

**WR1403: Business Waste Prevention  
Evidence Review**  
L4m3 – Review of Historic Materials &  
some Marginal Scope Issues



A report for  
Defra

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## Glossary

CSR	corporate social responsibility	SME	small/medium enterprise (EU definition)
DETR	(former) Department of the Environment, Transport and the Regions	UNEP	UN Environment Programme
DTI	(former) Department for Trade & Industry	UNIDO	UN Industrial Development Organization
ICT	information and communication technologies	US EPA	United States Environmental Protection Agency
NISP	National Industrial Symbiosis Programme	WAMTEC	Waste Management & Technology Centre
PRN	packaging recovery notes	WFD	Waste Framework Directive
ReMaDe	Recycling and Market Development (group)	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<sup>9</sup>}  
{kg, kilogramme, unit mass} {t, metric tonne, 1,000 kg}

## 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 4 modules that comprise technical annexes to the main report. This module deals specifically with historic and related materials pertinent to waste prevention but which were either supernumerary or marginal to the scope of the review.

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

# 1 Introduction

This element of the review has been collated by Professor Chris Coggins, the former Director of the Waste Management and Technology Centre (WAMTEC) at the University of Sheffield 1997-2001. It forms a technical annexe to main reports provided within the Level 2 modules, which have been bounded in their time period of review (i.e. from the mid 1990s onwards) and scope of consideration under the terms of reference for waste prevention activities. For the review, what was considered to be outside scope is restated in Table 1.

*Table 1: Description of activities in waste prevention deemed to be out of scope*

## Out of Scope

Businesses may be taking steps in dealing with a waste problem associated with residues – although there may be little they can do about the generation of such residues – and instituting further processing steps to recover useful fractions. According to the WFD these are examples of *recovery* post waste.

Examples include:

- **the reclamation of demolition residues for hardcore substitution off-site**
- **composting of food wastes to create a saleable product**
- **sending residues for general recovery operations.**

Certain classes of waste exchange rely on diversion to by-products with no attempt to mitigate the volume of such wastes. This is grey territory which we will exclude from our core considerations of waste prevention, but may be covered in our sections on cross-cutting themes of **L3m2: Reuse & Material Use Efficiency**.

Examples include:

- **off-cuts and production excess not fit for original purpose sent elsewhere (such as foam off-cuts, sold or not)**
- **casting sands from metal fabrication diverted into construction materials.**

The primary purpose of this module is to collate materials that are known that have arisen prior to the mid-1990s. Most of the materials described here are available only in paper form, and hence not amenable to the electronic searches of the main report modules. A secondary purpose is to collate some references on areas that are marginal to the core scope of the review.

- Section 2 focuses on early work on waste minimisation, and complements the material in module **L2m4-7: Waste Minimisation Clubs**.
- Section 3 refers to an extensive body of international work on Clean Production, initiated by the UN in the early 1990s but continued in later years, without which any review of business waste prevention would be incomplete.
- Section 4 focuses on waste exchange, which is marginal to the scope of this review. This lists some early references, and also brings the discussion right up-to-date through mention of on-line exchanges. The section complements the material in module **L3m2: Reuse & Material Use Efficiency**.
- Section 5 focuses on another marginal scope area, that of eco-parks. In this case, the material has not been included elsewhere, and so the references here are both historical and more recent.

## 2 Waste Minimisation Activity

### 2.1 Introduction

Waste minimisation activity comprises both a range of approaches including waste prevention, in-house and external recovery operations; and a number of initiatives based on business support and waste minimisation clubs in addition to self-motivated actions. There is extensive literature available on the subject, including the classic 'Project Catalyst' and Aire & Calder projects referred to in the main report.

Waste minimisation is not synonymous with waste prevention, but can embrace many of the same objectives. In essence, 'minimisation' operates within the current business paradigm, seeking increases in input/output efficiencies, whereas 'prevention' embraces a number of other approaches - described within the L2 report – of clean operations, green products and product/service innovations.

The following commentary largely relates to activities under the business support banner.

### 2.2 Historical Context

The results from the 1992 Aire & Calder projects were counter-intuitive. After all, why would profit-maximising companies ignore such large-scale opportunities to reduce their costs? Annual savings of £2.1 million were reported as being available to the eleven participating businesses simply by improving their use of water and energy and by reducing the amount of waste produced. Funded by the BOC Foundation, this well-documented UK project was inspired by an earlier Dutch PRISMA project concerned with water resources, the methodology for which was based on an existing US EPA waste prevention manual.

The counter-intuitive results were explained in terms of market failures: Resources were often under priced; water was sometimes abstracted almost free of charge from in-house bore-holes and local landfills offered gate fees of between £5 and £8 per tonne. At the same time businesses were more focussed on reducing the costs of another resource: labour.

