

**WR1403: Business Waste Prevention
Evidence Review
L1m0 – Executive Summary**



A report for
Defra

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1 Background & Purpose

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. The evidence review will help inform the preparation of England's National Waste Prevention Programme as required under the revised EU Waste Framework Directive of 2008 (WFD).

Within this review, waste prevention includes waste avoidance, waste reduction at source or in process and product reuse at end of life. The definition used is in line with that in the revised WFD:

'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;*
- b) the adverse impacts of the generated waste on the environment and human health; or*
- c) the content of harmful substances in materials and products.*

The focus in this evidence review 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. Recycling activities or their promotion are clearly outside the scope. So-called 'waste exchange' – including materials and product exchange – are also largely outside of the scope. The review acknowledges that these have a role but fall more into the categories of recovery or preparation for reuse rather than prevention.

2 Scope & Method

It was necessary to set an historic cut-off date on the search for evidence. Major publicly funded business support programmes on waste minimisation and prevention became established in the UK from the mid 1990s, so this evidence review starts at around that time. Selected older materials, such as evaluation reports on the pioneering CEST (Centre for Exploitation of Science and Technology) funded Aire & Calder project (1992) have been included for their historic perspective and as a benchmark for today's practices.

The search has not been confined solely to the UK; around 30% of the reviewed literature was sourced internationally including Anglophone nations (USA, Australia, New Zealand, Canada...), EU community documents and Scandinavian sources in English, and native German and French documents translated by the research team and others. A broad sample of experience has therefore been embraced.

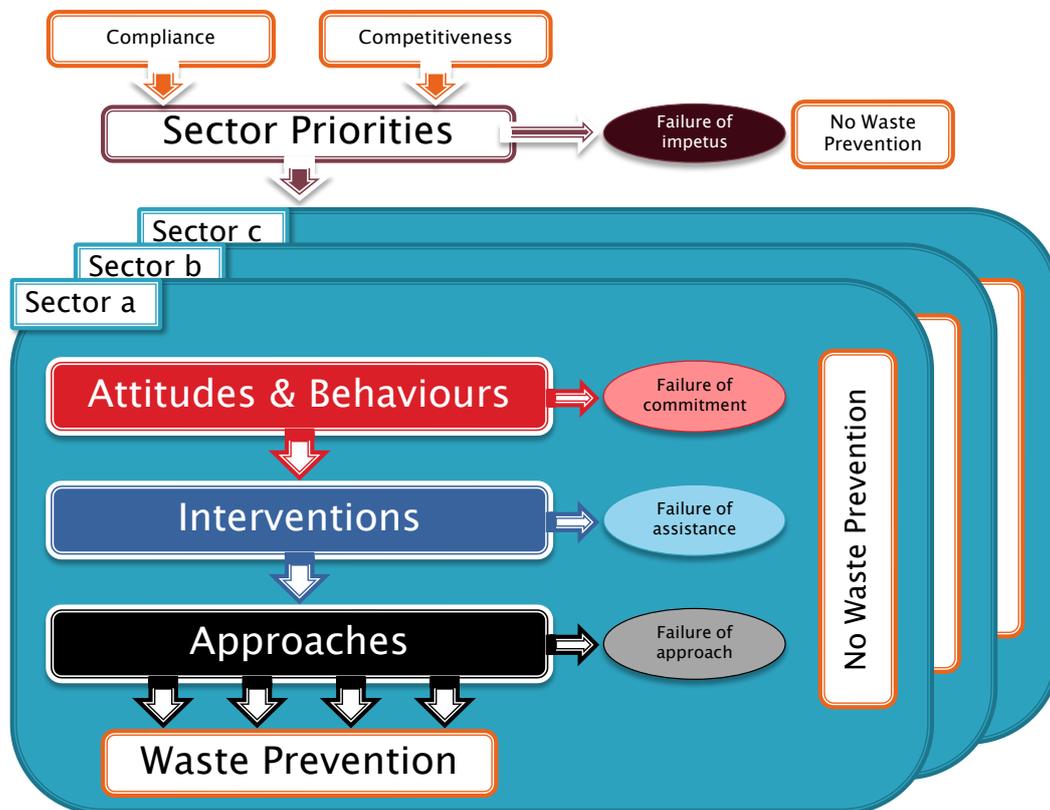
The sources for the search have included academic materials; meta-studies conducted by Defra and others; reports of programme achievements from assisting bodies or their Government sponsors; investigations and cases studies from these bodies; books, journals and periodicals, both printed and electronic; reports and databases held by Defra and others; and publicly available materials published by companies themselves or by specialist media. These have been augmented by consultation with over one hundred industry figures, academics, NGOs and other experts, including English and devolved agency representatives, who have recounted personal experience and insights or pointed to other sources.

