MAKING BUSINESS SENSE OF WASTE

THE MAYOR'S BUSINESS WASTE STRATEGY FOR LONDON

NOVEMBER 2011

MAYOR OF LONDON

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minicom 020 7983 4458

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CONTRIBUTORS CREDITS

GLA Group:
Andrew Richmond, Bert Glover, Doug Simpson, Emma Burton, Emma Lewis, Gill Lawton, Helen Woolston, Isabel Dedring, Jonathan Pauling, Kulveer Ranger, Larissa Bulla, Marian Kelly, Martin Powell, Matt Boyayanlar, Nicole Fletcher, Peter Heath, Sarah Foster, Stephen Tate, Saritha Visvalingam, Sumeet Manchanda.

Other contributing organisations:
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Copy-editing and design:
Helen Johnstone, John Wilson, Liana Bakar, Tom Lancaster.

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FOREWORD

As the old saying goes, where there is muck there is brass and there is indeed a massive economic opportunity inherent in London's waste which we must realise to its full potential.

There is also of course a real environmental imperative to stop sending rubbish to landfill or discarding items that can be used again or recycled, but we can also reap huge monetary benefits and create jobs if we make better use of our waste material.

My ambition is to put 'the village' back into the city. What I mean by this is that we can improve the quality of life for Londoners by ensuring that we focus our efforts on delivering a cleaner and greener city, with stronger and safer communities through our work to make London more sustainable and prosperous for decades more to come.

An exciting new generation of innovative techniques and technologies is now available making it possible to fuel homes, businesses and vehicles from that in the past, we have just chucked away. My vision is for London to lead on developing this greener infrastructure and implementing innovative approaches that generate a raft of new job opportunities and enterprises and serve our changing needs in waste management.

Business organisations have a large part to play in making this vision a reality, not least by dealing with their waste in an efficient and responsible way. Many organisations have taken impressive strides forward in dealing with waste in recent years. Recycling facilities are now commonplace in offices and companies have seen that there are real cash savings to be made by doing so, as well as knowing they are contributing to a cleaner, more pleasant city.

It is the Mayor's role to outline, facilitate and accelerate these opportunities.

There remains much more that can be achieved, particularly with regard to the prevention of rubbish in the first place and making sure we reuse items that are still in working order. There is money to be made by recycling and processing more of London's waste in London itself, and I am taking steps to see that the facilities we need get built. I also want to see ordinary businesses benefit from new ways of dealing with waste, and I will make sure they have the information they need to take advantage of reuse and recycling services in a way that saves them money in the long run.

In this strategy, we have outlined how businesses can support my plans for making London a zero waste city. It complements work, detailed in a separate document, to tackle household waste. Together, these two strategies offer a detailed view of all waste produced in the city – the first time this has ever been done for a city in the UK.

I look forward to working with all organisations in London to make sure we produce less waste, and that what waste there is, finds new life through reuse, recycling, or composting, or is converted into energy generation to power our dynamic city.

Boris Johnson
Mayor of London

PREFACE

A strategic framework for enhancing quality of life in London and protecting the environment

The Climate Change Adaptation Strategy is part of a series of strategies that together set out actions and policies to make London the best big city in the world. How? By improving the quality of life of Londoners and making the city more sustainable.

The future of the planet lies in cities. In the 1950s just 29 per cent of people lived in towns and cities. By the close of the 20th century that figure had increased to 47 per cent, and by 2050 it will hit 70 per cent. There are clearly benefits to city living. People live longer, have access to better education, extensive public transport, greater healthcare provision, more social, cultural and economic opportunities and a lower carbon footprint. The Mayor is working to ensure that London not only retains its world city status but remains among the best places on the planet to live, whatever your age or background. He also wants to ensure that the city is liveable and its development is sustainable for future generations.

The Mayor's ambition is to put 'the village' back into the city. What this means is improving the quality of life for Londoners by ensuring that we focus our efforts on delivering a cleaner and greener city with stronger and safer communities through our work to make London more sustainable.

The Mayor's environment strategies and programmes are built on three policy pillars. These are retrofitting London, greening London, and cleaner air for London. These pillars aim to improve the quality of life for Londoners and visitors, and to make the capital more attractive. The Mayor's programmes that underpin these pillars are delivering targeted improvements and benefits that Londoners can see and experience around them. They also aim to make public services more efficient and less of a burden on tax payers, whilst delivering wider environmental benefits such as conserving water, saving energy or reducing waste.

The three 'pillars' and example programmes:

Retrofitting London
Retrofitting London's existing buildings is not only crucial to tackling London's CO_2 emissions, it also reduces energy and water use, delivers new jobs and skills, as well as saving London businesses and homes money on energy bills. Almost 80 per cent of the 14,000 low carbon jobs that could be created per year from delivering the Mayor's CO_2 target and two thirds of the £721 million of annual low carbon economic activity would come from retrofitting.

Our homes and workplaces are responsible for nearly 80 per cent of the city's emissions. Fundamentally 80 per cent of these buildings will still be in use by 2050. The RE:NEW programme which installs a range of energy

and water efficiency measures in homes, enables Londoners to save money on their energy bills while making their homes more energy efficient. The RE:NEW demonstrations in 2010, have shown that households could save over £150 annually through retrofitting actions.

Greening London
The Victorians bestowed on us a city softened by trees and green spaces. Greening London builds on this legacy and aims to improve the look and feel of our city, making it more attractive whilst reducing the impact of noise and air pollution. Greening London also makes the city more resilient to flooding and extreme weather events, and can contribute to a healthy mind and body. The Mayor through his RE:LEAF programme and the London Green Grid has an ambition to increase tree cover by five per cent by 2025, therefore achieving one tree for every Londoner and creating a better network of interlinked, multi-functional and high quality open and green spaces.

Cleaner air for London
Air pollution is a serious health issue and the Mayor is determined to reduce its impact. Actions being taken to improve air quality include introducing the first ever age limit for black cabs, tougher standards for the Low Emission Zone, new cleaner hybrid and hydrogen buses and fitting older buses with equipment including filters to curb pollution. The new bus for London, which will be launched in 2012, will use the latest green technology making it 40 per cent more efficient than a conventional double decker. The Mayor is working to introduce more electric vehicles onto London's streets. In May this year, he launched Source London, the UK's first citywide electric vehicle charging network and membership scheme and we are also now investing record amounts to deliver a cycling revolution in London. Additional steps are being taken to tackle pollution levels at some of the busiest roads in central London. This includes utilising dust suppressant technology that prevents PM10 from re-circulating, installing green infrastructure to trap pollutants and a no engine idling campaign to reduce engines running unnecessarily when stationary. Eco-marshalls are also being deployed to help both monitor and reduce the impact of taxis on air quality.

London continues to attract people and businesses and therefore continues to grow. The London Plan forecasts the city's population could increase from 7.6 to 8.8 million by 2031. These strategies show that making London a sustainable city and protecting the environment does not mean we all have to be eco-warriors or make sacrifices to our standard of living. We can work to lessen our impact on the city while at the same time improving the environment and our quality of life.

In a post-Olympic London, we can also grasp the opportunity to make the capital a digital leader, an intelligent city. By harnessing the power of data, we can run our city more efficiently, understand environmental trade-offs, and communicate better with Londoners, enabling them to make better informed and sustainable choices in how they live and work. This is already happening through the explosion of social media and digital applications that encourage behaviour change based on the choices an individual makes. Data visualisation is also allowing us to understand complex data sets, telling us the results of the millions of decisions we make, on us, on our neighbourhoods, on our city and beyond.

Transitioning our city to a sustainable low carbon economy will also bring economic opportunities for London in terms of jobs and investment. Despite the economic downturn, the value of London's low carbon and environment sector is now worth over £23 billion, growing by over four per cent a year. As London and the rest of the world continue to reduce their greenhouse gas emissions over the coming decades, the economic opportunities from that activity will be huge. London must make sure it grabs this opportunity and continues to be a world leader.

Kulveer S Ranger
Mayor's Director of Environment

Endnotes

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4 'Mapping an urban ecosystem service: quantifying above-ground carbon storage at a city-wide scale', Zoe G. Davies, Jill L. Edmondson, Andreas Heinemeyer, Jonathan R. Leake and Kevin J. Gaston, Journal of Applied Ecology, 2011,
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EXECUTIVE SUMMARY

In the last few years, the way businesses deal with their waste has moved up the agenda. There has been a growing recognition that businesses, in both the commercial and industrial sector and the construction, demolition and excavation industries, need to be more aware of the resources they use and the waste their processes leave behind. As well as changes to government policy, that have put more emphasis on climate change impacts and focused in on capturing the economic benefits of waste, businesses themselves are paying more attention to the resources they use and their carbon footprint. With such changes taking place, there is a growing need for a revised strategy to tackle our business waste.

The Mayor's policy proposals, as detailed in this strategy, aim to set the overall direction for the management of business waste in London for the period 2010 to 2031, with specific actions to enable the move to sustainable resource and waste management within the next two to three years. These policies are designed to address the need for greater business resource efficiency and an improved waste infrastructure, which will be required to meet the objectives and targets of the Mayor's spatial development strategy, the *London Plan*, in relation to business waste.

The term 'business waste' in this strategy refers primarily to two distinct waste streams – that from the commercial and industrial (C&I) sector and that from construction, demolition and excavation (CDE) – that are collected and managed by the private sector.

Business waste accounts for 16 million tonnes, or around 80 per cent of solid waste generated in London. The Mayor's Business Waste Strategy is non-statutory but is designed to sit alongside the statutory Mayor's Municipal Waste Strategy (which relates to the remaining 20 per cent of waste) to provide a complete view of the waste sector in London.

The Mayor's vision, objectives and targets for business waste in London

The Mayor's vision for the management of London's business waste is set out in the introductory text to this strategy, along with the two key targets for business waste as outlined in the *London Plan*. Ultimately, the Mayor wants London to become a world leader in waste management, making use of innovative techniques and technologies to minimise the impact of waste on our environment and to exploit its massive economic value. The overriding aims are to:

- focus on waste reduction and the more efficient management of resources to reduce the financial and environmental impact of waste
- manage as much of London's waste within its boundaries as practicable, by taking a strategic approach to developing new capacity
- boost recycling performance and energy generation to deliver environmental and economic benefits to London.

The Mayor's key targets for the management of business waste are as follows:

- achieve 70 per cent reuse, recycling and composting of C&I waste by 2020, maintaining these levels to 2031
- achieve 95 per cent reuse, recycling and composting of CDE waste by 2020, maintaining these levels to 2031.

Opportunities for improving business waste performance

Detailed information about the waste London produces and how it is currently managed is set out in Chapter 1. Broadly half (48 per cent) of the waste generated in London comes from CDE, the largest source of waste arisings in London, but 82 per cent of it is reused, recycled

or composted. C&I waste accounts for a further 32 per cent of London's waste but only 52 per cent is reused, recycled or composted.

The Mayor's approach to business waste is to help provide the resources necessary to help drive resource efficiency in businesses, boost reuse, recycling and composting performance for both C&I and CDE waste and improve London's waste infrastructure provision for these two waste streams. The four key policy areas that will help deliver these objectives, summarised below, are set out in detail in Chapter 2.

The Mayor's policies for business waste in London

Policy 1
The Mayor wishes to change the way businesses and their employees feel about the resources they use and the waste they create, by promoting the commercial value of being resource-efficient. Greater resource-efficiency in business would help shift London towards a low-carbon society, with benefits for the wider economy, for the environment and for Londoners. Such an economy would use fewer resources more efficiently, produce less waste and use recovered resources in the form of both materials and energy.

Policy 1, therefore, sets out the actions that the Mayor will take to help businesses to identify and implement waste prevention measures within their organisation; minimise resource use and increase the uptake of reused, recycled and reclaimed products and materials; and realise the financial and wider commercial benefits of engaging in these activities.

Policy 2
Policy 2 sets out the actions that the Mayor will take to help businesses overcome the practical issues that make it difficult for them to separate waste for reuse, recycling and composting, and so encourage greater participation by businesses in achieving 70 per cent reuse, recycling and composting of C&I waste by 2020 and beyond. The Mayor's actions are, therefore, focused around helping businesses, especially small and medium-sized enterprises (SMEs), to access reuse, recycling and composting collections, or entering into collective contracting for these services.

The Mayor also proposes to use the planning system to ensure that the design of new and refurbished buildings provides suitable waste storage and access for collections. Other proposals will target London's food waste producers and those occupying multi-tenanted buildings or large business estates.

Policy 3
The development of new waste infrastructure in London is not coming forward at the rate required to reduce London's reliance on landfill or to capitalise fully on the income and employment opportunities from the reuse, recycling and reprocessing of the city's waste. This development is being hampered by finance and planning issues and a need for greater collaboration between different players in the waste management business, including feedstock providers, technology suppliers, off-take users (for heat, power, recyclate or fuel) and potential investors.

The Mayor plans to address the development of new waste infrastructure which will help to manage London's business waste within the capital, so that there is less reliance on landfill and the financial, economic and environmental benefits are felt within London. The aim is to stimulate growth in the market by sharing the risk associated with these new projects, illustrate their commercial viability and then attract

greater levels of private sector investment to fund the large-scale roll-out.

Policy 4
The CDE waste stream in London is already achieving high levels of reuse and recycling. However some projects are beginning to show that these levels can be increased even further. Greater emphasis is required in specific areas, such as in reducing the overall quantity of waste generated in the first place; reducing 'downcycling' of construction wastes such as converting unused bricks and blocks into aggregates; and increasing reuse within the industry. The Mayor's policy proposals for the CDE waste stream aim to drive improvements in resource efficiency by designing out waste at source, and by promoting best practice in reuse and recycling of all materials.

The Mayor will use the planning regime in London and supporting planning guidance to engage developers, architects and designers in looking for ways to design out waste at source and improve the overall resource efficiency of buildings and infrastructure projects. The planning regime will also be used to ensure that developers and their contractors make plans that maximise the opportunities for reuse and recycling of waste, such that London's strong reuse and recycling performance of CDE waste can be maintained. To support this, the Mayor will work with private sector partners to help fund delivery of the necessary infrastructure for CDE waste reuse and recycling.

In addition, the Mayor will encourage more CDE waste producers to sign up to a 'London 2012 standard' where they attempt to match and exceed the high reuse and recycling performance of the construction and demolition projects London 2012.

Leading by example

Finally, the Mayor is keen to show leadership on this issue and Chapter 3 illustrates how members of the Greater London Authority (GLA) Group, as business waste producers themselves, are helping to take a lead on sustainable resource and waste management in the capital. This includes Transport for London (TfL), the Metropolitan Police Authority (MPA), the London Fire and Emergency Planning Authority (LFEPA) and the Greater London Authority (GLA).

Appendices

The following supplementary information is provided within the appendices to this strategy:

- Appendix 1: Legislative framework for managing London's business waste
- Appendix 2: High-level implementation plan for the actions contained in this strategy.

INTRODUCTION

As the issue of business waste has moved up the agenda in recent years, and government policy has changed to reflect the growing concern about the climate change impacts of the way we deal with waste, the need for a new strategy for waste management in London has grown. Many businesses in both the commercial and industrial sector and the construction and demolition industry, have been putting a greater focus on the way they manage their resources, and the way they deal with waste. A strategy for business waste now needs to take these changing circumstances into account.

Managing waste in the current economic climate

Resource efficiency is an increasingly important business consideration in the current economic climate[1]. Traditionally, waste has always been perceived as a burden to deal with – an unnecessary cost that negatively impacts on the bottom line for businesses. The past 20 years, however, has seen a dramatic change in the way that we think about and manage our waste, to a point where there is much to be gained, financially, economically and socially, from realising the value contained within our waste. This provides an opportunity to:

- improve business practices, profitability and competitiveness
- capitalise on new market opportunities
- meet the legislative requirements in specific sectors with regard to waste management
- meet customer demands for more sustainable business practices
- enhance environmental and corporate social responsibility profiles.

It is estimated that London's total waste management bill is in the region of £2 billion per year and if we don't change the way we deal with London's waste, this will increase year on year as the landfill tax increases.

Landfill has traditionally been cheaper than recycling (and energy generation) but the landfill tax, at £56 per tonne in 2011 and rising (on top of the gate fees charged by sites for taking landfill waste), means that recycling is, on the whole, becoming cheaper than disposal and energy generation. The real savings however are in waste reduction and reuse. For every 1 per cent reduction in waste, approximately £20m is shaved off the bill. Similar savings can be achieved for waste that is reused. This strategy will focus heavily on what the Mayor and businesses can do to move in this direction.

Considering the climate change impacts of waste

Climate change is also a key consideration in what we do and managing our waste differently, as close as possible to the point of production, can bring numerous environmental benefits, particularly in terms of reduced greenhouse gas emissions.

Landfill sites contribute 40 per cent of the UK's methane emissions, a powerful greenhouse gas, and overall, landfill accounts for 3 per cent of the UK's total greenhouse gas emissions. London has the opportunity not only to reduce greenhouse gas emissions from waste management by reducing landfill gas, but also to reduce the consumption of fossil fuels by recycling (and offsetting the additional energy required to produce products from virgin materials) or by directly offsetting fossil fuel use through energy generation.

