WR1403: Business Waste Prevention Evidence Review

L3m1 – Self Motivation

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 part of the Level 3 Cross-Cutting Theme reports. It refers to the accompanying 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 Self Motivated action towards waste prevention.

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

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Glossary

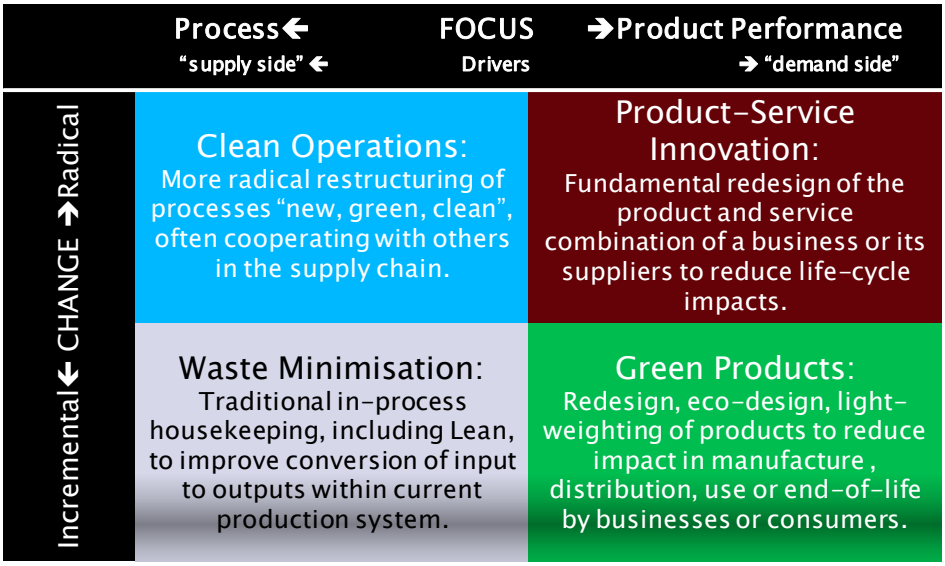
bre	Formerly known as Building Research Establishment	PR	public relations
CSR	corporate social responsibility	PVC	polyvinyl chloride
EMS	environmental management system	SME	small/medium enterprise (EU definition)
ESRC	Economic and Social Research Council	US EPA	US Environmental Protection Agency
IT	information technology	WRAP	Waste & Resources Action Programme

Units Conventional SI units and prefixes used throughout: {k, kilo, 1000} {M, mega, 1,000,000} {G, giga, 10^9} {kg, kilogramme, unit mass} {t, metric tonne, 1000 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



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1 Introduction

This module is provided as an addendum to the main report and examines one of a number of cross-cutting issues, namely self-motivated actions by companies to address waste prevention. By this we mean actions that were not overtly induced or catalysed by the actions of publicly funded agents. In general this means the initiatives were wholly funded by the companies themselves. Whilst the entire review has not included the effects of compliance with legislation, this aspect recognises that some companies may have acted either in anticipation of legislation, or as a by-product of other legislation not directly related to waste prevention. A consideration of initiatives that have failed has also been included, though evidence in the review for this was extremely limited.

Where action has taken place, we have attempted to describe the behavioural aspects that motivated this; a corresponding consideration of barriers accompanies the failures, where possible.

2 Self-motivated Actions by Sector

2.1 Construction and Demolition

Unsurprisingly, given the vast waste arisings from construction and demolition, this sector has received considerable attention from policy-makers and is subject to several interventions aimed at addressing waste, WRAP's Halving Waste to Landfill initiative being a prominent case in point. Nevertheless, some good examples exist of self-motivated initiatives including:

- the adoption of off-site manufacturing and plot-lot ordering techniques (1; 2)
- on-site recycling of surplus materials (3; 4; 5)
- use of less or reusable packaging (6; 7)
- redesigning building to designs to cut down on plasterboard usage (8)
- other unspecified activities described in the literature as 'waste minimisation' or 'best practice' (9; 10; 11).

Self-motivated examples of product/service innovation are rarely seen except through the reuse of reclaimed materials, well documented in the sector (12).

Drivers
In most instances of unsupported action, the main drivers have been legislative compliance (e.g. with Site Waste Management Plans, Duty of Care, etc.), which should affect all operators equally; or the opportunities to save money, especially as landfill disposal costs continue to rise. Remarkably little evidence of procurement pressure was found, except perhaps for developments which were public sector-funded; although, given the limitations of this review, evidence may exist elsewhere. Module **L2m5-1: Construction & Demolition** covers these issues in greater detail.