The results of these early waste minimisation projects were confirmed by regional-, sectoral- and company-specific projects, and yet there was continuing concern that perhaps the waste minimisation and cleaner production objectives were not what they seemed. Perhaps all that was being measured and described was an element of the annual improvements in resource efficiency that occur in all competitive markets as new equipment is purchased and as improved process designs are implemented. Such uncertainties could only be addressed by more sophisticated metrics and refined nomenclature.

These have developed but in the context not of waste management goals but of sustainable production and consumption objectives. Rather than affecting water, waste and energy resources the question was whether waste prevention could also contribute to decoupling the impact of economic growth on global warming. The potential to improve resource efficiency within the boundary of a business organisation came to be seen as a component of this much larger and pressing issue.

We offer a number of broad observations on the content from the era:

- Very different legislative frameworks existed in the EU and UK oriented to commercial and industrial waste prevention.
- Solid waste prevention was seen in a more holistic perspective along with preventing water and air pollution.

- Several pioneering projects based on 'river catchment areas' reflect this holistic perspective (e.g. Project Catalyst, Aire & Calder). These 'benchmark' projects were able to attract large companies. Here, corporate social responsibility was already manifesting along with environmental management systems and such companies could see public relations value. On the other hand, there was more difficulty in recruiting SMEs who were more concerned with 'survival'.
- The role of the Environment Agency in UK waste minimisation projects, following its formation in 1996, was critical. The former National Rivers Authority maintained a substantial influence.
- Significant funding became available through the Landfill Tax Credits Scheme: There was significant repetition of projects, and limited evaluation with most being short-term in nature and constrained by project funding and timing. This short-termism is reflected in the reports which are characterised by 'exit strategies' rather than 'succession strategies'.
- Apart from the Environment Agency, a range of initiators/co-ordinators/authors - from University academics through consultancies to local authority-led groups - was apparent.
- Pre-existing references tended to originate from North America rather than Europe. Literature sources range from leaflets to detailed project reports, with case studies varied by sector and in detailed reporting.
- Waste Minimisation Clubs were brought together under a range of organisations and initiatives, but co-operation and shared experience was often informal in nature.
- Overall, there is fairly limited quantitative data on successes (and failures), although waste auditing and a concern for better waste statistics emerged at this time. A significant exception is the work by Phillips *et al* at University College Northampton, who continues to be active.
- Alongside broad aims of 'waste minimisation' and 'waste prevention' some groups saw the importance of 'added value' through information on legislation, regulation and waste strategies/policies, and the emergence of waste exchanges.

## 2.3 **Reading Materials on Waste Minimisation**

Ashridge Management Resources Group (1994). Environmental- related Performance Measurement in Business. From Emissions to profit and sustainability?

Business in the Environment Yorkshire and Humber (2000). REAP – Final Report 2000. Helping SMEs and the Environment

Business Link Norfolk and Waveney, University of Hertfordshire and March Consulting Group (no date). Minimising waste from farm gate to restaurant plate

Canadian Council of Ministers of the Environment \*CCME) (early 1990s). Municipal Guide for the Promotion of Packaging Waste Reduction.

Centre for the Exploitation of Science and Technology (CEST) (1994). Waste Minimisation. A route to profit and cleaner production. An interim report on the Aire and Calder Project. By Johnston N.

Centre for the Exploitation of Science and Technology (CEST) (1995). Waste Minimisation. A route to profit and cleaner manufacturing. Final Report on Aire and Calder.

Centre for the Exploitation of Science and Technology (CEST) et al (1998). The Don, Rother Dearne Waste Minimisation Project. Final Report

Centre for the Exploitation of Science and Technology (CEST) et al (1999). Dee Catchment Waste Minimisation Project. Final Report.

Centre for the Exploitation of Science and Technology (CEST) (2000). The Aire and Calder Experience. Reducing costs and improving environmental efficiency through waste minimisation. Case Studies.

Department of the Environment (New South Wales) (2004). Producing and consuming efficiently to conserve our resources.

Department of Trade and Industry (DTI) (1994). Project Catalyst. Final Report

East of Scotland Waste Minimisation Project (2000). Final Report : How to reduce the tide of waste and see your company fortunes soar. + Newsletters.

Environ (n date)/. Zero Emissions Leicestershire. Final Report.

Environment Agency (1996). Hereford & Worcester Waste Minimisation Group.

Environment Agency (1998) The Medway and Swale Waste Minimisation Project.

Environment Agency (1998). Thames Valley Waste Minimisation Project.