A government Energy White Paper published in 2003 referred to energy and waste as the two key policy elements required as part of the sustainable consumption and production agenda and many cities around the world are now beginning to interlink policies on waste, energy and climate change mitigation. The City of Copenhagen, for example, has a

strategic waste management plan that focuses, for the first time, on climate as a key area in waste management[2]. Similarly, the City of San Francisco has linked its own strategic waste management decision-making to its Climate Action Plan[3].

London is seeking to stay at the cutting edge of waste and climate policy and practice, with the Mayor's Municipal Waste Strategy, which focuses on carbon dioxide-equivalent (CO_2eq) outcomes through the world-first Emissions Performance Standard for municipal waste management at city level. These priorities are also reflected in the business environment, with climate change and resource use being identified as the two of the key issues for most businesses[4].

The Mayor's vision for waste as a resource in London

The Mayor's vision is that London becomes a global leader in waste minimisation and management, as part of achieving the highest environmental standards and quality of life for its people. The Mayor wants London's waste and recycling industries to be central to the city's transition to a low-carbon economy, using innovative techniques and technologies to minimise the impact of waste on our environment and to exploit its massive economic value. The overriding aim is to reduce the amount of waste generated by the capital, significantly increase recycling and composting performance, and to generate energy in the most environmentally friendly way possible from rubbish that cannot be reused, recycled or composted.

A fresh approach to waste is needed to take London into a new era in waste management. For too long, waste has been seen as a burden – a cost to be minimised. But that has meant that London – its businesses and its waste authorities – has not been in a position to realise the full economic value that can come from waste. As the market for recycled goods develops, recyclable materials take on a value. The residual waste also has a value when used to generate energy. This potential value should be at the forefront of all decisions made around managing waste.

Underlying all that the Mayor is aiming to do on waste is the principle that the greatest environmental benefits should be sought at all times, with particular emphasis on reducing the climate change impact of waste.

The Mayor's objectives for waste

Planning policies, objectives and targets for management of London's waste are set out in the Mayor's spatial development plan for London, the *London Plan*. Key policies and proposals for waste management outlined in the *London Plan* are as follows:

- work towards zero waste to landfill by 2031
- manage as much of London's waste within its boundaries as practicable by taking a strategic approach to developing new capacity
- focus on waste reduction and the more efficient management of resources to reduce the financial and environmental impact of waste
- boost recycling performance and energy generation to deliver environmental and economic benefits to London
- promote waste management methods that achieve the greatest possible environmental benefits in terms of climate change, converting London's waste management from a carbon-emitting to a carbon-saving activity.

The Mayor's targets for business waste

The *London Plan* contains two key targets with respect to the management of London's business waste:

- achieve 70 per cent reuse, recycling and composting of commercial and industrial (C&I) waste by 2020, maintaining these levels to 2031
- achieve 95 per cent reuse, recycling and composting of construction, demolition, and excavation (CDE) waste by 2020, maintaining these levels to 2031.

Based on current estimates and future projections of business waste in London, Table 1 illustrates the quantities of business waste that would need to be recycled in order to achieve these targets in 2020 and 2031. These figures take into account the projected growth in business waste and are discussed in further detail in Chapter 1 on *London's Waste Picture and Legislative Context*. Estimated recycling performance for 2010 is based on a current, estimated recycling performance of 52 per cent for C&I waste and 82 per cent for CDE waste.

The Mayor's targets, while ultimately voluntary for individual businesses, are set for London as a whole and therefore, the business sector needs to play its part in contributing to improving the capital's reuse and recycling performance. These targets exceed those set out by the European Waste Framework Directive, which requires Member States to achieve:

- 50 per cent reuse and recycling of materials including paper, metal, plastic and glass from origins other than households where the waste streams are similar to the composition of household waste
- 70 per cent reuse, recycling and other material recovery of construction and demolition waste (excluding naturally occurring material)[5].

They also compare favourably to targets set for the devolved regions of the UK. Wales has set reuse and recycling targets for C&I waste of 67 per cent by 2019/20 and 70 per cent by 2024/25, plus a reuse, recycling and recovery target of 90 per cent for construction and demolition waste by 2019/20[6]. Scotland aims to achieve a minimum level of 70 per cent reuse and recycling for C&I waste by 2025 and 70 per cent reuse, recycling and recovery of construction and demolition waste by 2020[7].

The Mayor's policies and proposals for business waste

The Mayor has a statutory duty to provide strategic direction for the management of London's Local Authority Collected Waste (LACW). However, this accounts for just one fifth of London's waste and the Mayor realises that, in order to fully realise the economic and environmental value of waste as a resource, London requires a truly holistic approach to managing all of the waste that it generates – not just that from LACW sources.

Table 1 Quantities of business waste projected, and the quantities that would need to be recycled to meet the Mayor's targets in 2020 and 2031 (tonnes)

	2010		2020		2031	
	Estimated Arisings	Existing Recycling Performance	Projected Arisings	Target Recycling Performance	Projected Arisings	Target Recycling Performance
C&I Waste	6,496,000	3,377,920	6,450,000	4,515,000	6,596,000	4,617,200
CDE Waste	9,753,000	7,997,460	10,512,000	9,986,400	11,093,000	10,538,350
TOTAL	**16,249,000**	**10,725,780**	**16,962,000**	**14,501,400**	**17,689,000**	**15,155,550**

The policies and proposals in this strategy aim to set the high-level direction for the management of business waste in London for the period 2010 to 2031, with specific actions to enable the move to sustainable resource and waste management within the next two to three years. These policies are designed to address the need for greater business resource efficiency and an improved waste infrastructure, which will be required to meet the objectives and targets of the *London Plan* in relation to business waste.

In this strategy, the term 'business waste' refers to commercial and industrial (C&I) waste and construction, demolition and excavation (CDE) waste that is collected and managed by the private sector. Together, these two waste streams account for 16 million tonnes, or around 80 per cent of solid waste generated in London[8].

The Mayor has set out his direction on business waste within four broad policy areas. These are:

- Policy 1: Promoting the commercial value of a resource-efficient business – supporting businesses to realise the hidden savings and revenue opportunities from waste prevention and more effective management of the waste they generate.
- Policy 2: Boosting reuse, recycling and composting participation in the commercial and industrial sector – dealing with the practical issues that require intervention to help businesses prevent waste at source, access cost-effective recycling services, and to separate and store their waste in a way that does not cause harm to the environment, health or local area.
- Policy 3: Supporting the waste infrastructure market in London to grow and to deliver for businesses – providing assistance to the waste sector to broker new partnerships, access new sources of business waste, develop new waste infrastructure, find suitable sites for development, overcome planning and investment issues, and maximise opportunities for carbon reduction and energy generation.
- Policy 4: Driving improvements in resource efficiency in the construction and demolition sector while continuing to maintain the good levels of reuse and recycling performance already being achieved – focusing on driving environmental performance for the largest source of waste arisings in London.

While privately-collected business waste accounts for 80 per cent of the waste generated in London, some policy proposals (such as those addressing design processes or resource-efficiency measures), will be applicable to all businesses regardless of whether the waste is presented for collection by a local authority or by a private contractor.

There are no specific policy proposals in this document aimed at the management of hazardous waste, since both C&I and CDE waste streams will consist of waste that may be classified as hazardous, non-hazardous or inert. The classification of the waste, in this instance, is considered to be of less relevance than the overarching principles that support the Mayor's vision for sustainable resource and waste management in London. For example, waste reduction principles would be just as applicable to hazardous CDE waste management as to non-hazardous CDE waste management. However, as set out in Policy 5.19 of the *London Plan*, the Mayor will work in partnership with London boroughs, the Environment Agency, industry and neighbouring authorities to identify the capacity gap for dealing with hazardous waste and to provide and maintain direction on the need to increase capacity.

Delivering the strategy

The specific actions in this strategy will be delivered by:

- working in partnership with all of the GLA Group – the GLA, TfL, the MPA and the LFEPA – and the London Waste and Recycling Board (LWARB). These regional public sector organisations are putting significant efforts and funding towards business waste and resource-efficiency programmes
- working in partnership with local authorities, business groups and sector bodies, third sector organisations, the waste industry and business organisations in London. These groups are familiar with the issues affecting local businesses and the potential solutions for overcoming the barriers to better waste management and resource efficiency
- engaging, enabling and empowering individual employees and businesses to realise the value of, and thus make more sustainable choices with respect to green procurement, resource efficiency and waste management.

The strategy is intended to be applicable to all types and sizes of business in London but the Mayor will seek to deliver a sector-focused approach to target areas where action and assistance are most needed. The strategy assumes business compliance with legislative requirements and will complement the Mayor's policies and proposals being developed and implemented in other areas, such as for local authority collected waste[9], climate change mitigation[10], transport[11], air quality[12], economic development[13] and employment and skills[14]. Complementary links between the Mayor's strategies are highlighted in this document. A summary of legislative requirements considered in developing this strategy can be found in Appendix 1.

An implementation plan for delivering the Mayor's actions on business waste is set out in Appendix 2.

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CHAPTER ONE

LONDON'S WASTE PICTURE AND LEGISLATIVE CONTEXT

This chapter provides the context and evidence base for this strategy, setting out a picture of London's waste arisings and projections. It also seeks to highlight where the opportunities lie in relation to the Mayor's priorities and targets on:

- reducing London's waste going to landfill
- improving London's self-sufficiency in managing its own waste
- boosting reuse, recycling and composting targets.

London's waste arisings

For the purposes of this strategy, waste arisings are categorised into one of three streams dependent on the nature of the waste and how it is collected. These three streams are:

- Local Authority Collected Waste (LACW) (previously known as municipal waste).
- Commercial and industrial (C&I) waste.
- Construction, demolition and excavation (CDE) waste.

All three waste streams may consist of waste that is classified as hazardous, non-hazardous or inert and so no reference is made to hazardous waste as a distinct waste stream in the proposals of this strategy.

The quantities and management methods of LACW, C&I and CDE waste outlined in this chapter are based on data for 2008, which is used as the baseline year by a waste arisings study undertaken for the GLA by SLR Consulting Ltd[1]. This forms part of the updated evidence base for London's future waste arisings for the three primary waste streams for the period 2010-2031. The methodology for calculating CDE and C&I waste arisings can be viewed in the SLR Consulting study.

In 2008, London generated a total of 20 million tonnes of waste, comprising approximately 4 million tonnes of LACW, 6.5 million tonnes of C&I waste[2] and 9.5 million tonnes of CDE waste[3]. Figure 1 shows the proportion of each of these three waste streams in London.

LACW waste, which accounts for around 20 per cent of London's waste, is collected by local authorities (or Waste Collection Authorities) from homes, some small businesses and from municipal premises, parks and gardens. The remaining 80 per cent of London's waste comes from businesses and is collected and managed privately by waste contractors. Almost half (48 per cent) of the waste generated in London is CDE waste, while C&I waste accounts for just over a third (32 per cent).

London's waste management methods

Reuse, recycling and composting performance

Figure 2 shows the waste management methods used in London for each of the LACW, C&I and CDE waste streams[4]. Overall, 61 per cent of London's waste is reused, recycled or composted but this figure is skewed by the very large proportion of CDE waste (82 per cent) that is managed in this way. Reuse, recycling and composting accounts for 52 per cent of C&I waste in London, and only 27 per cent of LACW, although this waste makes up the lowest proportion of waste arisings overall.

'Other' refers to material that is sent for mechanical biological treatment, is disposed of using other treatment processes or is delivered to an unknown destination. It should be noted that the 24 per cent of C&I waste sent to 'other' destinations shown above includes 17 per cent of all C&I waste sent to unknown destinations.

Figure 1 Proportion of waste streams by origin in London, 2008

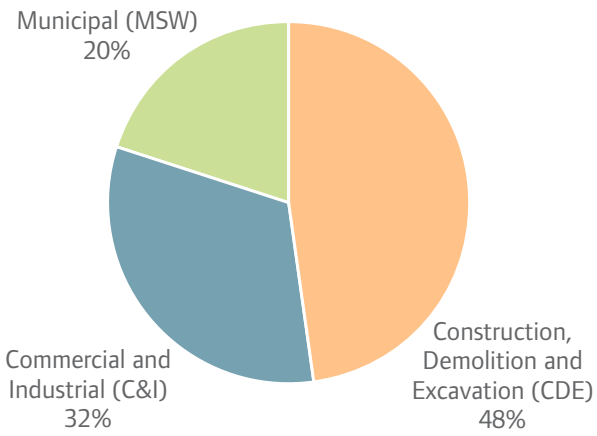


Figure 2 Breakdown of London's waste management methods

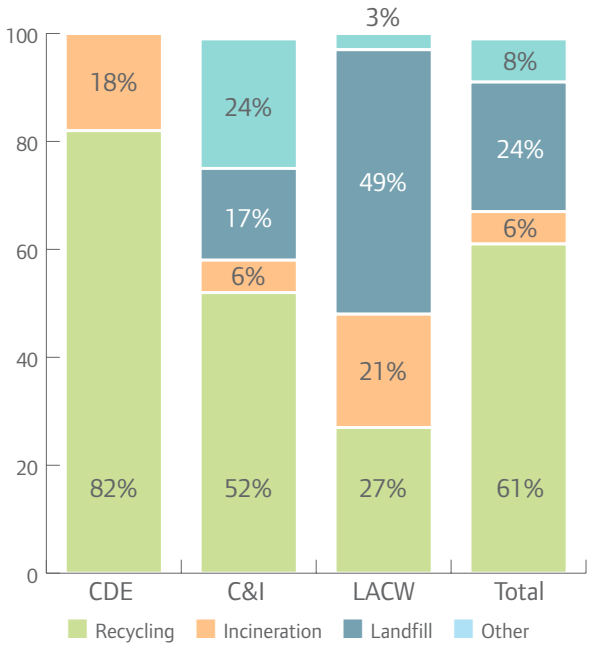
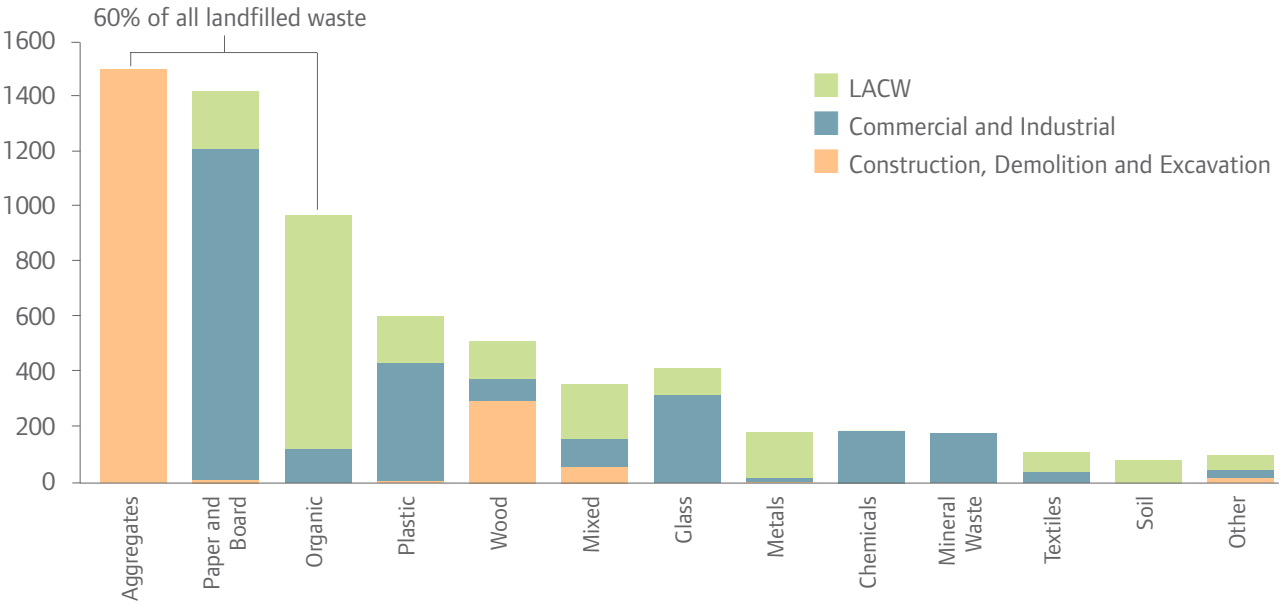


Figure 3 London's total waste to landfill by material, 2008 ('000 tonnes) (indicative)



London's reliance on landfill

The Environment Agency estimates that, of the 6.6 million tonnes of London's waste that went to landfill in 2008, approximately 85 per cent (5.6 million tonnes) was transported outside of the region[5]. Of this amount, 3.1 million tonnes was landfilled in the South East and 2.2 million tonnes in the East of England[6]. Of the total amount of London's waste sent to landfill, around 48 per cent is unsegregated, mixed waste[7].

According to Environment Agency data for London in 2008, only 25 per cent of C&I waste that went to landfill and 16 per cent of CDE waste was sent within the Greater London

regional area[8]. The figure for CDE waste sent to landfill a year previously, in 2007, was 28 per cent (no data available for C&I waste), which indicates an increasing reliance upon regions outside of London for dealing with this business waste[9]. Most of the waste exported for landfill outside of London in 2008 (75 per cent of C&I waste and 84 per cent of CDE waste) was managed mainly within the South East of England and East of England, with a small percentage going to other parts of the country[10].