2.2 Food and Drink

Much government attention has also been directed towards the UK's food and drink manufacturing sector, with waste minimisation clubs, government-supported commitments (e.g. Courtauld), one-on-one consultancy support and other forms of business support. Evidence for self-motivated waste prevention in the sector is available but limited. Waste minimisation approaches are rarely reported, an exception being an unnamed convenience food manufacturer which introduced constant monitoring of production wastes (13). It is possible that companies simply do not wish to publish information on efficiencies or advances they have made which could help their competitors. Self-motivated clean operations and green products approaches are more frequent and centre on bulk supply of raw materials (14), investment in new technology (15; 16) – including new IT systems for improved demand forecasting (17; 18), returnable transit packaging (19) and packaging lightweighting (14; 20; 21; 22; 23). Interestingly, the only example of product/service innovation found for the industry – i.e. home delivery of food to tailor customer needs with shortened supply chains in the UK (e.g. Abel & Cole, Riverford Organics, Rod & Bens, etc.) or abroad (21) - appears to be the result of self-motivated, unsupported behaviour.

Drivers
Drivers for the waste preventing behaviour appear to come mainly in the form of customer and procurement pressure, particularly from the larger retailer customers (24; 25; 26), and to a lesser extent from concerns over compliance with legislation (27; 28). Module **L2m5-2: Food & Drink** has more information.

2.3 Hospitality

The sheer diversity of the hospitality industry in terms of numbers and types of businesses would seem to defy traditional business support models. A degree of self-motivation might therefore be expected in most examples of waste prevention drawn from the sector and this is borne out in the limited evidence available. Most waste prevention actions appear self-motivated; this holds true for examples of packaging reduction and light-weighting (21; 29; 30; 31; 32; 33), donation of surpluses to good causes (21; 31; 32; 34), the use of returnable transit packaging (35), purchase of remanufactured goods (36), flexible menu selection (33), investment in improved ordering and forecasting systems (37), refillables (21; 29), design for reuse (31) and some leasing initiatives (21).

Drivers
The opportunity to save costs seems to be a universal driver (21; 30; 38; 39). Concerns of corporate social responsibility (CSR) and customer expectations – perceived or actual - may be important for larger, higher profile businesses (30; 40). Compliance with legislation is another motivating factor although whether it specifically drives waste prevention is unclear (41). Many actions are now also encouraged by award schemes which tend to be industry- rather than government-supported (e.g. Green Globe, Green Tourism Business Scheme, Green Hospitality Award), (31; 32; 42; 43), however few explicitly target waste prevention. Some examples of waste prevention appear to have been enabled through leadership from within (29; 44; 35), again highlighting the unusual prevalence of self-motivated behaviour in this sector. Module **L2m5-3: Hospitality** has more information.

2.4 Retail

Among retailers, waste prevention practice appears to be most evident in – or at least is more commonly reported for - the handful of large powerful companies (i.e. multiple grocers and well-known high street brands) which dominate the sector. Far less evidence comes from the diversity of smaller businesses. In the vast majority of cases reviewed in the present study, activities were encouraged by government-supported interventions, notably the Courtauld and Carrier Bag Commitments. Only a small number of apparently self-motivated initiatives have been evidenced, centring mainly on waste minimisation and clean operations. These include reducing supply chain waste (34), improved forecasting (34), reducing the price of items as they approach sell-by dates (34), offering less wasteful pack sizes (34), donating surpluses to charity, introducing reusable packaging (34) and procuring remanufactured refrigerated display cabinets (21).

Drivers
Given the paucity of evidence for self-motivated waste prevention behaviour in the retail sector, pointing to drivers with any degree of confidence is inadvisable. However, it is reasonable to surmise that CSR pressures as well as opportunities to save costs will be underlying motivators. For example, businesses will reference donations of surplus food to FareShare in their CSR report, while case studies on waste prevention often highlight the financial savings won. Worth noting in this context is Marks & Spencer's Plan A: M&S claims the eco-strategy has yielded in £50 million of additional profit[a] by acting as a 'unique selling point' for the company, enabling it to differentiate itself from its competitors. Module **L2m5-4: Retail** has more information.

[a] M&S (2010), "How we do business report 2010"

2.5 Automotive

Like the hospitality sector, most of the waste prevention actions identified in the present review have been self-motivated rather than supported by government. Initiatives cut across all approaches, with hazard reduction often a goal. Self-motivated actions include reduction in paint shop wastes (45; 46), improving processes (47), solvent recovery for in-process reuse (48; 49), use of reusable packaging (45; 50; 51) and cleaners (8), avoidance or reduction of hazardous process chemicals (8; 52; 53; 54) and switching to materials which result in less waste (55; 52; 51). The industry (e.g. Caterpillar) has also successfully pioneered the use remanufactured components – or entire products - as a business model (56; 57). Interestingly, though, surprisingly little evidence was reported on wastes saved through Lean manufacturing; it is possible – as in the food and drink sector – that companies prefer not to report on the details of successful interventions for fear of helping their competitors. Further, it is not known to what extent, or with what commonality across manufacturers, that the vehicle manufacturers apply their Lean (or waste prevention) thinking onto their Tier 1 or Tier 2 suppliers[a]. (See **L2m5-5: Automotive Sector**.)