It is important to be aware that the available sources of evidence do influence the nature of that evidence. In particular, the evidence found may to some extent have been self-selected, due to the emphasis placed by publicly funded agencies charged with assisting businesses on promoting positive outcomes; on the other hand, there are limited benefits to companies to report benefits of internal, voluntary initiatives.

In total, the project team gathered more than 960 documents, which were read, sorted for relevance, summarised and categorised as inputs to the detailed analysis. The outputs of that analysis, organised in a format developed with Defra’s Policy Team to best illustrate key features of waste prevention practice, comprise a suite of 28 stand-alone reports, introductory texts and supporting annexes, plus a Review Overview Report in addition to this Executive Summary. These reports have undergone a critical review by individuals widely acknowledged to be experts in various aspects of the waste, resources and business advisory field; this provided a broad test of balance, rigour, completeness and relevance.

Figure 1 shows graphically the broad logic of waste prevention action by business, starting from the basic drivers of legislation and competition.

Figure 1: Chain of events leading to waste prevention



Source: Oakdene Hollins/Brook Lyndhurst

Central to any analysis of the evidence is a detailed examination of the attitudes and behaviours of business. The other two fundamental perspectives used in the analysis were the particular commercial or industrial sector – as shown here, six illustrative sectors were selected to give focus to the review; and the types of intervention – as shown, eight types were selected, including two that explicitly examine

Sectors	Interventions
Construction & Demolition	Standards
Food & Drink	Labelling
Hospitality	Procurement
Retail	Commitments
Automotive	Communication
Office-Based Services	Incentives
	Waste Minimisation Clubs
	Other Business Support

the ‘publicly/privately funded assistance’ which have catalysed actions. In addition, cross-cutting modular reports cover the measurement of benefits, hazard reduction measures, self-motivated actions (as opposed to those driven by an external assistance programme) and reuse / material use efficiency.

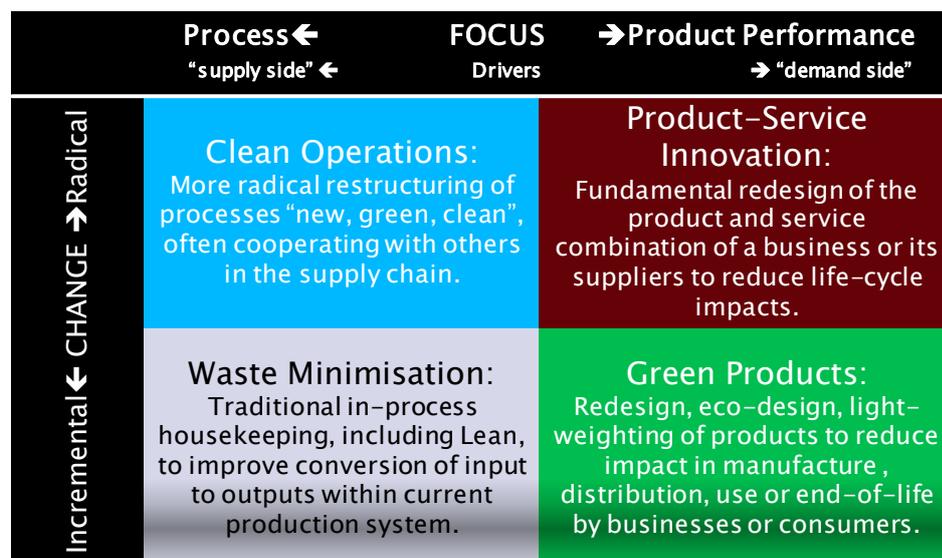
In examining these perspectives, this evidence review has characterised the types of action a business takes to prevent waste into four broad Approaches. Figure 2 shows graphically the relationship of these Approaches along two simple characteristic dimensions:

1. The vertical axis shows the degree of change involved, from ‘incremental’ to ‘radical’.
2. The horizontal axis shows the focus of the change, from ‘process’ to ‘product performance’. This could equally be viewed as a reflection of ‘supply side’ and ‘demand side’ drivers.