In terms of the potential opportunities for diverting waste from landfill, Figure 3 illustrates the specific material streams going to landfill from each of the three primary waste sources. For C&I waste, Figure 3 shows that the top categories of landfilled waste are paper and board, plastic and glass, and therefore, the best opportunities for diverting waste from landfill are in these waste materials.

For the CDE waste stream, the biggest opportunities are in aggregates, wood and mixed waste. Looking at LACW and C&I waste together, the top three opportunities for the development of a waste treatment infrastructure that can benefit both sectors are in the management of paper and board, organic materials and plastics.

The Environment Agency estimates that around 90 per cent of CDE waste to permitted landfill is soil and stones, with other research also indicating that very little 'hard' construction and demolition material is landfilled[11]. For example, a 2005 DCLG survey of CDE waste arisings in England reports that very little evidence was found of materials such as concrete, bricks, tiles, ceramics, track ballast and bituminous or coal tar products ('hard' construction and demolition waste) going to landfill[12]. However, a WRAP (Waste and Resource Action Programme) study showed that nationally, the market for recycled aggregate is likely to be largely saturated by 2016, so that increases in the recycling of CDE waste as aggregate are likely to be short-term only[13].

Composition of London's business waste and projected waste arisings

The composition of LACW generated in London is given in the Mayor's Municipal Waste Management Strategy for London, London's Wasted Resource. The composition of C&I and CDE waste is discussed further below.

Commercial and industrial waste

C&I waste arisings data presented in this strategy is based upon a waste per employee generation rate for different commercial and industrial sectors. Waste per employee generation rates are greater in the industrial sector than in the commercial sector but the dominance of the service sector in London means that this is likely to have a greater influence on the composition of C&I waste generated overall in London, now and in the future.

It is estimated that in 2010, London generated 6,496,000 tonnes of C&I waste. Figure 4 shows an indicative breakdown of the origin of this waste in London by sector. Manufacturing as a whole, combined with the power and utilities sector, together account for just a quarter of London's waste arisings[14]. The service sector accounts for the remainder, of which a third comes from the retail and wholesale sector.

The manufacturing sector in London is projected to continue to decline from 224,000 jobs in 2007 to 90,000 by 2031. At the same time, business and financial services could grow by 420,000 jobs from 1.56 million jobs in 2007 to 1.98 million in 2031, while jobs in the hotel

Figure 4 Indicative sector analysis of C&I waste arisings in London

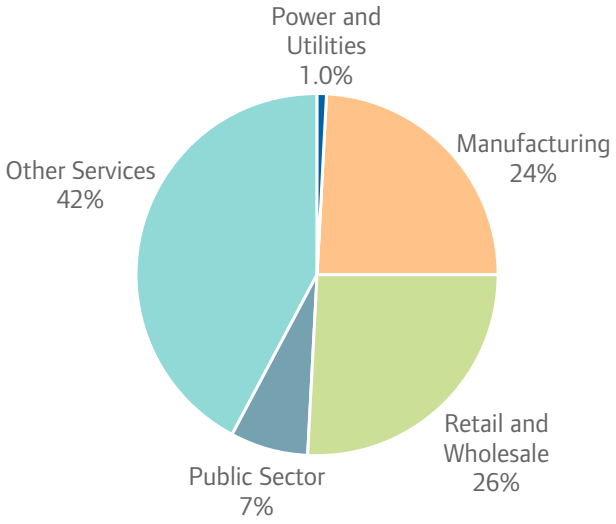
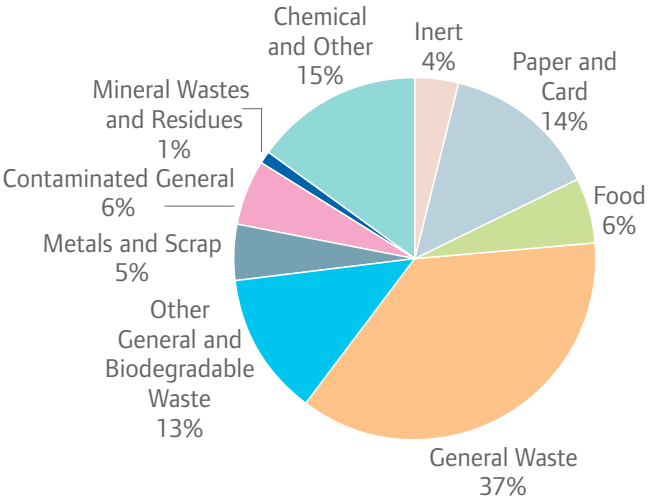


Figure 5 Indicative commercial waste composition for London



and restaurant trade are set to grow by 235,000, accounting for a fifth of new jobs, and retail is predicted to grow by 36,000 jobs[15]. Thus, the composition of London's business sectors will influence the types of waste generated in the capital and the opportunities for resource management and recovery.

The individual composition of each of the C&I sub-waste streams is shown in Figures 5 and 6 respectively. In both cases, general waste accounts for the majority of both the commercial (36 per cent) and industrial (75 per cent) sub-waste streams. Together with other general and biodegradable waste, which makes up 13 per cent of commercial waste and seven per cent of industrial waste, mixed wastes account for a significant proportion of the overall C&I waste stream. This is also substantiated by data from other surveys. For example, a 2009 C&I waste arisings survey for the Environment Agency in Wales suggested that around 50 per cent of the C&I waste stream comprised non-differentiated mixed wastes[16]. It is likely that a proportion of this waste could be segregated for reuse, recycling, composting or other recovery.

Figure 6 Indicative industrial waste composition for London

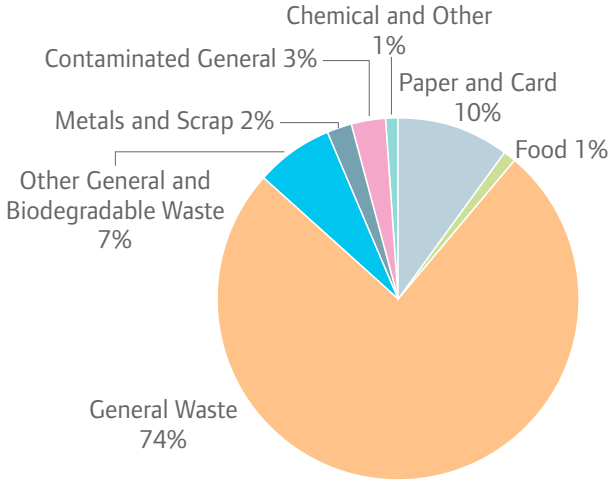


Table 2 (overleaf) shows the projected C&I waste arisings at five-year intervals throughout the period 2010 to 2031 as projected on the basis of the 2008 baseline data year.

Table 2 Projected C&I and CDE waste arisings ('000 tonnes) for London, 2010 to 2031

Waste Stream	2010	2015	2020	2025	2031
C&I Waste	6,496	6,450	6,450	6,498	6,596
CDE Waste	9,753	10,204	10,513	10,736	11,092
Total Business Waste Arisings	**16,249**	**16,654**	**16,963**	**17,234**	**17,688**

There has traditionally been less national policy action on C&I waste, than for the LACW and CDE waste streams. The Waste Strategy for England 2007, for example, stopped short of setting any specific targets for the management of C&I waste, although it did identify priority materials, products and sectors for action. Consequently, most of the actions for C&I waste have been delivered through voluntary commitments on a sector-by-sector basis. A large part of this work has been co-ordinated, or co-delivered, by WRAP, most notably through the Courtauld Commitment which is a retail industry voluntary commitment to halt packaging waste growth, deliver reductions in packaging waste and target waste in the retail supply chain[17]. More detail on this is included under Policy 2 in this document.

Most regulatory requirements for priority materials, products and sectors have been in the form of legislation that addresses producer responsibility, and is required to be implemented by European Union Member States. Since 1997, producer responsibility legislation has been introduced covering the design, manufacture, labelling, marketing and end-of-life management of packaging, end-of life vehicles, electrical and electronic equipment and batteries.

In 2009, the government set out its approach to the management of C&I waste in England as part of a broad-based campaign on resource efficiency, aimed at businesses, waste management companies, local authorities, regulators, delivery bodies and other parties with an interest in business waste and resource efficiency[18]. This was followed in March 2010 by *Less is More: Business Opportunities in Waste & Resource Management* that sets out the policy direction of the Department for Business Innovation and Skills (BIS) and the Department for the Environment, Food and Rural Affairs (Defra) in relation to the opportunities for British businesses to make use of material resources and waste across the supply chain[19].

The government has completed a further review of waste policy and management in England, published in June 2011. In relation to business waste, the main proposals include:

- developing a comprehensive waste prevention programme and in the meantime working with businesses and other organisations in the supply chain to drive waste reduction and reuse
- supporting businesses to reduce food waste both within their operations and in supply chains
- developing new voluntary responsibility deals with businesses in a range of sectors – including hospitality, retail, direct mail, waste industry – focussed on reducing and recycling waste
- supporting councils and the waste industry in improving the collection of waste from smaller businesses. This includes ending the Landfill Allowance Trading Scheme to remove an important perceived barrier to local authority service collection from businesses[20].

Construction, demolition and excavation waste

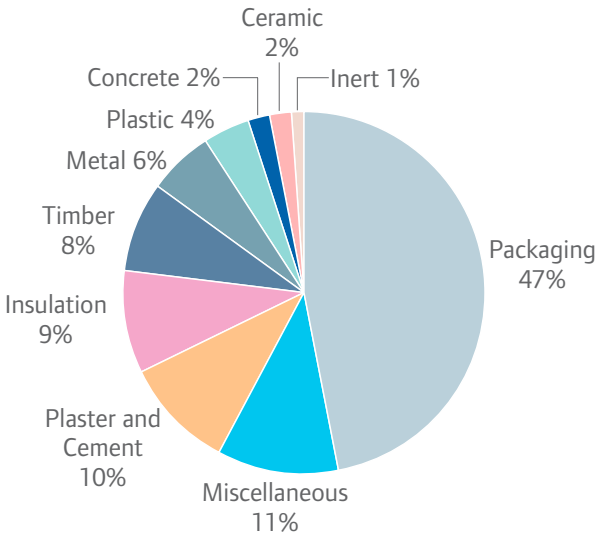
The CDE sector is the largest source of waste arisings in London (48 per cent of total waste), reflecting the national picture throughout the UK[21]. The composition of waste generated varies on a project-by-project basis according to the stage of development (for example, demolition, construction, refurbishment or maintenance) and the type of development being constructed (for example, whether it is a building or civil engineering project). Civil engineering projects typically generate more waste than demolition and buildings projects, mainly in the form of excavated soil and aggregate[22]. Waste from buildings projects is much more variable. Figure 7 shows the indicative composition of CDE waste generated by a new build construction project[23].

Projected growth of CDE waste in London is shown in Table 2 and will be driven partly by waste generated by major infrastructure projects in the capital, including Crossrail and the proposed Thames Tideway Tunnel. It is estimated, for example, that the Crossrail project in London will give rise to around 7.3 million cubic metres of CDE waste, equivalent to around 8.76 million tonnes, across the anticipated lifetime of the project from 2009 to 2017[24]. Generally, CDE waste will be influenced by factors such as the state of the economy and associated construction output, and construction methods.

Despite being the largest source of waste in London, the recycling performance of the CDE sector has been much stronger than that of the LACW and C&I sectors. The relatively high reuse and recycling rates have been achieved largely through a mixture of joint government and industry initiatives and regulation.

Following the identification of construction as a priority sector for action in the Waste Strategy for England 2007, a cross-government and industry-led initiative produced the Strategy for Sustainable Construction in June 2008. The strategy aims to promote the concept of sustainability in the construction industry by specifying a series of actions and targets across a range of issues, including procurement, design, innovation, people, regulation, climate change mitigation and adaptation and water. Its key target with respect to waste is to halve waste to landfill by 2012 relative to a 2008 baseline. It also promotes use of procurement targets, sector resource-efficiency plans, packaging waste reduction, supplier take-back schemes, use of life-cycle assessment tools for components and use of recycled content in construction.

Figure 7 Indicative CDE waste composition for a new build construction project



The Site Waste Management Plan Regulations 2008 came into force in April 2008 and require that a site waste management plan (SWMP) be prepared for all construction projects over the value of £300,000 (excluding VAT)[25]. The purpose of the SWMP is to record the amount and type of waste produced during all phases of construction and consider how that waste should be managed in terms of reuse, recycling and disposal. It is designed to increase the diversion

of construction waste from landfill and improve resource efficiency in civil engineering and built environment projects. At the planning stage, an SWMP can be used to steer the detailed design of the development towards finding opportunities for waste minimisation, reuse and recycling.

The Site Waste Management Plan Regulations 2008 are part of an increased focus at the planning stage on identifying options for waste reduction and increased use of recycled and secondary aggregates in new developments. References to SWMPs are now made in planning policy, supplementary planning guidance and developer guidance notes. Requirements for best practice CDE waste management have also been incorporated into environmental assessment methods, such as the Building Research Establishment Environmental Assessment Method (BREEAM) and the government's Code for Sustainable Homes and are therefore increasingly important for new developments.

WRAP has also worked with industry to develop a series of quality protocols for the production of aggregates from inert waste that are designed to broaden the market for the use of recycled aggregate[26]. Recycled aggregate makes an important contribution to the overall supply of aggregates, the need for which is reflected also in minerals planning policy. The government's Minerals Policy Statement 1 (MPS1), for example, promotes use of recycled and secondary aggregates in place of primary materials and seeks to set a specified level for the contribution of recycled and secondary materials in overall supply (contained within National and Regional Guidelines for Aggregates Provision)[27].

Hazardous waste

London produced 498,000 tonnes of hazardous waste in 2008. Based on data returns from waste management site operators, the Environment Agency estimates that most of this waste came from the Olympic Park development site at Stratford in East London . This waste would have been managed as hazardous CDE waste.

The Environment Agency further estimates that 68 per cent of this waste was deposited outside of the region, compared to 84 per cent in 2007[28]. However, the increase in the percentage of waste dealt with within London is skewed by the way the Olympic site in Stratford dealt with its waste, obscuring the fact that the actual tonnage of London's hazardous waste deposited outside the region has increased since 2007[29].

Endnotes

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2. A national C&I waste survey was conducted by Defra in 2010, which estimated a significantly lower level of C&I waste arising nationally including in London. While any reductions are to be welcomed, the survey was conducted in a deep recession and the figures arising may not fall within long-term trends. This Strategy uses the figures from the *London Plan*. The Defra survey results will be kept under review to inform future work.
3. Waste generated within the Greater London regional boundary.
4. Adapted from Appendix 2, 2009/10 Business Plan, LWARB, 2009. See also reference 14.
5. Adapted from Municipal waste statistics, Defra (2010), available at www.defra.gov.uk, and Commercial and Industrial Waste Survey, Defra (2010), available at www.defra.gov.uk/statistics/files/ci-final-report-101216.pdf (accessed 27 April 2011)
6. Landfill Data for London: Indicator One, Environment Agency (2010), available at www.environment-agency.gov.uk/research/library/publications/41039.aspx (accessed 06 July 2010).
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12. State of the Environment in London, Environment Agency (2010), available at http://publications.environment-agency.gov.uk/pdf/GETH0210BRXE-e-e.pdf (accessed 06 July 2010).
13. Survey of Arisings and Use of Alternatives to Primary Aggregates in England, 2005: Construction, Demolition and Excavation Waste (Final Report), DCLG (2007). Provides estimates of the quantities of recycled aggregate and the amount of soil, construction, demolition and excavation waste used and disposed of at permitted landfill sites and spread on registered exempt sites.
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24. Government Review of Waste Policy In England, Defra (2011), available at www.defra.gov.uk/publications/files/pb13540-waste-policy-review110614.pdf (accessed on 18 July 2011).
25. Waste Strategy Annual Progress Report, Defra (2008), available at: www.defra.gov.uk/environment/waste/strategy/index.htm?lang=_e (accessed 17 July 2009). Construction, demolition and excavation waste accounts for around 32 per cent of waste arisings nationally. Inert construction, demolition and excavation waste generated in England is approximately 90 million tonnes per annum. Other non-inert construction, demolition and excavation wastes and wasted construction materials account for a further 15-20 million tonnes and 13 million tonnes respectively, i.e. a total of around 120 million tonnes per annum from the construction industry, a third of all waste generated in England.
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CHAPTER TWO

BUSINESS WASTE POLICIES AND PROPOSALS FOR LONDON

POLICY 1
PROMOTING THE COMMERCIAL VALUE OF A RESOURCE-EFFICIENT BUSINESS

Vision
The Mayor wishes to change the way businesses and their employees feel about the resources they use and the waste they create, by promoting the commercial value of being resource-efficient. Greater resource-efficiency in business would help shift London towards a low-carbon society, with benefits for the wider economy, for the environment and for Londoners. Such an economy would use fewer resources more efficiently, produce less waste and use recovered resources in the form of both materials and energy.