Drivers
As with other sectors reviewed here, self-motivated initiatives are very likely to be driven by the opportunity to save costs (58; 55; 57) or to avoid falling foul of environmental regulations (49; 59). Few automotive companies appear to track – or report on – waste prevention suggesting that the environmental benefits of their actions are typically small in comparison to gains from improved productivity (46). The role of standards is interesting in the context of self-motivated behaviour; evidence suggests that automotive companies will implement the environmental management (EMS) standard ISO 14001 with no direct government intervention (60; 61) but rather in response to demands from stakeholders, especially parent companies or powerful customers (62; 11). However, it should be noted that true waste prevention is rarely an explicit requirement of EMS accreditation. Module **L2m5-5: Automotive** has more information.

2.6 Office-Based Services

Companies in service industries may generally be less aware of, or involved in, waste prevention activities because they are subject to lower raw material costs than businesses operating in more material-intensive sectors such as manufacturing or construction (63; 64). This might lead one to anticipate that external business support would invariably be needed to stimulate and facilitate waste prevention in the office-based services sector, but the available evidence – albeit limited – would seem to refute such an expectation. On the basis of the handful of relevant case studies and reports available, the bulk of waste prevention activities in the office-based services appear self-motivated. These include waste prevention through raising awareness and introducing staff incentive schemes (65; 66), modifying printing procedures – typically switching to double-sided printing (65), stationery rationalisation and reuse (65; 67), reuse and reconditioning of office furniture (68), new technology such as the development of new low-waste printer cartridges by Xerox (69; 21) and switching to paperless billing and other forms of electronic service delivery (67; 70).

Drivers
Various drivers for these activities have been highlighted including CSR/stakeholder pressures and EMS (65; 66; 71; 65; 70). Senior commitment and staff engagement, including the appointment of 'champions' also seemed important (67; 72; 65). The financial costs saved by a waste prevention initiative were cited only once (70); but publicly revealing this as an underlying motivator may perhaps have weighed against the positive PR value of the initiative.

[a] Personal Communication, Professor Steve Evans, University of Cranfield

Evidence was generally lacking in the office-based services sector for waste prevention, supported or otherwise, so drawing firm conclusions is difficult. It should be noted, though, that this review included public sector office services (where more substantial evidence of waste prevention may have been expected) only opportunistically since the search scope was directed primarily to commercial services. However, the likelihood of finding self-motivated behaviour is arguably low given current policies on sustainable public procurement (see, for example, the Sustainable Operations on the Government Estate Requirements introduced in 2006). Module **L2m5-6: Office-Based Services** has more information.

3 Types of Self-Motivated Initiative

The preceding brief analysis suggests that self-motivated waste prevention behaviour is more common in some sectors (i.e. hospitality, automotive, office-based services) than others (i.e. construction, food and drink, retail). However, this impression may be false, resulting either from the fact that far more business support has been directed at the latter sectors than the former or simply that the information is not divulged by the former businesses; in this review, reports and case studies on supported initiatives in the latter sectors far outweigh published evidence for self-motivated action.

Several themes do emerge, however. Firstly, larger companies seem more prepared to take unilateral action to prevent waste than do SMEs. Not only are they more likely to possess the necessary skills and resources to effect change, but they are more subject to public scrutiny. Another key observation is that although self-motivated actions seem rarer than supported ones, they cut across the range of waste prevention approaches: waste minimisation (e.g. plot-lot ordering), clean operations (e.g. returnable transit packaging), green products (e.g. packaging light-weighting) and product/service innovation (e.g. remanufacturing).

Moreover, the drivers for self-motivated action generally mirror those for supported initiatives: the opportunity to save on costs, concerns over legislative compliance, CSR goals, customer and procurement pressure, and sometimes EMSs.

These observations highlight the need to consider if external intervention, for example through the support of market development, is always necessary. Reasons for doing so could include bringing innovations forward in time and putting them into the public domain.

4 When is Support Needed?

Given that most of the self-motivated examples discussed above concern larger companies, it can be argued that business support would be better directed at smaller enterprises lacking the skills, knowledge and desire to prevent waste in their operations. Interventions such as waste audits, workshops and training sessions appear to have particularly been effective. Examples include Canada's Enviroclub (73) and Western Australia's Clean Production Programme which focused on SMEs in dry cleaning (74). Among sectors where self-motivated behaviour is well evidenced, a demand nevertheless exists for greater business support. For instance, a 2004 ESRC-supported study concludes that the UK restaurant sector would respond well to external business support; it reports that businesses were frustrated "at the government's lack of partnership and consultation with the restaurant industry" (35).