Figure 2 is divided into four quadrants:

- In the incremental/process (bottom left) quadrant, the Waste Minimisation approach looks at an existing operation and ‘squeezes out’ waste.
- In the radical/product (upper right) quadrant, the Product/Service Innovation (PSI) approach looks to change fundamentally the whole way a particular business operates. This may mean entirely new products but may also mean new modes of ownership, payment and delivery.
- The other two approaches, in the top left and bottom right quadrants (Cleaner Operations and Green Products) bridge the two, but with opposing emphasis on the factors of FOCUS and CHANGE.

Figure 2: Positioning of Approaches in response to business drivers including waste



Source: Oakdene Hollins/Brook Lyndhurst

The findings of the review are presented in terms of these four Approaches, whether the focus is on behaviours, a particular intervention or a particular sector. However, we acknowledge that many actions span more than one of these Approaches.

3 Headlines & Findings

The core question for any review of the evidence on waste prevention is, how much of it is occurring? In this case, how much has business waste been reduced by explicit waste prevention activities? Unfortunately, the quality of the evidence is not sufficient to provide statistically defensible estimates even in the six key commercial and industrial sectors covered. Examination of the correlation between changes in sales value in each sector and waste arisings shows high-level evidence of a decoupling. This is indicative of a broad movement in the right direction, even if it has not been possible to isolate the factors that are contributing most to this positive trend. Review of the evidence, in order to isolate these factors, has often been frustrated by the absence of baseline data; by loose use of terminology, with 'waste prevention' being used to refer to waste diversion from landfill and to recycling as well as to waste prevention within the revised WFD definition; and by a failure to report the behavioural drivers in organisations. Such frustrations are to be expected in a field of research that is in its infancy and where policy objectives are still being refined.

This review of evidence has identified numerous learnings, insights and research gaps (see the module **L1m1: Review Overview Report** for a summary). The review of the eight types of intervention show that these have each contributed to business waste prevention, but the balance between them varies significantly by sector (see the individual reports under **L2m4: Interventions**).

The Waste Framework Directive provides the backdrop for promoting waste prevention to the business community. Annex IV of the Directive singles out sixteen mechanisms that Member States could employ, and which they are obliged to consider explicitly in their National Waste Prevention Programmes. The review found evidence that actions taken to date in the UK to stimulate waste prevention embrace all of these mechanisms; there is therefore precedent for further action under any of them, should they be deemed appropriate (see **L2m4-0: Interventions Introduction, Table 1**).

The evidence review found that businesses are generally positive about waste prevention objectives, are positive about the use of commitments and voluntary arrangements and are responsive to communication on this issue that place a focus on costs and opportunity (see **L2m3: Attitudes & Behaviours, Section 5.3**). However, for waste prevention through reduction of the hazardousness of waste, the conclusions identify the adoption of regulation as being most effective (see **L2m6: Hazard Reduction**). There is also support for the contribution of standards and environmental management systems; as a component of this, certain sectors have adopted Lean Manufacturing practices. Lean can be harnessed successfully for waste prevention, but its focus is on overall business efficiency rather than just resource efficiency, and the evidence review has found instances where Lean savings have reduced e.g. labour costs, but have resulted in increased waste generation (see **L2m5-5: Automotive**). This in turn highlights the generic point that Waste Prevention is just one component of the overall Resource Efficiency message alongside, for example, water and energy savings.

There are surprising and perhaps contradictory conclusions as well. With recycling for recovery and landfill diversion relatively widespread, the behavioural report findings (in **L2m3: Attitudes & Behaviours**) hint that it can become a barrier to investigating and acting on waste prevention at source. This is strongly evidenced within the construction sector where, for example, crushing hardcore and using it as backfill or aggregate on site leads to a significant reduction in waste generation, but at the expense of more sustainable and profitable business practices such as deconstruction and building material reuse (see **L2m5-1: Construction & Demolition**).