Vision to policy
The Mayor will provide businesses with the resources necessary to help:
- identify and implement waste prevention measures within their organisation.
- minimise resource use and increase the uptake of reused, recycled and reclaimed products and materials.
- realise the financial and wider commercial benefits of being actively engaged in these resource-efficiency and waste-prevention activities across the whole supply chain, from resource extraction to product design, production, distribution, consumption, reuse, waste prevention, recycling, treatment and disposal.

Policy to action
- Proposal 1.1: Support businesses to identify and implement waste prevention opportunities across the supply chain.
- Proposal 1.2: Support businesses to close the loop in London and drive the market for use of recovered resources.
- Proposal 1.3: Deliver communications campaigns and initiatives to promote the financial, commercial and environmental benefits of resource efficiency to businesses and their employees.

The value of a resource-efficient business
Work undertaken by the Defra and BIS has identified that the best opportunities for businesses to improve their resource efficiency are in reducing or eliminating waste at source, when materials have the most value and incur none of the costs of disposal or treatment. These opportunities exist across the supply chain for all businesses and all stages of the product life-cycle[1].

Transforming perceptions about waste prevention and resource efficiency
A study undertaken on behalf of the GLA in 2004 found that businesses perceive there to be a number of barriers to implementing resource efficiency and waste minimisation measures. The key barriers[2] were:
- the financial costs involved in implementing waste minimisation and recycling schemes (the potential payback of such schemes was not well recognised)
- a reluctance by the private sector to invest in waste infrastructure, due to perceived financial risks, lack of markets for recovered materials and energy, potential volatility in commodity markets and uncertainties in the planning regime
- a perception of recycled products as of poor quality, by both businesses and consumers
- the limited influence businesses had to prevent waste, which needed to be dealt with further up the supply chain. Businesses felt that more should be done on waste prevention at the manufacturing stage.

Surveys have shown that financial costs are considered to be the most significant issue in improving resource efficiency among businesses. A C&I waste survey, commissioned for the Environment Agency in Wales, found that financial costs were considered to be the biggest barrier to improving resource efficiency and that this was the case in all sizes of business[3].

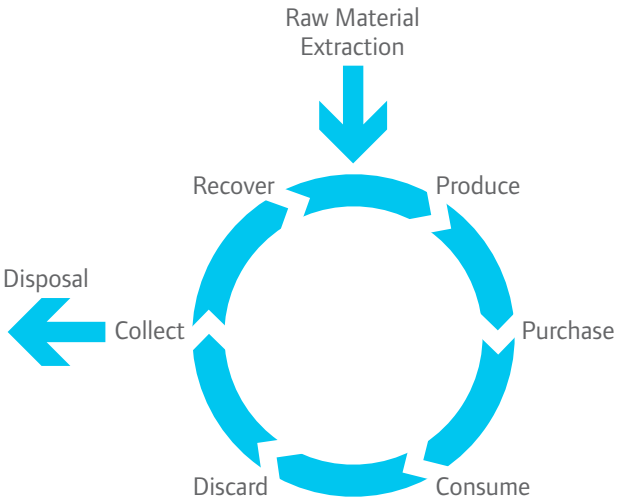
Despite the perceived financial barriers, 90 per cent of the businesses surveyed still considered that they undertook some kind of waste minimisation, reuse or recycling activity, with only a small number (mainly small businesses) reporting that they did nothing at all to engage with resource efficiency[3]. Small businesses may be less likely to reduce, reuse and recycle because they feel they are too small to benefit from implementing such resource efficiency measures[5].

Perceptions about cost of waste minimisation

Most businesses are still focused on managing waste outputs rather than looking at waste reduction and material inputs[6]. The perception that it costs more to implement waste minimisation and recycling schemes is often based only on the visible costs of waste collection and disposal, with businesses not realising the wider benefits that could result from improved resource efficiency.

To see the real value to businesses, there needs to be a better understanding of the true cost of waste, which is far greater than the direct costs of collection and disposal. The bulk of waste costs are hidden (for example, in terms of raw material costs, energy and water consumption) and so the additional value that could be achieved from resource-efficient practices is often difficult to identify and measure.

Figure 8 The product life-cycle



This highlights the need to consider resource and waste management on a whole life-cycle basis, dealing with the impact on operations and products, and looking both upstream in the supply chain and downstream at the point of use and end-of-life stages. With a better understanding of supply chain issues and the product life-cycle (see Figure 8), it is easier to identify where potential savings can be made. Whereas, by not taking into account these additional 'hidden' costs, businesses could be hugely underestimating the potential benefits of implementing waste minimisation and other resource-efficiency measures within their organisations.

Notwithstanding these hidden costs, the direct costs of waste disposal to landfill will rise as the landfill tax continues to increase. Landfill tax, which stands at £56 per tonne for the financial year 2011/2012, will increase by £8 per year until 2014/15 to £80 per tonne (this is on top of landfill gate fees and other handling costs, such as haulage). Industry can assume landfill taxes will not fall below this level after 2015, giving a baseline against which to consider investment in new methods of waste processing and treatment. So, even without identifying the

hidden costs of waste management, businesses will find their disposal costs will rise if they fail to engage in resource efficiency.

Avoiding the costs of resource inefficiency

WRAP estimates that the true cost of waste can be between five and 20 times the visible costs of disposal, depending on the quantity and nature of the waste produced[7]. On the other hand, Envirowise (now part of WRAP) estimates that simple and no-cost or low-cost waste minimisation measures could save the equivalent of one per cent of turnover, dependent on sector[8]. The Environment Agency also estimates that low-cost or no-cost resource-efficiency measures have the potential to save UK business about £6.4 billion each year.

Furthermore, by improving the way the waste that is created is managed, savings can be made on disposal costs by avoiding landfill tax and new revenue opportunities can be found for businesses through the more efficient handling of large quantities of recyclable materials. The level of savings that can be achieved vary by sector but are potentially greatest in resource-intensive industries like construction and manufacturing and in retail and wholesale.

Construction

In the construction sector, which accounts for almost half of London's waste arisings, WRAP has assessed that the potential net cost saving to developers and contractors of implementing resource-efficiency measures could be 0.4 per cent of total construction value[9]. These savings are based on an analysis to identify costs and benefits achievable when introducing waste reduction and recovery plans into the design stage on a construction project. While the net benefit is typically a small proportion of construction value, this can equate to a large saving in absolute monetary terms.

WRAP's assessment showed that good practice waste management in construction should at least be cost neutral, with the 'worst performing' case study still achieving a net benefit of 0.03 per cent. Using waste forecasting tools, such as WRAP's Net Waste Tool[10] and the ICE (Institution of Civil Engineers) Demolition Protocol[11], can help to realise cost-saving opportunities that exist in this area[12].

The Mayor's proposals for improving resource efficiency and waste prevention measures for CDE waste are discussed further in Policy 4 of this strategy.

Manufacturing

A study commissioned by the Environment Agency found that manufacturers investing in best-practice waste minimisation techniques could achieve savings of around £2-2.9 billion per year in operating costs, equivalent to five to seven per cent of UK manufacturing profits in 2000[13]. For London, the total net saving in manufacturing costs would be around £195 million; a significant saving given that manufacturing accounts for around a quarter of the capital's C&I waste[14]. The study also found that the typical average payback period from waste minimisation process improvements could be 12 months or less – a quick-win improvement, both financially and environmentally.

Cost-savings for other commercial and industrial sectors are discussed in a report quantifying the business resource-efficiency opportunities in the UK economy[15]. The report identifies that 'low-cost or no-cost' resource-efficiency savings across all sectors within the London business economy could be worth as much

Table 3 Top 10 sectors identified for waste cost-saving opportunities[17]

Rank	Sector	Estimated waste cost-saving opportunity
1	Food Products, Beverages and Tobacco	£71 million
2	Retail	£65 million
3	Travel Agents and Leisure, Other Business, Finance and Real Estate, Computer-Related Activities	£49 million
4	Construction	£22 million
5	Manufacture of Machinery and Equipment	£17 million
6	Chemicals, Chemical Products, Synthetic Products, Rubber and Plastic Products	£15 million
7	Hotels and Catering	£10 million
8	Education	£5 million
9	Paper, Publishing and Printing	£5 million
10	Energy Supply	£3 million
TOTAL		**£262 million (96 per cent of total waste cost-saving opportunity for London)**

as £272 million, 8.6 per cent of the total potential waste savings across England and Wales[16]. Table 3 shows the top ten sectors, accounting for 96 per cent of this potential waste-saving opportunity, with the food, drink and tobacco industry and the retail sector appearing to offer the greatest opportunities in this area.

Wider benefits to London's businesses, economy and environment

The wider economic opportunities from resource efficiency and improved waste management are recognised nationally in Defra's position statement, *Less is More: Business Opportunities in Waste & Resource Management*[18]. These include:

- the development of repair and maintenance sectors that help to extend product life-cycles
- sales growth as a result of more market opportunities in the recycling and reprocessing sector, which will help to ensure that collections and processing remain economically viable for London
- market development opportunities for outputs from materials reprocessing and energy generation
- market development of commodity trading schemes
- investment opportunities in waste infrastructure and technologies
- employment creation and skills development.

Some of these benefits that are particularly applicable to waste prevention and resource efficiency are explored further below.

Business benefits

As well as the financial costs that can be avoided, businesses can benefit from waste-prevention and resource-efficiency measures by being better able to manage regulatory and reputational risks, meeting stakeholder

demands for sustainable business practices and enhancing their environmental and social responsibility profiles.

Economic benefits

The Mayor sets out in policies 2 and 3 of this strategy how he intends to boost levels of reuse, recycling and composting by London's businesses. The Mayor is also keen to see that the material that is collected for reuse, recycling and composting is of a high quality so that it can be reprocessed into higher value products. This should help overcome the perception of recycled materials as poor quality and should, in turn, drive the market for further recovery of materials.

Stimulating demand for material resources, and waste minimisation and management services should lead to wider benefits for London's economy as a whole. As the market for recovered materials develops, it boosts the economic viability of collection and processing operations and maintains the size and diversity of the waste service sector. There are also opportunities for third sector organisations, including voluntary groups, charities and social enterprises, to develop their role in the waste sector and the London economy generally. The market for re-usable items is often more localised than for recyclable materials, thus keeping many of the opportunities for new enterprise development in London.

The contribution of the resource and waste market to the development of the green industries sector should lead to new training and employment opportunities for Londoners. It is estimated that the number of jobs likely to be created to prepare London to manage its waste in the most carbon-efficient and economically beneficial way will be 1,260, ranging from research and development, project management and manufacturing through to maintenance and operation of the facilities needed[19]. In New York City, there are already more than 32,000 jobs in recycling, and the number is to grow substantially through the implementation of the city's Solid Waste Management Plan, *Beyond Waste: A Sustainable Materials Management Strategy for New York*, which focuses on waste prevention, materials management, education and producer responsibility for products and packaging, and moving the city away from end-of-pipe waste management solutions[20].

Environmental benefits

Waste prevention offers the greatest potential to divert waste from landfill and make carbon dioxide equivalent (CO_2eq) savings. Avoiding unnecessary waste reduces the demand for raw materials and the extraction and processing of those raw materials, which uses energy and creates waste. Waste prevention and minimisation also reduce the need for transport and its associated impacts, such as fuel consumption, congestion, noise and air pollution.

The effects of reducing waste can have an impact on the whole of a product's lifecycle, preventing greenhouse gas emissions and reducing economic costs back to the point at which raw materials are extracted. The key to effective waste prevention and minimisation lies in the front-end procurement strategy of a business – both in terms of actively minimising material requirements, preventing waste and procuring materials that are being reused or have been recycled.

The Mayor's proposals for action on business resource efficiency and waste prevention are outlined below in this policy chapter. End-of-life management of waste is discussed in Policies 2, 3 and 4 of this strategy.

Proposal 1.1 Support businesses to identify and implement waste prevention opportunities across the supply chain

Action 1.1.1:
The Mayor will support the continued provision of business resource-efficiency support programmes to help businesses to manage their resources and waste more effectively. The Mayor will continue to manage the funding provided by the European Regional Development Fund (ERDF) and use it to support a variety of business support projects in London. He will also continue to promote the Mayor's Green Procurement Code, which successfully helped businesses reduce waste over the past few years.

ERDF Business Resource Efficiency support projects in London

The ERDF for London is managed by the GLA Group. One of the ERDF's four main priorities is 'Business innovation and research and promoting eco-efficiency'. The objective of this priority is to improve the capacity of London's businesses, particularly its small and medium-sized enterprises (SMEs), and to innovate through developing new products, processes and services, leading to increased growth, competitiveness and improved environmental performance. The programme also provides assistance for London's extensive knowledge base to help create new commercial opportunities and effectively exploit new ideas.

As of February 2011, nine projects providing resource efficiency advice (along with other environmental practice advice) to London businesses have been committed to, with a total planned spend of over £13.5 million – half of which comes from ERDF funding and the other half from a variety of public and private sources. Some projects have a sector focus, such as for the print, creative and media sectors, whereas others are open to all businesses, particularly SMEs.

For further information, case studies and to access support, visit www.lda.gov.uk/our-work/european-funds/ERDF/index.aspx.

The Mayor of London's Green Procurement Code

The Mayor of London's Green Procurement Code is a support service offering businesses a range of tools and guidance to reduce their environmental impact through responsible purchasing practices. The code aims to raise awareness of the benefits of responsible purchasing practices and to help businesses realise the value of these, including cost and efficiency savings, an improved corporate profile, reduced reputational risk, gaining a competitive advantage and improved staff morale. On a wider, economic level, the Green Procurement Code aims to help drive demand for sustainable products and services that:

- use fewer natural resources
- contain fewer hazardous materials
- have a longer life-span
- consume less energy or water in production or use
- generate less waste in production or use
- are reused or contain recycled material
- can be reused or recycled at end-of-life.

Businesses that sign up to the code can access a range of guidance on:

- training staff in responsible purchasing practices
- securing management approval for responsible purchasing initiatives
- putting in place responsible purchasing policies, frameworks and stakeholder communication programmes

- engaging suppliers
- identifying and measuring the environmental and financial impacts of responsible purchasing practices.

In 2010, the code successfully moved from being a free service to a paid-for service, demonstrating that businesses saw enough value in the service to want to pay for it. The code will continue to be offered as a paid-for service in future, supported by the Mayor and the GLA Group in various ways, such as by licensing the intellectual property developed over the years, supporting annual awards, continuing its association with the Mayor and maintaining access to the GLA Group's procurement expertise.

For more information about the Mayor of London's Green Procurement Code, visit www.greenprocurementcode.co.uk/.

Action 1.1.2

The Mayor will explore the potential to work with London's industry sector organisations to help direct businesses towards sector-specific guidance on waste prevention and resource efficiency, or to help to develop this where none exists. The Mayor envisages that this will include working with organisations in London that are already taking a lead in this area and have developed expertise in such practices as:

- the measurement, assessment and disclosure of waste performance in supply chains
- the procurement of reused and recycled content
- supporting suppliers to reduce waste so as to lessen the impacts of product-related packaging, for example, further down the supply chain.

An example of this work is the Ska Rating tool for building interior fit-out, being promoted by the Better Buildings Partnership to its members. The Ska Rating is an environmental labelling method designed to rate and compare the environmental performance of fit-out projects, initially for office buildings in the UK. Supported by the Royal Institute for Chartered Surveyors, Ska Rating is designed to encourage good practice in fit-out work and has been developed collaboratively by consultants, contractors and occupiers. More detail on the Better Buildings Partnership is available under Policy 2.

Action 1.1.3

The Mayor will work with business liaison groups such as the Federation of Small Businesses, the Food and Drink Federation, the Confederation of British Industries, and London First to help translate the resource-management agenda into the language of economic growth and competitiveness, making it appropriate to a business audience. Through their expertise, the Mayor hopes to identify issues and actions specific to businesses of different sizes and in different sectors. The Mayor will also seek to work with these groups to raise awareness of best practice and introduce voluntary codes to improve waste management practices, such as for source separation of glass by colour.

Action 1.1.4

The Mayor will launch, in conjunction with partners, a designing-out-waste competition with the retail and wholesale sector in London to publicise the financial and commercial benefits of waste prevention and resource efficiency to businesses, employees and consumers.

Proposal 1.2 Support businesses to close the loop in London and drive the market for use of recovered resources.

Action 1.2.1

The Mayor will lend his support to organisations and initiatives that stimulate demand for reused and recycled materials, and promote the

market opportunities this creates for London's reprocessing and manufacturing sectors. This includes supporting initiatives such as the new and ambitious London Reuse Network.

London Reuse Network

The London Reuse Network is an attempt to build a new operational network model, across London, to significantly increase the reuse of items that would otherwise be discarded to go to landfill. The development of this network is being led by a new organisation called London Reuse Limited (LRL), which is the partner delivering this initiative for the London Community Resource Network (LCRN). Over the years, LCRN has developed a network of member organisations, which collect and sell or redistribute reusable items to Londoners. Working closely with these organisations, LRL seeks to develop working partnerships that create a step change in the thinking towards reuse, and develop a coordinated and large operational network to increase the collection, repair and retail opportunities for the thousands of tonnes of reusable items that would otherwise be destined for landfill.

