appear to be a number of potential reasons for this. Employees may experience moral struggles between their home and work identities, or look to their employers to put the right structures and incentives in place to enable waste prevention behaviour. Current behaviours may also be 'routinised' and 'unthinking', and hence difficult to overcome.

While it is necessary to disaggregate recycling from waste prevention behaviours in future communication with the sector (for example, by business support providers), it is important that the audience is not alienated by suggesting that previous behaviour (i.e. focus on recycling) was wrong. Advice and support for managers helping them to engage, incentivise and communicate with staff throughout the organisation may also help to facilitate wider uptake. This is a consideration for business

[a] A forthcoming report for Defra by consultants ERM on longer product lifetimes (EVO445) may provide further insights in the issue of carpets; however this report was not available to this review.

support services. Managers may need information not only on practical measures they could take but also guidance on effective behaviour change approaches.

Given the potential role of procurement in driving waste minimisation down the supply chain, this is an area of likely opportunity for prevention too. For example, a change in the behaviour of large scale procurers in the public and private sectors might be capable of extending product lifetimes and shifting the balance between end of life management and product/service innovation for office furniture, ICT and carpets (though this would need to be assessed further). Building new case studies from large companies might help to demonstrate how these options can be 'fit for purpose' for the sector.

5.3 Research Gaps

- The current evidence base largely exists in the form of case studies (for large companies) or non-sector specific information on motivations and barriers for SMEs. **There is a need for more systematic evidence on both current practice and the outcome of voluntary initiatives being undertaken by companies in the sector.** This is unlikely to be available from secondary sources because initiatives in the sector are likely to be largely voluntary, often private and probably commercially sensitive. Further primary research could include:

    - Desk research to review a representative sample of CSR reports to identify best practice in large office-based corporates, although this might be limited by the way in which prevention is rarely reported as a separate outcome.

    - A 'roundtable' of large and medium size companies to identify opportunities for encouraging greater paper reduction, furniture and WEEE re-use, and collaboration with PSI suppliers, which might form the basis of guidance or case studies to office-based services more widely. The Strategic Supply Chain Group might be one such forum.

- **More research into the behavioural/social dimension of waste prevention activities would provide greater insight into the reasons why internal change management programmes do or do not work.** This would need to examine how staff and managers respond to such initiatives, what works in terms of maximising internal engagement, and which activities are most effective in leading directly to waste prevention. This could perhaps be achieved through action research with businesses wanting to pilot a waste prevention/resource efficiency initiative, or in action research to accompany any future business support programmes.

- Since the viability of reuse and remanufacturing business models in the UK largely depends on customer demand, **further research could be undertaken to understand the key factors influencing purchasing behaviours in the office-based sector**, as well as the key challenges and opportunities for the service based sector as a whole when it comes to reducing their waste impacts through purchasing and engagement with PSI suppliers.

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