Environmental Protection Agency (EPA) (July 1999). WasteWise Update. The Measure of Success in Calculating Waste Reduction. Site. <http://www.epa.gov/wastewise>

Environmental Technology Best Practice Programme (1997). Minimising waste improves the bottom line. Results from the Humber Forum Waste Minimisation Project. GC18. + Case Studies.

Environmental Technology Best Practice Programme (1998). Cut waste boost profits. Results from the West Midlands Waste Minimisation Programme. NC11.

Green Business Network Nottingham Business School (1998). Environmental business activity amongst business support organisations across the East Midlands region.

Gronow B., Phillips P. S. and Read A. D. (1998). Waste minimisation in the East Midlands. Humber Resource Efficiency Centre.

Institute of Wastes Management (1996). 'Waste Minimisation' Report of IWM Waste Minimisation Group, chaired by Chris Coggins.

Kayes R. (1994). Green Audit Kit – an Evaluation of the South Devon Green Tourism Initiative. Final Report.

Leicestershire Waste Minimisation Association (2001). Project Report.

Leicestershire Waste Minimisation Initiative (1995, 1997+). Project Reports, Newsletters and Case Studies.

London Environment Centre & London Guildhall University (1997). The North West London Waste Management Project.

March Consulting Group (1996). Humber Waste Minimisation Project. Final Report.

North Wales Waste Network (2000). A waste minimisation project for rural North Wales. Achievements over 2 years, Case Studies., Recommendations.

Öko-Institut uv (1999). Waste Prevention and Minimisation,]. Final Report. Commissioned by European Commission DG XI.

Orr and Boss (1998). Nottingham Waste Minimisation Initiative.

Phillips P. S., Read, A. D., Green A. E. and Bates M. P. (1999). UK waste minimisation clubs : a contribution to sustainable waste management. *Resource Conservation and Recycling*, 27, pp 217-47.

Phillips P. S., Pike K., Bates M. P. And Read A. D. (1999). Developing effective waste minimisation clubs – a case study from the East Midlands of England

Pike K., Cumberpatch E. and Phillips P. S. (1999). The Northamptonshire Resource Efficiency Project: Use of surveys to predict company success in waste minimisation.

SEPA (1998). The reality of waste minimisation for industries and local authorities in Scotland. Summary Report

SEPA (2001). Waste minimisation projects and clubs in Scotland.

Turner J. (2001). A Comparative Study of Waste Management in British and German SMEs, with Particular Reference to Packaging Waste and Engineering Companies'. PhD University of Sheffield. (*PCC as Director of Studies*).

University of Northumbria in Newcastle (2000). Project Tyneside Waste Minimisation project. Final Report summary + Case Studies.

Waste Directories (A to Z) for Businesses (late 1990's). Less formal type of waste exchanges (see later) where unwanted goods and materials can be reused/recovered instead of primary raw materials – and reducing/preventing waste from going for disposal: Bradford, Corsham, Eastern Region, Hampshire & Isle of Wight, Leicestershire, Northamptonshire, North East Regional Development Agency, Peterborough, Sheffield, South Wales, South West, South Yorkshire, Wales, Wealden, West Sussex, Wiltshire.

Welsh Office et al (1998) SABINA. Sustainable Business in Action. (Severn Estuary).

WS Atkins, March Consulting Group and Aspects International; (1994). Project Catalyst. Report to the Demos Project Event, Manchester Airport.

## 3 Clean Production

Clean production has been extensively reviewed within the analysis under the approach known as 'clean operations'. Any review of the topic would be remiss in not mentioning the efforts of the UNEP-UNIDO initiative (see <http://www.unep.fr/scp/cp/>). This has comprised a network of some 100 national and regional Cleaner Production Centres all around the world targeting defining best practice and initiating programmes in key sectors including retail, tourism, metals and minerals, ICT, oil and gas, waste, water and others. Latterly the emphasis has moved to a more holistic approach under the sustainable consumption and production banner.

The site comprises numerous resources and reports although the majority are high level policy documents or how-to manuals for operators within the chosen sectors. As such, they contain relatively little quantitative data on the outcomes of any of the initiatives, although a number of the guides quote individual company benefits as exemplified in our core text.

## 4 Waste Exchanges

### 4.1 Historical Context

Within the scope the current work, waste exchanges do not take a central role. This is because they are not aimed at primary prevention measures, but rather the mitigation of waste arisings by onward use for consumption by others. Where products are concerned, this is not generally in the original application; where materials are concerned, they clearly have lower quality than virgin materials and hence are destined for inferior applications, or require further processing for use.

Nevertheless, having appeared in North America and the UK in the 1990s under the banner:

*“One company's waste is another's alternative, or secondary, raw material”*

they have received much attention over the last decade for their role in waste diversion achieved without recourse to strong measures or incentives. As witnessed by our review, which has included numerous National Industrial Symbiosis Programme (NISP) projects, construction has provided fertile ground for the diversion of excess building materials - although largely in one-off projects.