The London Reuse Network's projects cover the following product streams: domestic furniture, office furniture, hotel fittings, carpets, textiles, paint, large and small WEEE (ie fridges and appliances), small household items, books, bicycles, children's toys and equipment, and wood. The projects provide an approved, quality-assured collection service to households and businesses across London.

As a charitable initiative, the London Reuse Network promotes its service directly to London's residents and to businesses, enabling donations of items which can be used for charitable purposes or circulated back into the retail market. The London Reuse Network also works closely with local authorities to ensure as much as possible of the bulky waste collected is reused, either in partnership with authorities and existing contractors, or under contract to the authorities themselves.

The ideal physical infrastructure is being developed to facilitate the work of the Network, comprising 'depots', which serve multiple 'hubs', which in turn support multiple 'outlets'. Depots accommodate bulk collections and hold stock to balance the throughput, enhancing the sorting and storing facilities and increasing capacity for recycling. Hubs are Approved Reuse Centres supporting a mix of activities including storage, sorting, training, volunteering, repair, distribution and retailing – where the proportionate emphasis of each activity varies with local conditions and priorities. Outlets focus on distribution, retail and casual collection with low levels of storage in some locations.

London Reuse Network's delivery partners have well-established relationships with social services, housing associations, homeless, refugee and other organisations serving vulnerable Londoners and people in need, and these are currently the primary recipients of reused goods. London Reuse Network works in partnership with national and international networks through which significant volumes of goods for reuse are requested.

The outlets, including many of London's charity shops, retail reused goods to the public, targeting thrifty-, green- and fashion- conscious consumers. Working with established peer-to-peer systems (eg Freecycle, Give & Take, Freegle, Eastex),

London Reuse Network enables virtual access to, and distribution of, reused goods to a wider public.

London Reuse Network is possibly the largest and most ambitious reuse intervention of its kind anywhere in the world. It has received funding via a combination of grant and loan funding from LWARB. The intention is that the Network becomes self-sufficient from a funding perspective over the long term, and the developed model becomes one to replicate worldwide.

For more information about the London Reuse Network, visit www.lcrn.org.uk/projects/london-reuse-network/

Proposal 1.3 Engage with, and inform, businesses and their employees about the financial, commercial and environmental value of waste minimisation and resource efficiency

While the potential cost savings of waste minimisation and resource efficiency may be attractive to the bottom line, these will only be achieved with the buy-in of an organisation's employees. In some cases, a complete cultural change may be required to make waste minimisation and recycling schemes work. A survey of Londoners found that while 83 per cent said that their workplace provided adequate recycling facilities, nearly half did not use those facilities[21].

Providing good information is crucial in changing people's perceptions of waste from being a business cost to a business opportunity. A study looking at the application of waste minimisation measures to businesses in the food and drink sector in the east of England, for example, found that the benefits were greatest where organisations and their employees were provided with good access to information to help overcome any lack of awareness or training[22].

Action 1.3.1

The Mayor, in partnership with WRAP, will continue to deliver the Recycle for London programme between 2010 and 2013. Funding for this Londonwide reduction, reuse and recycling engagement programme has been secured from the LWARB, with funding and in-kind support also provided by WRAP and the GLA.

Recycle for London

Recycle for London aims to deliver communications that will drive waste reduction, reuse and recycling behaviour change in London and, ultimately, divert London's waste from landfill. The LWARB has approved grant funding of £3.5 million over three years to the programme, which is delivered by the GLA working in partnership with WRAP. The GLA and WRAP also provide funding and in-kind support to the programme.

The programme's aims are to:

- improve reuse and recycling rates and reduce household and business waste in London
- support the LWARB's aim to boost London's green economy and transform how London manages its waste
- support the Mayor's municipal and business waste strategies.

Its objectives are to reduce waste (with an emphasis on food), improve London's LACW recycling performance, provide information to the public to support new infrastructure (such as promoting the use of on-the-go recycling, and improving awareness of business waste, food waste collections, and reuse services), reduce the amount of certain materials going into landfill, such as textiles, batteries, electrical items and furniture, promote the creation of higher value items from recycled content, and maximise the social value of reuse and recycling.

More information about Recycle for London see www.recycleforlondon.com/.

Part of the Recycle for London programme will be specifically targeted at London's business sector and Recycle for London will seek to work with commercial partners to deliver elements of the programme, where those partners can add real value. It will also aim to drive a permanent behavioural change in London's workforce. With full details to be developed and delivered in 2012-13, the initial thinking is that the Recycle for London engagement plan for businesses will target certain waste streams or business sectors where there is most potential, as identified elsewhere in this strategy. Some of the ideas being considered include:

- partnering with existing national and regional programmes to influence the reduction, reuse and recycling of a range of business waste materials.
- activities to capture unwanted furniture and IT equipment for reuse, which could boost third-sector involvement in the waste sector and reduce the costs to businesses of disposal.
- partnering with businesses on a producer-responsibility basis to tackle waste that ends up in the household waste stream, thus widening the sphere of influence of businesses with respect to their waste impacts. For example, packaging waste makes up 15-25 per cent of the weight of household waste, which could be reduced through better design by businesses upstream in the supply chain[23].
- developing and promoting best practice in business sectors where there are high potential gains from better waste management. The food sector, including restaurants, catering businesses, hospitality is one such area. Here, there may be opportunity to work with the Mayor's London Food Board and its Waste Working Group to promote a new food waste hierarchy. This is discussed further in Policy 2 of this strategy.
- raising awareness of the rising landfill tax and how it affects waste disposal costs, to act as a disincentive to create waste – and help to bring this into the mainstream financial considerations for business.

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11. ICE Demolition Protocol http://aggregain.wrap.org.uk/demolition/the_ice_demolition_protocol/index.html.
12. For new-build projects, the savings can be found mostly by reducing the waste that occurs as a result of over-purchasing in order to build in an allowance for damages that may occur. The allowances made for wasted materials add to the total cost of the project. Using new planning and design tools can reduce these allowances. Where refurbishment projects are concerned, there can be significant savings in the cost of waste disposal by taking the opportunity to segregate or reuse 'strip-out' waste. These savings would normally be retained by the main contractor, as the party usually responsible for the management and payment of waste disposal on a project. However, savings could be shared throughout the supply chain, if procurement contracts included clauses to this effect.
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POLICY 2
BOOSTING REUSE, RECYCLING AND COMPOSTING PARTICIPATION IN THE COMMERCIAL AND INDUSTRIAL SECTOR

Vision
The Mayor wants to help all types and sizes of businesses to overcome the practical issues that prevent greater separation of waste for reuse and recycling, so as to encourage businesses to participate in achieving rates of 70 per cent reuse, recycling and composting of C&I waste by 2020 and beyond.

Vision to policy
The Mayor will target his policy proposals on those sectors and waste streams that are most likely to yield significant improvements in waste reduction and in reuse, recycling and composting performance, to be most effective in diverting London's C&I waste from landfill. These policy proposals and actions are focused on helping businesses to overcome the practical issues that prevent greater participation in active resource and waste management.

Policy to action
- Proposal 2.1: Increase access to reuse, recycling and composting services, and collective contracting arrangements, particularly for small and medium-size businesses.
- Proposal 2.2: Target London's food waste producers.
- Proposal 2.3: Boost reuse, recycling and composting performance in multi-tenanted buildings and on large estates.
- Proposal 2.4: Improve storage capacity and collection access arrangements to business premises.

The challenges for commercial and industrial waste producers
Evidence shows that businesses of all types and sizes, ranging from SMEs to large corporations, want to become more actively engaged in the effective management of their resources and waste. A confidential piece of research commissioned by one of the London Business Improvement Districts (BIDs), to assess the feasibility of on-site recycling within BID areas and the appetite for collective contracting and public place recycling, found that more than half of businesses had an environmental policy in place and even more were keen to obtain support to help implement environmental measures[1]. The research found that many businesses were keen to have access to services enabling:

- recycling of food waste
- recycling of green waste from privately managed parks and public areas
- collection and recycling of waste electrical and electronic equipment (WEEE), batteries and furniture
- collective recycling contracts[2]

It was found that there was high demand for collection of dry recyclables (especially for paper, cardboard and plastics for office and retail-based businesses) and for separate food and glass waste collections from food retail and hospitality businesses. These are considered to be some of the key opportunities for recycling in London, enabling the capital's businesses to meet reuse, recycling and composting targets for C&I waste. This is supported by the findings of a study commissioned by Westminster Council in 2005 to assess the quantity and composition of commercial waste generated over a 12-month period from the retail, office and hospitality sectors, which make up most of the businesses within the City of Westminster area[3]. The top five waste streams by weight from each of the three sectors are shown in Table 4.

Table 4 Top five waste streams for the retail, office and hospitality sectors[4]

Retail		Office		Hospitality	
Cardboard	40 per cent	Paper	65 per cent	Glass	41 per cent
Paper	27 per cent	Food	10 per cent	Food	20 per cent
Plastic	13 per cent	Plastic	8 per cent	Cardboard	12 per cent
Food	9 per cent	Cardboard	7 per cent	Paper	11 per cent
Glass	3 per cent	Glass	5 per cent	Plastic	7 per cent

In excess of 70 per cent of the waste from each of the retail, hospitality and office premises was potentially recyclable[5]. The study's findings are likely to be reflected in many parts of central London, particularly where a similar mix of retail, office and hospitality prevails.

The Westminster study found that:

- For the retail sector, the three largest fractions – paper, cardboard and plastic – came mostly from product-related packaging waste. The two other significant waste streams – glass and food waste - were attributed to staffroom waste[6].
- Within the hospitality sector, (which includes cafes, restaurants and bars), 71 per cent of waste was potentially recyclable. A significant proportion – 41 per cent by weight – of the waste generated was glass. Clear glass made up 18 per cent of the overall waste composition, 17 per cent was green glass and seven per cent brown glass[7].
- For offices, 75 per cent of waste was potentially recyclable. Paper represented the main fraction of waste but food (10 per cent) was also a significant waste stream.

Unpublished research undertaken by the GLA also shows that there is inadequate capture of paper and cardboard from the C&I waste stream, with large volumes going to landfill, despite there being existing collection systems and reprocessing infrastructure in place for these two materials[8]. Given the high proportion of office-based businesses within London and the quantity of waste paper and cardboard likely to be generated, this indicates that many businesses are still either not engaged in sustainable waste management initiatives or feel unable to participate for other reasons.

It has been reported, both anecdotally and through published research, that there are a number of barriers preventing greater participation in reuse, recycling and composting activities. These issues are:

- gaining access to reuse, recycling and composting services, especially for SMEs
- recycling in multi-tenanted buildings and on large estates
- prohibitive costs of collection, particularly for food waste and glass
- insufficient availability of storage space for recycling containers and access to premises by refuse collection vehicles.

This is supported by research commissioned by a London BID, which found that the top three improvements required by businesses in terms of waste management were:

- to reduce collection contract costs
- to improve the public realm
- to have access to a local recycling centre[9]

Proposal 2.1 Increase access to reuse, recycling and composting services and supporting collaborative working to develop collective contracts and collection

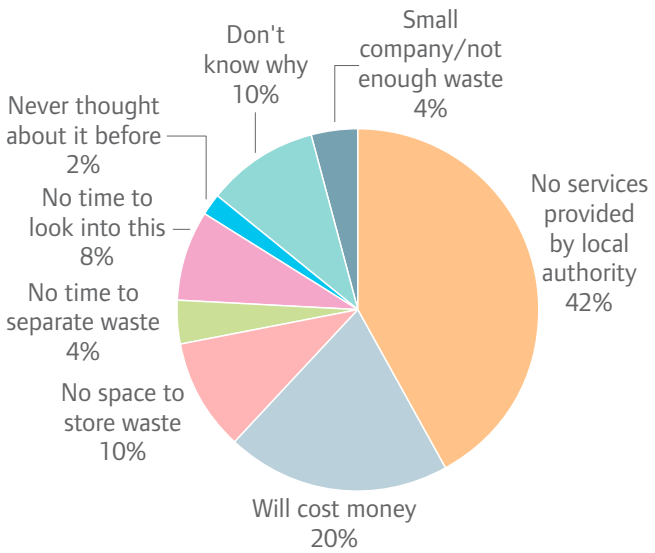
Despite the appetite for becoming involved in reuse, recycling and composting activities, many businesses struggle to find and access suitable collection services. This may be because:

- they do not know where to go for the services that they need
- the quantities they have available are considered too small for collection
- the costs are considered prohibitive, especially for food waste and glass collections from SMEs and the hospitality sector[10].

The issues for SMEs and the hospitality sector are particularly well documented.

Small and medium-size enterprises
According to data from BIS, 99.3 per cent of enterprises within London are small businesses with less than 50 employees. A further 0.5 per cent are medium-size businesses with (50-249 employees) and just 0.2 per cent are large businesses (more than 250 employees)[11]. In terms of employee numbers, small and medium-size businesses account for 38.5 per cent and 9.5 per cent of London's workforce respectively and, together, almost half of the turnover generated in the capital.

Figure 9 Reasons given by SMEs for not recycling



The Federation of Small Businesses reports, however, that while there is an appetite among smaller business for waste minimisation and recycling activities[12], the amounts recycled are often small in relation to total waste output and recycling activity can be sporadic[13]. The two key reasons for the lack of recycling activity appear to be cost and gaining access to recycling services, with small businesses often unable to take advantage of economies of scale in waste contracts, making collection for recycling and recovery expensive[14]. This is supported by a number of surveys including those commissioned by the Federation of Small Businesses[15] and by the London Assembly[16]. The London Assembly research concluded that around one-fifth of SMEs were not actively engaged in recycling. Figure 9 illustrates the reasons given for this[17].

Defra conducted a Call for Evidence for the Government Review of Waste Policy in England 2011, which identified several barriers faced by small businesses regarding waste and recycling collections. The barriers identified included:

- a lack of facilities for businesses to take their waste and recycling (as opposed to having it collected from their premises)
- a lack of recycling services in some areas and in relation to some materials (particularly food waste)
- high cost of service to the business user and lack of convenience
- a lack of awareness amongst SMEs of their legal obligations
- a lack of awareness amongst SMEs of services available in their area.

Table 5 Non-household LACW in London, 2000/01 to 2008/09 ('000 tonnes)

Non-Household LACW	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Residual Waste	1,008	996	1,024	962	1,011	810	761	734	750
Recycling	40	33	43	49	62	76	67	74	83
TOTAL	**1,048**	**1,029**	**1,067**	**1,011**	**1,073**	**886**	**828**	**808**	**833**

Businesses have the ability to choose whether they have their waste collected by a local authority or private waste contractor although small businesses, particularly, often look to their local authority as the first point of call in managing their waste. It has been reported that, in London in 2009, around 88 per cent (29 out of 33) of waste collection authorities were able to provide a trade waste collection service (for residual, or 'black bag', waste). Furthermore, 23 waste collection authorities (70 per cent) were able to provide trade waste recycling collections[18]. Some local authorities, such as the Corporation of London's Clean City Awards Scheme for Businesses, have also established their own business waste recycling programmes to reward businesses, and thus provide an incentive, to recycle more of their waste[19].

Despite the number of waste collection authorities offering these services, the actual amount of waste and recyclables collected from businesses by local authorities has been declining. This trend is detailed in Table 5, which shows that just 833,000 tonnes of non-household LACW was collected by London's local authorities in 2008/09, down from over one million tonnes in 2005/06[20].

Given that C&I waste arisings have not declined overall during this period[21], the implication is that fewer businesses are taking up the waste services that may be offered by their local authority. In the London Assembly survey, 42 per cent of businesses claimed that they did not recycle due to lack of service provision by their local authority[22].

Waste collection authorities have a duty to collect household waste and recyclables in accordance with Section 45(1)(a) of the Environmental Protection Act 1990 and the Household Waste Recycling Act 2003. However, they only have a duty to arrange for the collection of commercial waste under Section 45(1)(b) of the same Act if requested to do so by a business within their jurisdiction.

Charges are levied by local authorities for their trade waste recycling services but these may not be considered cost-effective by the waste producer, especially if there is a lack of knowledge about collection charges generally, which puts many businesses off from making changes in their waste management practices. Where there is support to develop new services, it is often directed towards household recycling collections rather than developing cost-effective trade waste services[23].

The 2011 Government Review of Waste Policy in England recognises that local authorities can do more to provide waste collection and recycling services to small businesses, and commits government to working with local authorities and private waste collection companies to make it easier for small businesses to recycle. In addition, Government is developing a Business Waste and Recycling Collection Commitment for local authorities to sign up to – this will set out

the principles of how they help local businesses meet their waste management responsibilities and recycle more[24].

Another issue is that not enough waste may be generated by a single commercial property to warrant a commercial refuse contract. The Federation of Small Businesses, for example, reports that local authorities are either unwilling or unable to collect the small amounts of waste generated by smaller commercial properties[25]. A small quantity of waste requiring collection from a single property is likely to be an issue regardless of whether collected by a local authority or by the private sector. Small businesses are likely to be a less attractive contract to a private waste management contractor and so find themselves pushed back to relying on their local authority collections.