There are strong indications that the true cost of waste is an important influence but is still not recognised or sufficiently appreciated. Poor conceptual understanding of waste prevention by businesses appears to be at the root of a number of the identified barriers – particularly those related to understanding of and attitudes towards costs and cost savings. Because businesses tend to associate

‘waste prevention’ with an ‘end-of-pipe’ issue and not with improvements in efficiency and productivity, let alone new modes of business delivery, they often fail to appreciate the full costs of waste (including e.g. raw material and labour costs embedded in off-specification products). To illustrate the difference, one study in the retail sector estimated savings of £627/tonne from waste prevention, compared to £70/tonne from diversion (see **L2m3: Attitudes & Behaviours**, **L2m5-4: Retail** and **-5: Automotive**).

Direct – and costly – methods of communication have been more effective than relying on web sites, for example, especially as businesses value advice that is tailored to their sector, their position in the supply chain, and to the needs of personnel accountable for taking action on waste (see **L2m4-5: Communications**).

One of the most effective drivers for waste prevention is the leadership of some larger scale businesses, particularly in suitably structured sectors such as food retailing. Harnessing the resources of these leading organisations – where corporate culture has already changed so that other businesses are drawn in and engaged – represents a common theme arising from this research. A complementary aspect has been found in Japan’s ‘Top Runner’ programme, where standards for ‘best performing’ products to be specified in public purchasing have been set by the manufacturers themselves, setting themselves ever rising targets to meet. This approach has proven effective in energy and water using products, but could potentially be transferred to other resources (see **L2m4-6: Incentives**).

The learning from the review of incentives provides only hints of what may be possible in waste prevention. The effect of Landfill Tax on waste volumes is well-evidenced, but this is not unambiguously attributable to waste prevention measures as opposed to recycling or diversion; the correlation of R&D support for new technologies with projected waste prevention benefits looks promising but has not yet been proven in practice; and Extended Producer Responsibility measures have certainly provoked recycling and packaging light-weighting initiatives, but their wider impact on waste prevention is not proven. The measures examined may have coincidentally encouraged waste prevention but improved evaluation of their contribution is a possible subject of further investigation.

There is much evidence for the use of voluntary agreements to reduce waste, but few explicitly target waste prevention. Generally, such commitments focus on landfill diversion, with prevention often an incidental outcome – this despite signatory companies and government bodies emphasising the importance of the ‘waste hierarchy’. However, businesses appear generally favourable to voluntary agreements, although this may be less true for SMEs. Key motivators for businesses include Corporate Social Responsibility and customer pressures, a desire to engage with national policy, the opportunity to make financial savings and the implicit ‘threat’ of legislation should they refuse to participate. Few barriers to involvement were found except perhaps a lack of capability within individual companies to fulfil their commitments. In terms of behavioural aspects, much of the evidence centred on enablers: key success factors included the engagement of sector leaders and relevant trade associations. The notable examples in the field include the Food & Drink Federation’s Five Fold Ambition, the Courtauld Commitment and WRAP’s Halving Waste to Landfill (see **L2m4-4: Commitments & Voluntary Agreements**).

A diverse range of business support has provided the backbone of waste and resource initiatives since the early 1990s. In particular, the evidence suggests that the best run waste minimisation clubs can generate ten-fold returns on investment. Key success factors include: recruitment based on engagement with true cost savings; access to appropriate supporting skills; and sufficient resources for training, communications and cross-learning between participants (see **L2m4-7: Waste Minimisation Clubs**). These findings are complementary to those from other forms of business support such as help-lines, on-line guides and consultancy provision. Once again, a strong focus on costs, profitability and new opportunities leads to greater success, although the main target of activity has not generally been waste prevention in the sectors studied but rather recycling, landfill diversion, or wider resource efficiency measures, with prevention as a secondary benefit (see **L2m4-8: Other Business Support**). For both types

of support there is mixed evidence about whether they could sustain themselves free of public funding, although a strongly committed central ‘facilitator’ is one of the core elements of success.