However, for certain process-intensive industries (e.g. automotive) business support needs to be carefully structured and in-depth because waste prevention strategies cannot necessarily be copied from one company to another (75); each firm will have its idiosyncrasies (76). This is confirmed by an analysis of business support programme in Nebraska which showed that simple projects and short-term assistance resulted in the lowest monetary and lowest solid waste reductions per client, whereas in-depth assistance led to the highest savings (77). Moreover, as discussed below, even if SMEs wish to effect change, they may lack the necessary influence in the supply chain to do so. This may explain why business support initiatives targeting supply chains have proved so successful; examples include WRAP's Courtauld Commitment, and Envirowise's 2002-7 Supply Chain Partnership Forum (78 p. 18) and work with Allied Distillers and suppliers (79).

Another area where external support may be important is in trialling new technologies, especially 'disruptive' ones; the support which WRAP has given for trialling in-store self-dispensing systems for detergents with ASDA and Unilever is a good example (80).

Caution should be exercised when attributing the success of a supported initiative since companies already committed to environmental improvement are often the ones who thrive under support. For instance, a 2007 Defra study quantifying the business benefits of resource efficiency found that the better performing companies sought advice more often than the neediest (81). The 1998 Aylesbury Vale Industrial Waste Reduction Project reached similar conclusions (82). Modules **L2m4-7: Waste Minimisation Clubs** and **WR1403-L2m4-8: Other Business Support** have more information.

5 Failed Initiatives

As expected, few companies deciding to take waste prevention action were willing to publicise examples of failure. Where lessons can be learned, these are probably equally applicable to situations where waste prevention has received external business support. The reasons why self-motivated waste prevention may fail have been grouped here as follows:

- lack of in-house expertise
- lack of supply chain power
- unintended consequences
- poor internal communications
- lack of employee or Change Manager power.

In-house expertise
Lack of technical or managerial expertise to tackle waste prevention could be an explanation for failure. A 2008 report by the House of Lords suggests that even where businesses realise the financial costs of waste and are aware of waste reduction strategies "an understanding of how to implement them is lacking" (69 p. 73). According to a report from the US EPA, even large companies may lack knowledge of best practices of waste prevention, especially when dealing with hazardous substances and life-cycle aspects (83). However, given their resources and expertise, larger firms will be better placed than SMEs to investigate and capitalise on opportunities for waste prevention. This is proved by the observation that most of the successful self-motivated waste prevention activities identified in this review are evidenced by big businesses, such as high street retailers, multiple grocers or large construction companies.

Supply chain power
Not only do larger companies have the resources to implement waste prevention initiatives, their size means that when change is needed in the supply chain, they have the influence to make it happen. It is notable, therefore, that the few evidenced cases of failed self-motivated waste prevention are seen with smaller enterprises whose initiatives are often contingent on decisions taken elsewhere in the supply chain; in these cases the company taking the action seems to have insufficient procurement power. For instance, when RASCards, a manufacturer of plastic store cards based in the northwest of England, asked a supplier of PVC sheets to eliminate timber cages around the product, the request was refused. RASCards eventually switched supplier and made modest material savings (8). A similar example comes from Kingspan Insulation, a manufacturer of insulation products for the construction industry: having adopted BRE's Framework Standard for Responsible Sourcing of Construction Products, Kingspan was initially unable to change the behaviour of a large supplier so as to save waste. Kingspan solved the problem by careful negotiation and by subtly changing the language it used with the supplier. (6)

Even where a procurer is powerful and a supplier is acquiescent, the initiative can still falter if the supplier lacks the necessary resources or expertise to make the requested changes such as investment in technology, the appointment of an environmental manager or better training. This is likely to be truer for smaller SMEs (26).

Unintended consequences
Self-motivated waste prevention activities can also fail in the sense of producing unintended consequences. For example, when Rejuvenation, an American manufacturer of period-effect lighting and other house parts, asked a supplier to find an alternative to polystyrene packaging, the latter was replaced with a tray made from moulded pulp. The new packaging, while boasting a higher recycled content and recyclability, was actually heavier (84). In theory this would have a small effect on transport

emissions (though probably negligible considering packaging density), but with an overall life-cycle benefit, though this is not evidenced.

Internal communications and agency for change

Although equally relevant to supported waste prevention activities, poor internal communications within an organisation and especially a "lack of agency" felt by employees (27) are likely to hamper self-motivated initiatives. A good example comes from the food and drink sector, where research for WRAP in 2010, involving visits to 13 sites operated by leading manufacturers, revealed that in all but one case environmental managers were disengaged from the production processes, which obstructed their efforts to cut production waste (85).

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