The end result is that businesses either do not separate waste for recycling or end up dealing with it in a way that is not in compliance with legislation governing the management of waste. A YouGov survey, for example, reports that about a third of small businesses take their waste home or to a household reuse and recycling centre for recycling.

Given the increasing similarities in composition of LACW and C&I waste arisings, local authorities should be able to provide economically and environmentally viable services to collect and reprocess materials, in a way that delivers good quality, high-value material as an end-product. This is particularly true in densely populated areas, where collections can be frequent and yields more economically viable.

The economic importance of small and medium-size businesses to London, coupled with the resource and waste management challenges they face, mean that greater recognition is required to help address their needs in this area. Improving recycling performance is one of the main environmental concerns of smaller businesses[26] and so the challenge is to find ways to help them boost their actual reuse and recycling participation. This is considered as a priority area in Defra's current position statement on deriving economic opportunities from waste, which recommends improving access to collection and sorting of waste from small and medium-size businesses[27].

While the Federation of Small Businesses has called for local authorities to provide cheaper, more efficient waste and recycling collections and provide help to become greener businesses[28], the Mayor believes that he can assist by encouraging businesses to work in partnership. This should help to generate economies of scale for collection and processing, particularly in parts of London that have a high proportion of small businesses. This should help to increase the variety and quality of materials sent to recycling by small businesses.

Hospitality sector

A study in urban licensed premises in London identified a range of perceived barriers to glass recycling. These include perceptions that costs of glass waste recycling are higher than general trade waste collection; and that glass waste recycling services may not be as frequent, reliable or effective as general trade waste collection services. The study concluded that very large companies and very small businesses have a high awareness of the importance of glass waste recycling. While cost is an issue for both large and small businesses, it is not an overriding one. Large businesses also value reliability and efficiency, while small business owners are often motivated to recycle due to their personal commitment to recycling[29]. Other characteristics that help businesses to choose glass recycling services include regularity of collections, compliance with

health and safety legislation and easy handling for staff. For small and medium-size hospitality businesses, the frequency of collection and size of containers used for storage were the most important factors when deciding whether or not to recycle glass[30].

Where glass is collected for recycling this is often as colour-mixed glass. Yet mixed glass, even where it is separated via a materials recycling facility, is often of too low a quality to be used in container manufacture[31]. Alternative uses for recycling of mixed glass exist in the aggregate industry but this is less favourable in carbon terms than closed-loop recycling.

Action 2.1.1

The Mayor will support development of tools that help businesses to find and to access business waste reuse and recycling services[32]. This will also help organisations, such as the third sector, to increase their work with the business sector.

The LWARB, for example, will support the development of more online information about ways for both consumers and SMEs to access reuse services. This will follow the development of the London Reuse Network in the years ahead, with more shared collection, storage and distribution facilities coming on stream, to be accessed by all types of reuse projects across London.

Action 2.1.2

The Mayor will continue to support the London BIDs network as a way to provide access to, and achieve economies of scale for, waste reuse and recycling services[32]. In addition, he will work with BIDs to offer best-practice advice on the delivery of waste management projects. He will also help to promote opportunities to find waste management efficiencies between neighbouring BIDs and assist with the setting up of resource-efficiency clubs within these forums.

Over the past few years, some London BIDs have successfully helped set up collective waste collection and management contracts for the businesses in their areas. Collective contracting can reduce costs significantly, particularly where large businesses, estate owners and managing agents of multi-tenanted buildings are involved, and there are commercially attractive quantities of material for recycling. The other benefits of collective contracting are:

- reduced waste traffic within the BID area, with knock-on benefits in terms of less congestion, better air quality, and more time freed up for other collection and delivery vehicles
- improved possibilities for expanding collections to other materials, such as glass and plastic that might otherwise be more difficult to collect (plastics because of the many types of plastic available, and glass because of the need to separate to maintain quality)
- the waste contractor is able to collect a higher volume of materials in a small geographical area from a high density of customer premises.

In promoting collective contracting, a BID may not necessarily need to have any contractual responsibilities itself but instead takes on the following roles:

- using levies to provide a free or reduced-cost recycling service
- engage with a waste contractor to provide a collective recycling approach in the area, helping to promote to, and recruit, businesses
- promote the scheme to individual businesses to help them establish individual contracts with the waste contractor
- act to co-ordinate data from the waste contractor to communicate levels of business participation and recycling performance.

London Business Improvement Districts (BIDs) Network

A Business Improvement District (BID) is a business-led and business-funded organisation set up to improve a defined commercial area. Varying in shape and size, BIDs operate for a maximum term of five years, beyond which they are subject to a renewal process to secure additional five year terms.

BIDs offer services in return for a financial contribution from businesses and a say in the decision-making process about how those funds should be spent. Consequently, businesses are able to define the priorities for improvements to their local area that should help to retain existing, and attract new, businesses and to make areas an attractive place to work and visit.

A levy on business rates (typically between 1-2.5 per cent in London) is charged, in addition to existing business rates. Collection of the levy is administered by the local authority governing a specific BID area. A governing board is established made up of representatives of the business community who are responsible for consulting on, and implementing, priority programmes for the BID area.

A BID is responsible for developing a business plan that sets out priorities for making area and service improvements. It also details how the BID will be managed and operated. This includes establishing an operating agreement with the local authority governing the BID area to administer collection of BID levies from participating businesses.

The London BIDs Programme has been running since 2003 and is aimed at supporting the development of new BIDs and guiding the management and renewal of existing BIDs across London. The London BIDs Network provides a strategic advisory board made up of representative organisations that disseminate best practice and policy guidance via a series of events, training, publications and online information. The Mayor has supported the BIDs network over the past few years by providing funding for a common website and for events where best practice can be shared. The Mayor will continue to support the network by sharing GLA expertise and helping to create new business opportunities, especially in waste and recycling.

Involvement in a BID programme provides the following benefits to businesses:

- businesses are able to decide what additional services should be provided and BID levy money is ring-fenced specifically for these services
- businesses benefit from increased promotion of the area by the BID management team
- partnership working and joint service provision and procurement provides economies of scale and subsequent cost reductions for businesses
- opportunities for networking with neighbouring businesses are improved
- dealing with public bodies, including local authorities and the police, is made easier.

As of February 2011, there were 25 formal BIDs and eight developing BIDs within the Greater London area. Information and contact details for each BID can be found at www.londonbids.co.uk/bid-locations.html.

More information about BIDs, their governance and methods of funding is available from www.londonbids.co.uk/ and UK BIDs, the National BIDs Advisory Service, at www.ukbids.org/index.php.

CASE STUDY 2.1
Team London Bridge Business Improvement District

The Team London Bridge Business Improvement District represents 270 businesses operating in the London Bridge area bordered by the River Thames, London Bridge, Tower Bridge and along Tooley Street.

In 2009/10, Team London Bridge managed a budget of just over £1 million from business levies, funding carry-over from previous financial years and from project partners. The majority of this funding (38 per cent, or £655,220) was spent on environment and street scene projects with the remainder distributed across other areas such as business promotion, corporate social responsibility, security and safety, advocacy and networking and core operating costs. These funding priorities and investments are set by the BID businesses and their representatives, which shows that there is a strong appetite for improvement of environmental performance and public realm. Funds in this area were directed to capital investment and providing new services in areas such as cleaning and maintenance, new energy-efficient lighting, the provision of recycling services, and clearing graffiti and litter.

The BID has partnered with First Mile to offer a subsidised, mixed collection recycling service that improves recycling performance levels of its business community and reduces costs. First Mile provides mixed recycling sacks for collection of paper, card, plastic, metal and glass. This service has been taken up primarily by SMEs within the area, with many larger businesses and organisations already providing their own service. By using one main contractor, fewer collection points are needed and the amount of refuse collection vehicle traffic in the area is minimised.

While, ultimately, businesses still pay for the service through their BID levy, the economies of scale achieved in service provision mean that costs are lower than otherwise for collections from individual premises. The scheme is also administered by Team London Bridge on behalf of its members so that smaller businesses, particularly, do not have to worry about dedicating time and resources to finding services.

As part of its service to Team London Bridge, First Mile is also able to offer a food waste collection service; quarterly collections of waste electrical and electronic equipment (WEEE), batteries and furniture; and a confidential waste collection service.

Action 2.1.3

The Mayor will encourage waste authorities to expand their business waste collection and disposal services. There is demand for this as businesses, especially smaller businesses, see this as one of their links with their local authorities. As business waste becomes more similar to household waste, providing these services should become easier and perhaps cheaper for local authorities. This should also ensure the waste authorities are able to make best use of their facilities and infrastructure.

Action 2.1.4

The Mayor will work with companies affected by the 'producer responsibility' regime and those working with them to comply with the regulations, to promote a joined up approach to reuse and recycling from both businesses and households. The Mayor will seek to find optimal solutions to the management of WEEE and other waste streams by doing this.

Proposal 2.2 Target London's food waste producers

Too much food waste is going to landfill, instead of being captured for composting or reprocessing, due to the limited collection systems and reprocessing infrastructure in place[33]. It is estimated that around 41 per cent of the total amount of waste generated by the food and drink manufacturing sector in London is food waste, equivalent to 23,153 tonnes (3.8 per cent of the UK's total food waste)[34]. In the hospitality sector, the 2005 study for Westminster City Council estimated that around 20 per cent of the waste was food waste, the second largest fraction, after glass (41 per cent)[35]

Packaging, food waste and influencing consumer behaviour (for example, through marketing and consumer communications, and store-based recycling) are considered to be the three key issues in the food industry[36].

A lot of work has already been done, or is underway, on packaging, to reduce and improve packaging with respect to household waste. Much of this work has been undertaken by WRAP, primarily through the Courtauld Commitment programme, which is a voluntary resource-efficiency programme for the UK retail sector. The current phase of this programme, being carried out over 2011 – 2015, has three targets:

- to reduce the weight of packaging, increase recycling rates of packaging and increase the recycled content of all grocery packaging. Through these measures the aim is to reduce the carbon impact of grocery packaging by 10 per cent.
- to reduce UK household food and drink waste by four per cent
- to reduce traditional grocery product and packaging waste in the grocery supply chain by five per cent - including both solid and liquid waste[37].

The Mayor believes, however, that there is still much to be gained from tackling London's food waste, particularly with regard to energy generation and linking to his wider objectives on sustainable food and social poverty in London. These priorities extend to all of London's food waste producers, including food and drink manufacturers, the retail and wholesale sector, hotels and catering and the hospitality sector.

Action 2.2.1

The Mayor will work with the London Food Board Waste Working Group and food-producing business sectors to help raise awareness and understanding of the waste chain – from producer through to point of treatment and disposal – and identify the issues around separation, collection and treatment of food waste. This should, in turn, increase awareness of the demand for food waste collections and infrastructure, and help those investing in food waste treatment infrastructure to understand and minimise the risks involved in building, maintaining and operating a treatment infrastructure for food waste. Further information about the Mayor's proposals for supporting the business waste infrastructure market in London can be found in Policy 3 of this strategy.

The key issues in managing food waste in London are stimulating demand for collection services and developing the necessary waste treatment infrastructure. The Waste Working Group has highlighted the following points:

- There is a need for food waste producers to understand how waste is managed at the point of treatment and disposal and how this influences the methods of separation and collection that might be required as a result.
- There is a need for the waste industry to better understand the issues faced by businesses with respect to separation and storage of waste,

and the issues around the availability and awareness of food waste collection services.
- There needs to be greater understanding among food waste producers of the factors affecting market prices for the collection of food waste, such as competition, haulage, treatment capacity.
- There needs to be an assessment of how to create push/pull demand for food waste collections and infrastructure.

Separate food waste collection is ideal when the food waste is sent for carbon-efficient disposal methods such as anaerobic digestion. However there is currently no legislative demand to encourage businesses to have their food waste collected separately. Separate food waste collection services are not offered by many waste collection companies either. The challenge therefore is to create a market for these services. Food waste processing infrastructure is being developed in London (see Policy 3 for examples), and the hope is that gate fees at these facilities will be competitive with other disposal methods – this would help create the market for separate food waste collections[38].

Other work with the London Food Board may include the development of sector-specific action plans for food waste producers in London, such as food and drink manufacturers, the retail and wholesale sector, hotels and catering and the hospitality sector.

Action 2.2.2

The Mayor will assist food waste producers in London to prevent unwanted, edible food going to waste by supporting the use of food redistribution schemes such as the FareShare Community Food Network charity.

The Mayor is already supporting FareShare through the LWARB. He will also call on food producers, distributors and retailers to formally support collection of food for these schemes to enable its distribution to a wide range of recipient organisations, such as charities and other voluntary groups.

In March 2010, the LWARB awarded a grant of £362,000 to FareShare to help save edible food from landfill. The grant has been used to provide 90 per cent of funding for a new food distribution depot in the Park Royal business area of north-west London, leading to the creation of two new jobs (a depot manager and shift co-ordinator) and around 50 volunteering opportunities. This is aiding the distribution of the equivalent of 800,000 meals to the homeless and other vulnerable groups within London each year, saving an estimated 300 tonnes of food waste from landfill in the process[39].

FareShare Community Food Network

The FareShare Community Food Network is a national UK charity that supports communities to relieve food poverty. FareShare provides a paid-for collection service to the food and drink industry to distribute good quality food that no longer has a commercial value but is fit for purpose to local community groups. Each year, across the UK, FareShare distributes around 20,000 tonnes of food that would otherwise have been wasted. In 2008/09, the redistribution of this food contributed to providing more than 7.4 million meals and helped business food waste producers to reduce CO_2eq emissions by 13,950 tonnes (as a result of avoiding the methane emissions this food would have produced in landfill)[40]. FareShare's experience, skills and operations in this area mean that it is also able to provide a series of education, training, employment and volunteering opportunities.

FareShare is represented on the Mayor's London Food Board, which informs and guides programmes to improve access to healthy food in the capital, boost economic opportunities for the food sector and reduce the food system's impact on the environment, including by reducing food waste and diverting it from landfill. More details about the FareShare Community Food Network are available from www.FareShare.org.uk/.

Action 2.2.3

The Mayor will work with the London Food Board Waste Working Group to develop, launch and promote a food waste hierarchy to help businesses follow best practice in food waste reduction, redistribution and disposal.

The food waste hierarchy will give precedence to food waste reduction, for example by avoiding surpluses in the first place and by donating edible food for charitable redistribution; it will also promote the potential to divert unwanted food for livestock feed where practicable and legally permitted; finally it will indicate that when the above avenues have been exhausted, best disposal methods (including composting and anaerobic digestion) should be considered. This will help businesses understand best practice in this area, and help them make decisions about how to adopt this best practice, as appropriate to their specific operations.

The hierarchy is scheduled to be launched in autumn 2011 at a 'Feeding the 5000' event[41] to promote food waste reduction, and the redistribution of edible food. The Mayor will continue to promote this hierarchy to businesses after the event, as the opportunities arise.

Proposal 2.3 Boost reuse, recycling and composting performance in multi-tenanted buildings and on large estates

Commercial landlords and managing agents for multi-tenanted buildings and large estates have an important role to play in helping to reduce waste and providing recycling services to their tenants.

A confidential piece of research, commissioned by one of the London BIDs to assess the feasibility of on-site recycling within the BID area, as well as collective contracting and public place recycling,[42] found that some large estate owners and managing agents were disposing of all waste generated by tenants to landfill. This had the result of lowering the overall recycling performance for the BID to just 5 per cent, even though some other individual businesses were achieving recycling rates as high as between 60 per cent and 70 per cent. Based on the Westminster waste analysis study, which looked at the retail, office and hospitality businesses that are likely to occupy these types of premises, this indicates that a high proportion of paper, cardboard, food and glass waste may be going to landfill as mixed waste (see Table 4)[43].

Many occupiers of multi-tenanted buildings are several steps removed from the waste collection process (via cleaning contractors and buildings facilities management) and may not know who is responsible for this even though, legally, they have a Duty of Care to ensure correct management to the final point of disposal or to a point where the waste ceases to be a 'waste'. The payment of a service charge, while this may cover waste management costs, does not legally discharge tenants from their responsibilities as waste producers. All waste producers should be aware of how a service provider manages their waste once it passes into their control.

Commercial landlords and managing agents should take the opportunity to improve storage and access arrangements, where possible, during refurbishment or maintenance work and provide a training or awareness raising role to support tenants and make them aware of their obligations.

If the managing agent has no desire to offer reuse, recycling and composting services (particularly as the managing agent is not the direct producer of the waste) or lacks awareness about the possibilities for doing so, tenants may feel restricted in becoming further engaged in sustainability issues, despite their best intentions. Managing agents may also feel that they have insufficient time or the correct level of engagement to work with their tenants. Either way, both parties are likely to be affected by rising landfill disposal costs as a result.

Action 2.3.1
The Mayor aims to address these issues through the GLA Group's funding and support of projects such as the Better Buildings Partnership (BBP), a collaboration of London's leading commercial property owners and allied organisations. The primary aim of the BBP is to develop solutions to help landlords and managing agents to improve the sustainability of London's existing commercial building stock.