The propensity or otherwise of businesses to commit resources to clubs and other support is reflected in the review of self-motivated waste prevention activities. Whilst the number of examples was extremely limited and slanted towards a few sectors (perhaps reflecting the recent sector emphasis of support programmes), the motivations of costs and profits, Corporate Social Responsibility concerns and legislative threats *et al.* are equally evident. Most examples are those of larger companies, which may be enabled by greater resources than SMEs or perhaps because of the degree of public scrutiny they attract. Interestingly, their waste prevention actions span the four approaches with less skew towards the Waste Minimisation approach than the bulk of the evidence, suggesting that genuine open-minded business-based decisions may be being made in respect of waste in these circumstances (see **L3m1-1: Self-Motivated Activities**).

It is clear too that SMEs present a major category of business with whom it is difficult to engage (see **L2m3: Attitudes & Behaviours, Section 5.4**). The key learning here is that, compared to larger enterprises, SMEs may be less empowered to take action because they feel driven by their customers’ or supply chain demands, which may not include considerations of waste. They are also less aware of waste prevention issues and hence less likely to act, although this may reflect the attitudes and priorities of management in respect of their own or customer priorities. Lack of resources can also hamper actions both in terms of internal investment, and because specialist support may be required to augment skills, which can only be obtained with assistance. This skill gap may also contribute to the initial lack of recognition of both the value and opportunity of waste.

4 Measurement & Action

The evidence presented in this review shows how the metrics associated with waste prevention have developed since the first publicly-funded waste minimisation project in the UK, Aire and Calder, which started in 1992. Beginning with potential financial savings and quantities of water, energy and waste within the boundaries of a firm, they later include comparative measures of global warming potential categorised at different stages of the supply chain (see **L2m7: Metrics**). These more comprehensive metrics have encouraged a move toward priority sectors where improvements could yield the largest benefits, whether in food and drink or construction, retail or elsewhere. The most effective interventions in these sectors, be they standards and labelling or procurement and communications for example, are still being explored and the need to innovate around structures that gain the widest possible collaboration of businesses is evident.

The traditional business support interventions have focused on the supply-side measures of Waste Minimisation and Clean Operations. There is generally less evidence available on the waste prevention opportunities of the demand side measures of Green Products and Product/Service Innovation (PSI). However, both the evidence here and separate work by WRAP illuminated in its 2009 report, *Meeting the UK climate change challenge: The contribution of resource efficiency*^a, would appear to suggest that the benefits of successfully implementing the demand side measures are potentially much greater, including the opportunity to design out waste in the first place. The most ambitious Product/Service Innovation approaches often fall outside the boundaries of a single firm or even the boundaries of a single sector or supply chain. If the potential for demand-side measures is to be realised, an improved evidence base on behavioural issues in business, such as the food and drink and construction sectors, would help to target

^a WRAP, 2009, Meeting the UK climate change challenge: The contribution of resource efficiency. WRAP Project EVA128. Report prepared by Stockholm Environment Institute and University of Durham Business School, WRAP.

resources less speculatively in the future. Encouragement of organisations to report on their failures as well as their successes would assist this effort significantly.

The messages from the pioneering projects in the early 1990s still have an audience in individual businesses that need to address end of pipe waste reduction opportunities. These opportunities will persist and should not be neglected. This will be the case even if new product/services are adopted, since they will need optimisation over time; but more importantly because the whole costs associated with waste, rather than simply end-of-pipe disposal, still do not appear to be fully appreciated by businesses. However, more ambitious changes appear to be realisable by moving whole sectors or supply chains in concert, such as has been observed in the Courtauld Commitment. These shifts require greater collaboration between businesses in conjunction with measures of success that are common to and embrace all agents in a supply chain. This review highlights evidence that is helpful in addressing these new challenges, as well as identifying gaps where further evidence is required (see **L1m1: Review Overview Report**).

Future evidence work should focus on three main 'pillars' in waste prevention and resource efficiency:

1. **Measuring success** - how can success in waste prevention be recognised and measured, to facilitate making an effective business case to decision makers?
2. **Encouraging Ambition** - how can breakthrough thinking challenge current ways of operating and lead to more ambitious approaches for implementing radically new ideas for waste reduction and reuse, thus helping to move businesses beyond recycling and incremental 'green housekeeping' measures (or waste minimisation approaches)?
3. **Changing Culture** - how can a wider culture of waste prevention and resource efficiency be developed and embedded?