### 4.2 More Recent Developments

There is an added dimension that a number of waste exchanges occur voluntarily or mediated by private sector ventures including such ‘novel’ agents as eBay (for commercial and consumer products) or freely in domestic use as exemplified by Freecycle and Freegle. (For a more detailed evaluation of such on-line mechanisms refer to WRAP's project *RES144 Online Exchange Potential Impact*.)

Further developments in this area included the promotion of ‘eco-recovery parks’ and ‘clusters’ of companies promoting synergies in terms of resource efficiency and waste exchange. A networking group was also established bringing together a number of regional or sub-regional Recycling and Market Development (ReMaDe) groups across England Wales and Scotland. The following agents have been active in the area:

- Environment Exchange: Launched in November 1998 to provide an electronic market-place for environmental economic instruments and commodities, with specific reference to Packaging Recovery Notes (PRNs). Various booklets and Quarterly Reports.
- Waste Exchange Services (1998) The Complete Recycling Service for Industry.
- National Industrial Symbiosis Programme (NISP): [www.nisp.org.uk](http://www.nisp.org.uk) Established in early 2003, operated under contract to WRAP with effect from April 2010.

### 4.3 Reading Materials on Waste Exchange

AEAT (1994). Study on Electronic Exchanges for Recyclables. Final Report. A report for European Commission DG 111.

BRE (1998). DETR Materials Information Exchange.

Chicago Board of Trade (1995+). Recyclables Exchange. Project Overview.

Groundwork - Cresswell et al. (no date). Profit from waste. An internet-based waste trading system.  
[www.profit-from-waste.com](http://www.profit-from-waste.com)

Mosedale, J. F. (1999). An investigation of the feasibility of developing a sustainable waste exchange scheme with an internet accessed database. A case study of Groundwork Blackburn. University Salford, MSc Dissertation in partial fulfilment of a Degree in Environmental Protection.

South Wessex Waste Minimisation Group (1997). Waste Exchange : Rubbish or Resource. With approved wording by Environment Agency. *(used by WAMTEC in Sheffield in developing its own electronic and paper waste exchange service).*

US EPA (1994) Review of Industrial Waste Exchanges. EPA-530-K-94-003.

## 5 Eco-Parks

### 5.1 Historical Context

Eco-parks emerged in the USA in the 1990s and included informal or formalised sites where waste was received, sorted and made available to companies and social enterprises seeking used goods for repair and remanufacture, secondary raw materials, organic waste for re-processing and waste for energy recovery. They are not core to the scope of this work since their primary objective is not necessarily waste prevention, but could embrace other aims such as social inclusiveness, preparation for reuse or recovery operations.

They are interesting as a component of industrial symbiosis, largely because of the benefits that might arise from geographic proximity both in terms of shared infrastructure and by simplified logistics in managing flows of products and materials between compatible, adjacent processing facilities and retail units.

### 5.2 Reading Materials on 'Eco-parks' or 'Sustainable Growth Parks'

Binn Eco-park (2010). Renewable Energy Technology in Teesside. [www.binnecopark.com](http://www.binnecopark.com)

Cabazon Band of Indians (2005). Cabazon Resource Recovery Park.

Coggins P. C. (2006). Background Paper on ReMaDe Projects in the UK.

Doncaster Council (2005). Doncaster Zero Waste Strategy – Organic Resource Park.

Enviroparks Limited (2009). energy creation through innovation. [www.enviroparks.co.uk](http://www.enviroparks.co.uk)

Excelar (2000). Sustainable Growth Park project Phase 1. Investigation of White Goods Refurbishment Centre. New SME Opportunity No. 1

Integrated Resources Recovery Bureau and JLM Associates (1993). From Swords into Plowshares : Long Beach Recycling Market Development Zone.

London Remade (2001). London Remade Supply Infrastructure Project – Phase 1 2001-2002.  
LondonWaste Limited (2009). EcoPark.

Loxley Land & Property (2008). Beeleywood Sustainable Recycling Village. [www.beeleywood.com](http://www.beeleywood.com)

(The) Monterey Regional Waste Management District (MRWMD) (1996). Monterey Resource Recovery Park.

Peel Environmental (2010). INCEPARK resource recovery. Solutions for business and the environment.

Urban Mines Ltd. (2000). Development of Markets For Secondary Raw materials. Task 1: An Analysis of Bradford Objective 2 Regional Waste Flows. First Edition.

Urban Ore (1990s), Various Resource Recovery parks in USA.

(The) Wales Environment Trust Limited (2002). Draft Proposal for a Commercial Amenity Site Network.  
Warmer Bulletin (2006). Supplement on EcoParks.

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