The BBP has produced a series of toolkits to help owners and occupiers of commercial buildings to work together to reduce the environmental impact of their buildings. For example, the BBP's Green Lease Toolkit allows owners and occupiers to agree waste, water, carbon and energy reduction strategies that best fit with the circumstances of individual properties. The Green Building Management Toolkit develops this work further and provides practical guidance on how to set up and run a Green Building Management Group. The Managing Agents Sustainability Toolkit provides various tools to help improve waste management at building level.

The toolkits are most relevant to multi-occupied buildings where landlords and tenants need to find ways to work together to improve their environmental performance, including waste and recycling performance. The toolkits will help the many landlords who wish to improve the environmental impact of their building stock but are unable to find ways to engage with the multitude of tenants all with differing aspirations and differing lease terms and timescales. The toolkits will also help tenants with corporate social responsibility policies that would like to do more, with assistance from their landlord, including measuring and managing their own environmental impacts.

Better Buildings Partnership and its toolkits
The Better Buildings Partnership (BBP) is a collaboration of London's leading commercial property owners and allied organisations, which is supported by the Mayor of London and the GLA Group. Its primary aim is to develop solutions to help landlords and managing agents to improve the sustainability of London's existing commercial building stock.

The BBP has produced a series of toolkits to enable owners and occupiers of commercial buildings to work together to reduce the environmental impact of their buildings. More specifically, the toolkits allow owners and occupiers to agree waste, water, carbon and energy reduction strategies that best fit with the circumstances of individual properties.

The Green Lease Toolkit contains a series of non-prescriptive, best practice

recommendations, a model Memorandum of Understanding which can be used in full or in part and which parties can enter into at any stage of any lease, and a model Green Lease Clauses form, which is designed to be used as minimum best practice in new and renewal leases.

The Green Lease Toolkit's best practice recommendations for waste include the adoption of sustainable procurement schemes, including reuse and supplier take-back schemes; co-operation between owners and occupiers on the joint setting of recycling targets and shared waste facilities for occupiers (to reduce vehicle journeys and overall collection charges); awareness-raising and training programmes for both employees and cleaning contractors to encourage correct use of, and participation in, reuse and recycling programmes; provisions for the storage and collection of hazardous wastes, including fluorescent bulbs, mobile phones and batteries, to reduce overall collection costs and the risk of not complying with the legal requirements for handling hazardous waste; consistent and frequent measurement of waste data; data sharing on waste to landfill and recycling; regular waste audits; and application of the above principles to the management of both operational waste and waste from refurbishment and maintenance.

The Green Building Management Toolkit provides guidance for setting up and running a Green Building Management Group, which would consist of landlords and tenants. It provides various useful templates to be used by such groups, including a waste action plan template and a waste monitoring report template, with suggestions on indicators and reporting methods.

The Managing Agents Sustainability Toolkit contains guidance on the waste hierarchy; development of a building-wide waste strategy; carrying out waste audits; understanding Duty of Care responsibilities; managing waste during refurbishment and fit-out; identifying and disposing of hazardous waste; and identifying and disposing of electrical equipment.

The Green Lease Toolkit was the BBP's first publication and a BBP Working Group has been trialling its use for over a year. Members of this BBP Working Group have reported the following successes and potential uses as a result of its implementation:

- It helps commercial landlords to engage with lawyers, property management companies and tenants on lease negotiation.
- It provides a best-practice benchmark for the commercial property sector, by illustrating good practice in terms of both environmental opportunities and potential cost reductions.
- It should become a selling point for landlords, helping to attract tenants into buildings, and encouraging further uptake of the Toolkit.
- As it helps occupiers make cost savings through reduced service charges, it should in turn, benefit the owner through improved tenant retention rates.
- It should lead to a more joined-up approach within occupier organisations, between those with responsibility for negotiating leases and those formulating corporate policies on waste (this is a particular issue where retail tenants are concerned)[44].

The BBP toolkits are available to download online at www.betterbuildingspartnership.co.uk

CASE STUDY 2.2
York House, owned by BBP member British Land

At York House, zero waste was sent to landfill in 2010/11, with 79 per cent recycled and the remaining 21 per cent sent for incineration with energy recovery.

Some 166 tonnes of waste were diverted from landfill, equivalent to almost £8,000 in landfill taxes. This was thanks to the efforts of property owner and occupier British Land, building management team Broadgate Estates Ltd, and occupiers Bunzl, Government of Singapore Investment Corporation (London Office) Pte Ltd, hurleypalmerflatt and Moor Park Capital LLP.

The introduction of a food composting scheme in 2009/10 significantly improved recycling rates, with waste food now turned into high quality compost which is used for agriculture in Kent. Occupiers have also run recycling awareness campaigns, putting up posters, improving labelling and sending out emails to staff. Ensuring staff make full use of recycling facilities and correctly segregate waste, is particularly important as most of the recycling is achieved through on-site segregation.

A wide range of material streams are collected for recycling, including cardboard, paper, glass and batteries. Waste electrical and electronic equipment are separated so they can be broken down and components reused, toners are collected and sent for refilling, and food waste is sent for composting. Waste is weighed on site, ensuring data accuracy.

The waste contractor Capital Waste was recommended to the York House building management team by colleagues at Broadgate in the City of London, where Capital Waste helped some buildings to win Clean City awards.

Focus on waste reduction

As well as increasing recycling, British Land reduced the amount of waste generated by its staff at York House by 10 per cent per person in 2010/11, compared to 2009/10.

Waste reduction initiatives included:

- encouraging people only to print when really necessary, and always to print on both sides
- reducing deliveries of printed media and encouraging people to view materials online
- installing new software that measures printing, with monthly reports highlighting to Head of Department whether their team's consumption is reducing or increasing
- introducing a new project team to support people in reducing their consumption, and Waste Reduction Champions to work within individual teams.

Source: British Land

Waste management at York House

CASE STUDY 2.2: York House, owned by BBP member British Land. © British Land.

Action 2.3.2

The Mayor will seek to work with sector organisations such as the British Institute of Facilities Management, large estate owners and managing agents and transport organisations such as the GLA Group and Network Rail, on the possibility of finding spaces on site to house small-scale waste treatment options such as balers, shredders and in-vessel composting units. A number of delivery partners may be required in terms of providing landholdings, establishing treatment processes, and maintaining ongoing operations and maintenance.

Action 2.3.3

The Mayor will seek to facilitate sponsorship opportunities for the provision of 'trade waste' bring bank hubs and 'on-the-go' public place recycling within London's business parks and estates. Towards this end, the Mayor will seek to develop existing and new partnerships with London boroughs and other organisations such as those operating recycling incentive schemes, local business groups, retailers, manufacturers, the property industry and the waste sector.

Proposal 2.4 Ensure that all new and refurbished developments have sufficient internal and external space available for storage of bulky waste, residual waste and recycling. This is to facilitate separation of waste that can be reused and recycled and ultimately diverted from landfill. It will also help to lessen the impact of business waste on the street-scene environment in London.

Often space can be at a premium, and having to house different types of waste and recycling containers can be a disincentive to separating waste for reuse and recycling, particularly for small businesses. The design of external waste storage areas also needs to be carefully considered so that businesses can feel confident in placing waste securely outside of their premises without causing environmental harm or other problems, such as attracting vermin.

In a survey of 1,538 businesses in Wales, for example, seven per cent said that lack of storage space was a barrier to recycling[45]. Anecdotal evidence obtained from members of London's Smart Green Business, representing some of London's BID organisations, also indicates that insufficient storage capacity is a barrier to recycling, particularly in relation to increasing the range of materials collected[46].

Smart Green Business

Smart Green Business is a network set up to provide access to professional advice and support to help businesses achieve economic advantage through environmental action. It aims to support more than 1,300 SMEs in London, helping businesses to improve environmental performance in seven key areas including waste management and recycling, green procurement, business resource efficiency, environmental management systems, energy auditing, travel planning and knowledge transfer partnership. By June 2012, the Smart Green Business group aims to have helped businesses to:

- divert 1,300 tonnes of waste from landfill
- save 7,000 cubic metres of water
- avoid the use of two tonnes of materials
- save 300 tonnes of CO_2eq.

Smart Green Business is funded by the Mayor via the ERDF Operational Programme 2007-13. The initiative contributes towards the Mayor's Economic Development Strategy, which sets out a vision to create a sustainable world city with strong, long-term economic

growth, social inclusion and environmental improvement.

Project delivery of Smart Green Business is being managed and co-ordinated by the Cross River Partnership, with input from its delivery partners, including eight of the London BIDs (Angel Aim, Bayswater, Better Bankside, Camden Town Unlimited, Heart of London Business Alliance, Team London Bridge, Victoria and Waterloo Quarter), Westminster Council, North Central Travel Plan Network and South East London Transport Strategy. Other strategic partners include the London BIDs Network and the London boroughs of Camden, Islington, Lambeth and Southwark.

Mixed and contaminated waste materials are harder to convert into valuable new materials and products. Therefore, the ability to separate waste at source is important in the case of many materials. A 2007 survey for the Environment Agency in Wales found that a third of commercial and industrial waste generated was mixed waste, which could potentially have been diverted from landfill for recycling if it had been separated at source.

Access to premises by refuse collection vehicles is also a concern, especially where storage and loading bays are not at street level or are positioned away from thoroughfares that have sufficient room to accommodate collection vehicles. It is further complicated by the fact that storage and collection areas can be a range of different places, including footpaths, shared basement and loading bays, shared internal and storage areas, and private storage and bin collection areas. The need to transfer recycling, as well as residual waste, containers over long distances or up and down multiple building levels can be a deterrent to separating waste material streams for recycling.

Automated waste collection systems and underground storage areas are difficult to retrofit, due to the existing underground infrastructure of buildings, and high capital expenditure costs. Therefore, these collection technologies are best suited to proposals for new development.

Action 2.4.1

The Mayor will make use of the planning process, through the *London Plan* and his supplementary planning guidance on sustainable design and construction, to ensure the provision of waste storage space in new and refurbished developments[47]. Local planning authorities will be required to ensure that all planning applications for new and refurbished developments have provided for sufficient waste storage space. In addition, an operational waste strategy for new developments should be submitted to show how the potential types and quantities of waste that may be generated can be managed on-site in such a way as to achieve 70 per cent recycling of C&I waste.

Endnotes

1. Confidential research undertaken and reported in 2010.
2. These findings are based on survey responses from a range of sectors and business sizes represented by London's BIDs and are considered to be representative of a cross-sectoral response.
3. Waste Analysis Project: Final Report, SWAP (2005), available at www3.westminster.gov.uk/docstores/publications_store/WCCWasteAnalysisFinalReport.pdf (accessed 18 June 2010).
4., Ibid.
5., Ibid.
6., Ibid.
7., Ibid.
8. Defined as more than 50 per cent of total tonnage to landfill.
9. Confidential research undertaken by London BID.
10. Anecdotal evidence from Smart Green Business, 29 July 2010.
11. SME Statistics for the UK and Regions 2008: Table 17 – London, BIS (2008).
12. Social and Environmental Responsibility and the Small Business Owner, Federation of Small Businesses (2007), available at www.fsb.org.uk/policy/Publications (accessed 07 June 2010). In a survey conducted by the Federation of Small Businesses, 83 per cent of respondents actively engaged in waste minimisation and recycling.
13. The Local Elections in England 2008: A Small Business Manifesto, Federation of Small Businesses (2008), available at www.fsb.org.uk/policy/Publications (accessed 07 June 2010).
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POLICY 3
SUPPORTING THE WASTE INFRASTRUCTURE MARKET IN LONDON TO GROW AND TO DELIVER FOR BUSINESSES

Vision

The Mayor wants to assist the development of new waste infrastructure which will help to manage London's business waste within the capital, so that there is less reliance on landfill. This will also bring financial, economic and environmental benefits to London. The aim is to stimulate market development by sharing the risk associated with these new projects, illustrating their commercial viability and then attracting greater levels of private sector investment to fund large-scale roll-out.

Vision to policy

- The Mayor will use the role of the LWARB to support and accelerate the delivery of London's waste infrastructure requirements such that the opportunity for early landfill diversion is not missed.
- The Mayor will use his influence over London's planning regime to ensure that new waste treatment infrastructure is not delayed in being brought to market.
- The Mayor will also encourage the development of waste facilities in a way that facilitates their integration into London's urban environment and helps to reduce the operational impacts of the waste sector upon the environment.

Policy to action

- **Proposal 3.1:** Work to attract new investment for waste infrastructure in London.
- **Proposal 3.2:** Facilitate business partnerships to help catalyse development of waste infrastructure in London.
- **Proposal 3.3:** Improve the knowledge base for waste sector investors.
- **Proposal 3.4:** Identify additional opportunities for the development of the business waste infrastructure.
- **Proposal 3.5:** Facilitate delivery of waste infrastructure improvements through the strategic planning process.
- **Proposal 3.6:** Integrate waste facilities into the urban environment.

Reducing London's reliance on landfill

London currently sends 17 per cent of its C&I waste and 18 per cent of its CDE waste to landfill (see Figure 2) and is largely reliant on existing sites outside of the region, where capacity is reducing. Notwithstanding the issue of diminishing landfill availability, both within and outside of the Greater London region, a lack of processing alternatives means that London is not realising the economic and employment opportunities that new waste infrastructure would bring, nor the environmental benefits, in terms of lower greenhouse gas emissions from the new treatment technologies and lower overall vehicle mileages.

London's reliance on landfill can be most reduced by the provision of alternative treatment options for key waste streams such as mixed plastics, food waste, wood, metals (specifically from LACW), paper and board (specifically from the C&I waste stream) and textiles.

These materials have been identified as those which have significant potential to displace virgin materials and fossil-fuel derived energy, based on the total tonnage produced, the proportion currently landfilled and the potential CO_2eq that would be saved overall as a result of diverting these materials from landfill.

Investment opportunities and challenges in developing waste infrastructure

Waste management and recycling services are considered part of the UK Low Carbon and Environmental Goods and Services sector. In London, the existing market for low carbon and environmental goods and services was worth around £21 billion in 2007/08, representing almost 10,000 companies and employing close to 156,000 people[1]. The environmental sector, including the waste management and recycling sub-sectors, was worth £3.8 billion in London[2] and the renewable energy and emerging low carbon sectors were worth £6.5 billion and £10.7 billion respectively[3].

A report by Ernst & Young indicates that access to capital and borrowing costs for developers in the UK Low Carbon and Environmental Goods and Services Sector – including the waste sector – remain the key barrier to growth[4]. Current planning procedures can also be difficult for infrastructure developers to negotiate and can act as a deterrent to attracting inward investment into the waste sector. The design, development and deployment of new technologies also requires significant collaboration between partnership organisations.

The LWARB's experience shows that traditional investment organisations can be very wary about new energy generation technologies which have not yet been widely implemented and proven in the UK, even when they have been used elsewhere, such as in the case of some gasification technologies.

A report by the Institution of Civil Engineers also cites finance and planning issues as the barriers to be overcome in order to improve infrastructure for resource and waste management[5]. The report highlights that there has been insufficient focus on new waste treatment infrastructure for non-LACW waste streams to date, and a key recommendation is the integration of the strategy and planning aspects of LACW with C&I waste infrastructure.

Ensuring that London has sufficient waste infrastructure to meet its landfill diversion priorities will provide a number of secondary opportunities including inward investment into London's waste sector, the development of a low-carbon London and significant employment opportunities.

Businesses operating in the waste sector in the UK have seen a fundamental change in their market strategies as a result of the shift in thinking from waste to resource, driven by social, commercial and legislative pressures. Previously, waste services comprised mainly transport, logistics and landfill disposal. In the LACW sector, major operators have changed their service offering, in response to local authorities' current preference for longer-term, integrated contracts for LACW management, to cover collection, transportation, recycling, landfill and other forms of waste treatment and energy generation solutions[6]. These long-term contracts provide commercial certainty that enables substantial levels of investment to build new infrastructure.

However, there is still a market failure in the development of infrastructure for C&I waste. Unlike the LACW sector, there are no long-term contracts available for significant amounts of C&I waste to underpin the capital costs of new waste management infrastructure development. Businesses contract with waste management companies individually, unlike households which contract collectively via their waste disposal authorities. Individual businesses do not produce a lot of waste, so a waste management company would need to secure waste contracts from thousands, possibly tens of thousands of

businesses, to generate enough feedstock for a new waste treatment facility.

Another issue hindering waste infrastructure development for the C&I sector is the short length of feedstock contracts available. Businesses understandably do not enter into waste management contracts of more than two or three years. It is very difficult therefore for waste infrastructure developers and their investors to feel secure about having enough long-term C&I waste contracts to back the development of a new treatment facility.

Despite these difficulties, there are developers who see the opportunity to build 'merchant' facilities to deal with C&I waste. These are facilities built at risk, without the benefit of long-term contracts and are dependent on short and medium-term business contracts (typically from a few months to two-three years) and on the additional waste secured in an ad-hoc way via the 'spot market'. Due to the inherent risks involved, developers of merchant facilities face major hurdles in securing financial investments. The Mayor has provided funding to the LWARB to help accelerate the development of merchant facilities in London for C&I waste management, and this has produced a significant number of projects, as described later in this section.

Another option would be that more facilities built by waste management companies on the back of long-term local authority waste management contracts could include some 'merchant' capacity to treat C&I waste. The Mayor, through the LWARB, is also working to encourage this and significant successes are being achieved in this area as well.

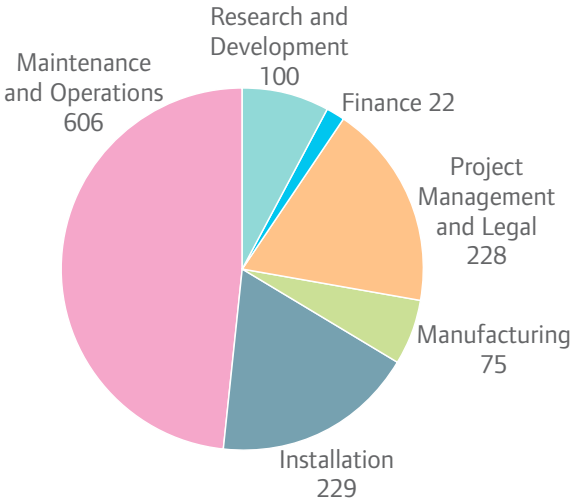
Not having waste infrastructure for C&I waste would mean that a substantial percentage of this waste would continue to go to landfill. As the landfill tax is rising, this would prove more and more expensive for London's businesses. It is therefore crucial that this infrastructure is built quickly.

The experience of the LWARB and other organisations has shown that the recent banking crisis and the inherent risks associated with merchant facilities has meant that many businesses have faced difficulties gaining access to new capital to develop the infrastructure that London needs to treat its waste[7]. The Mayor's response to this has been to provide minimum amounts of funding, via the LWARB, to projects so that they can then gain the remaining majority of funding from the private sector, getting them 'over the line' so to speak. The LWARB is providing funding in as commercial a manner as possible, mostly in the form of loans which, once repaid, can be re-invested into other projects, creating a much-needed recyclable flow of public capital into infrastructure projects.

London needs to build on its strengths in securing investment in new waste infrastructure developments. The Ernst & Young report illustrates the potential economic benefits of securing private sector investment in new waste infrastructure as part of the Mayor's overall programme on climate change mitigation. The report estimates that, by 2025, creating the optimal recycling and energy generation infrastructure will contribute a projected:

- Direct Gross Value Added (GVA) of £52 million per year (7.2 per cent of the overall climate change mitigation programme contribution of £720 million per year).
- 1,260 jobs (gross) per year (8.8 per cent of the total of 14,357 jobs).
- inward investment of £78 million per year (9.2 per cent of the overall climate change mitigation programme contribution of £845 million per year)[8].

Figure 10 Estimated average annual jobs creation in the waste sector, 2009 to 2025[9]



The majority of these jobs (roughly 600 per year) are estimated to be in maintenance and operations. The breakdown of these jobs is shown in Figure 10.

Tackling climate change

The waste sector is considered to be one of four primary areas within the Mayor's climate change mitigation programme, the others being building efficiency, transport and decentralised energy. Tackling climate change by reducing greenhouse gas emissions is a global priority. There is now a strong scientific consensus that greenhouse gas emissions, as a result of human activity, are causing the climate to change at an unprecedented scale and speed[10].

Traditional methods of waste management are a net contributor to climate change and the European Environment Agency estimates that methane emissions from UK landfill sites are among the highest of the EU Member States[11]. Decomposition of biodegradable materials in landfill, for example, generates around 40 per cent of the UK's methane emissions and 3 per cent of the country's greenhouse gas emissions. London's waste sector has an opportunity to become a net reducer of greenhouse gas emissions through more effective management of waste and linking to opportunities in the decentralised energy sector.

The Mayor has already set out in his Municipal Waste Management Strategy, *London's Wasted Resource*, that the management of London's LACW should achieve significant climate change mitigation benefits, particularly for waste that currently goes to landfill or energy generation. Instead of focusing on particular waste services or technologies, the Mayor has looked at the outcomes of particular methods (based on their lifecycle CO_2eq emissions performance) to develop a CO_2eq emissions performance standard (EPS). This outcome-based approach establishes two key principles:

- that the focus will be on recovering the materials and choosing the reprocessing routes which deliver the greatest CO_2eq savings
- that there will be support for decentralised energy generation from LACW in a way that is no more polluting in carbon terms than the baseload energy generation it replaces[12].

Achieving the EPS will ensure the management of London's LACW ceases to be a net contributor to climate change and becomes one that plays a role in achieving significant climate change mitigation benefits. London will be the first city in the world to develop an EPS for LACW management, sending a clear message to London's waste authorities and the waste industry to focus on waste management activities that achieve the greatest CO_2eq savings.

London's CO_2 Emissions

In 2008, London's CO_2 emissions were 44.7 million tonnes ($MtCO_2$), equivalent to 8.4 per cent of the UK's total CO_2 emissions. The supply and use of electricity and other fossil fuels in buildings is the primary source of CO_2

emissions in London. The Mayor intends to tackle emissions by reducing energy demand on a sector-by-sector basis while at the same time 'de-carbonising' the supply of energy.

The Mayor has committed to an overall target of reducing London's CO_2 emissions by 60 per cent on 1990 levels by 2025 and at least 80 per cent by 2050. These targets are on the basis that this is the contribution London and the UK as a whole need to make to help stabilise atmospheric concentrations of CO_2 at 450ppm.

More information on the Mayor's strategic objectives for climate change mitigation and energy, and the benefits of moving London to a low-carbon economy, can be found in *Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy)*[13] and *Prospectus for London: The Low Carbon Capital*[14].

Developing the green skills sector

The Mayor's policy proposals on helping Londoners gain the skills and experience needed to participate in the low-carbon economy are dealt with in *Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy*[15]. The Mayor's main programme for delivering the skills and experience necessary in this area is the Low Carbon Employment and Skills Programme, which is made up of a number of projects that will ensure Londoners are able to secure sustainable employment within the low-carbon economy, including:

- assessing the employment and skills required to support the low-carbon sector in London
- creating jobs through the Mayor's climate change programmes
- working in partnerships to identify the requirements for low-carbon skills training and employment support.

Proposal 3.1 Work to attract new investment for waste infrastructure in London

As described above, the public sector needs to provide strategic investment to overcome the market failures that are preventing new waste infrastructure development in London, particularly in the treatment of London's C&I waste.

Action 3.1.1

The Mayor will invest in the development of waste infrastructure in London through two key routes: the LWARB Infrastructure Fund and the London Green Fund. Each of these two funds will help to lever investment into large-scale, Londonwide programmes to help develop and attract private sector investment to new waste infrastructure capacity in London.

The LWARB Infrastructure Fund

From 2009 to 2011, the LWARB had a total investment fund of £58 million available from DEFRA and the GLA Group to help provide financial support for waste infrastructure and campaigns, brokerage support and to help to bridge the gap between the Mayor's strategies for waste and their implementation. At least another £18 million is available for the period 2011 to 2014.

As part of its total investment fund of £58 million, the LWARB allocated £21 million to help develop waste infrastructure from a preferred pool of projects. This £21 million Infrastructure Fund supports a portfolio of projects that, by 31 March 2015, will:

- divert over 500,000 tonnes of waste from landfill each year
- save over 3m tonnes of CO_2eq over the lifetime of the projects
- create approximately 150 jobs within London[16].

More information about the LWARB is contained in Box 3.2.

The LWARB

The LWARB was established by the GLA in 2007 to promote and encourage a reduction in the waste produced, an increase in reuse and recycling and an increase in the use of methods of collection, treatment and disposal that are more beneficial to the environment in London. The LWARB's remit covers all waste streams (LACW, C&I waste and CDE waste) and it seeks to achieve its objectives through the provision of three key services:

- A £76 million fund* to provide financial support for waste infrastructure and communications campaigns. The fund is administered by an eight-member board and three programme-specific committees (an investment committee, an audit committee and a flats recycling programme committee).
- A brokerage and project development service that aims to bring together waste producers, site owners, London boroughs and energy users to provide new sites for waste infrastructure. It will provide expertise, funds and contacts to help develop waste projects to meet its priorities.
- A role as a best-practice co-ordinator to provide a knowledge and data management centre helping interested parties to bridge the gap between strategy and implementation.

For each year during the life of the fund, the LWARB must prepare a business plan that sets out its priorities and methods for disbursing any funds at its disposal. Funds will be distributed by way of grants, loans, guarantees, equity participation and other financing vehicles to the following types of project:

- waste infrastructure or technologies that significantly reduce CO_2eq emissions and divert waste from landfill, including reuse infrastructure, manufacturing infrastructure for reprocessing recyclate into new materials, recycling, composting and anaerobic digestion facilities and new and emerging advanced thermal treatment or chemical conversion technologies
- projects that contribute towards district heating networks and connections to maximise combined heat and power opportunities
- awareness campaigns to target specific community sectors and convey broad messages about waste reduction, reuse and recycling, delivery of which will be via the Recycle for London campaign (as discussed in Policy 1).

For more information about the LWARB, visit www.lwarb.gov.uk.

*£58m from 2008 – 2011 and £18m from 2011 – 2014

The London Green Fund

The London Green Fund is the London component of the JESSICA (Joint European Support for Sustainable Investment in City Areas) initiative developed by the European Commission and the European Investment Bank in collaboration with the Council of Europe Development Bank. JESSICA allows member states of the EU to invest a proportion of their EU grant funding to make repayable investments in projects, thereby creating a revolving investment fund for funding the regeneration of urban areas.

The London Green Fund is a separate funding stream from the LWARB Infrastructure Fund, so potential project sponsors may apply for funding from both streams.

The London Green Fund

The London Green Fund operates as a revolving fund for making repayable investments in environmental infrastructure projects and programmes that contribute

to tackling climate change through the development of new waste infrastructure, decentralised energy and energy efficiency schemes. It will provide equity, loans or guarantees – not grants - to projects and any return on investments will be reinvested in environmental projects.

Relative to commercial markets, the London Green Fund has the flexibility to take a longer-term view of the scale and timing of financial returns expected from investments, particularly in the current economic climate. Once projects have demonstrated a track record and financial return the London Green Fund will be able to realise its original investments, in part or in full, for re-investment in a similar activity.

The London Green Fund has been set up with an initial fund size of £100m. The Mayor has provided half of this, with £32 million provided by the LDA and £18m provided by the LWARB. These contributions were matched by £50m funding from the European Regional Development Fund (ERDF). The London Green Fund has separate Urban Development Funds (UDF) for its two initial priority areas – waste and energy efficiency. Each UDF will be managed by an external fund manager to ensure full project analysis from both a financial and environmental perspective prior to investment. The process allows the Mayor, the GLA Group and the LWARB to determine the strategic objectives of the fund and its investment criteria while the independent fund manager ensures that the fund itself is focused on investment and delivery.

The £18m LWARB contribution has been matched by £18m funding from ERDF to form a distinct £36m Waste UDF to be invested solely in the waste sector.

Foresight Group have been selected as the fund manager for the Waste UDF. The UDF, now called the Foresight Environmental Fund, was launched in March 2011 and is open for business. Foresight Group have already committed to securing an additional £36m of private capital to increase the size of the Waste UDF to at least £72m. This demonstrates how public funds from London and Europe are not only being invested in ways that ensure they can generate returns to be reinvested, but are also being leveraged at UDF and at project level to bring private sector finance into the waste sector in London.

CASE STUDY 3.1
Biossence Gasification Facility, East London

Biossence Ltd was established in 2006 to develop, build, own and operate energy generation facilities using the gasification advanced thermal treatment technology.

Biossence's first plant, the East London Sustainable Energy Facility (ELSEF), will process 98,000 tonnes per year of solid recovered fuel (SRF) derived from local LACW sources. The SRF will be provided under a long-term fuel supply contract from the nearby Frog Island mechanical biological treatment facility, which is operated by Shanks East London under a 25-year private-finance initiative (PFI) contract with the East London Waste Authority.

The facility will generate 18-20 megawatts of electrical power and around 10 megawatts of thermal power. A small amount of power will be used to meet the facility's own needs and the balance exported to the National Grid.

CASE STUDY 3.1 Biossence Gasification Facility, East London – an artist's impression.

The LWARB is providing around £9 million in financial assistance on a commercial basis that will facilitate construction of the £80 million facility. The LWARB's funding will be used to underwrite technology development for the facility to help attract private sector investment into the project.

Biossence also has planning permission for a 400,000 tonne gasification plant near Liverpool and is developing a pipeline of other projects around the UK and abroad. For more information visit www.biossence.com

Proposal 3.2 Facilitate business partnerships to help catalyse development of waste infrastructure in London

Every tonne of food waste that goes to landfill results in a significant amount of CO_2eq emissions: 297kg on average. Food waste reduction is the ideal solution to eliminating such harmful emissions. Where this is not possible, the next best solution can be to turn this waste into compost or energy using appropriate industrial processes. This can achieve significant results: for example, every tonne of food waste treated via anaerobic digestion to generate electricity can result in 83 kg of CO_2eq savings compared with current UK electricity generation (which is produced mostly using fossil fuels), and 380kg of CO_2eq savings when compared with sending the waste to landfill[17]. Composting a tonne of food waste rather than sending it to landfill can result in 344 kg CO_2eq reduced.

Action 3.2.1

The Mayor will use the Food Waste to Fuel Alliance Programme to take a sector-specific approach to the development of at least five exemplar food waste treatment infrastructure projects in London.

The Food Waste to Fuel Alliance is a brokerage service that seeks to bring together technology providers, energy companies and food waste producers in cross-sector partnerships that can deliver economies of scale, increase value for money and share some of the risk involved in developing new food waste treatment infrastructure[18]. Working closely with the LWARB, the alliance is creating partnerships for the development of an infrastructure for anaerobic digestion, used cooking oil processing and other fuel or energy producing projects, for which there is plenty of opportunity in London. The alliance is made up of a number of representatives from the GLA Group, including the GLA, the LWARB, TfL and Capital Growth. Businesses involved in this programme to date include British Airways, BAA, Sainsbury and Keystone Distribution. The alliance aims to support food waste treatment infrastructure projects with one or more of the following objectives:

- contributing to decentralised energy (heat and power) networks
- providing renewable transport fuel (bio-fuel and hydrogen).
- providing compost for local use, linked to the Mayor's Capital Growth Programme that promotes community food schemes in London.

As of May 2011, several exciting projects are in the early stages of development by alliance members. One is a food waste-to-biojet fuel project by British Airways and their partners Solena, where at the time of writing, site negotiations and technical evaluation work were underway. If this project is successful, over 16 million gallons of fuel could be produced per year, enough twice over to fuel all of British Airways' flights from London City Airport.

A second project, in the very early stages of development, is a used cooking oil collection and processing service by Addison Lee, a

London-based courier and taxi company. A recent study for the London Borough of Camden concludes that biodiesel from used cooking oil provides a very high level of greenhouse gas savings compared to other transport biofuels[19], and the Mayor is very supportive of this idea. The company's ambition is to be able to collect oil free of charge from London businesses, and use the oil produced within one or more of their service fleets.

Other potential projects under the Food Waste to Fuel initiative include various anaerobic digestion projects in collaboration with the LWARB and project developers.

Action 3.2.2

The LWARB will continue to offer a brokerage and project development service that aims to bring together waste producers, site owners, London boroughs and energy users to provide new sites for waste treatment infrastructure.

The service is now open in the form of a web-based system where companies can register their details and interest and look for potential project partners. As of May 2011, 15 companies had registered their interest.

The service will seek to become more proactive over time and provide expertise, funds and contacts to help develop waste projects to meet the Mayor's priorities for improving waste treatment infrastructure in London. The LWARB will seek to develop project partnerships bringing together five principal components: a site operator, a feedstock provider, a technology supplier, off-take users (for heat, power, recyclate or fuel) and finance provision[20].

Action 3.2.3

Work with London boroughs, the GLA Group and the Olympic Park Legacy Company to catalyse development of waste infrastructure in East London as part of the legacy of the 2012 Games.

A commitment was made in the London 2012 bid that, if successful, the 2012 Olympic and Paralympic Games would catalyse waste infrastructure in East London as part of the legacy of the Games. This commitment is being honoured, with several facilities now having been assisted, through Mayoral investment via LWARB, with their plans to locate in East London.

The Olympic Park Legacy Company, in the preparation of the Olympic Park Legacy Master Plan, has identified waste-derived syngas or biogas as one of the most cost-effective means of providing energy to the Olympic Park in legacy to ensure it is a low-carbon development. Discussions are underway with Cofely, the Olympic Park energy centre operators, about the technical potential for this to happen. Discussions are also underway with local authority partners to identify a site for the gas-producing facility.

Proposal 3.3 Improve the knowledge base for waste sector investors

Action 3.3.1: Research has been undertaken to produce a catalogue of commercially operating waste infrastructure facilities across the world, to showcase the opportunities for their development in London. The Mayor will publish this catalogue in 2011-12. The catalogue will comprise a series of international case studies of existing commercial or demonstrator plants using anaerobic digestion, gasification or mechanical-biological treatment processes to treat waste.

The facilities selected for inclusion in the catalogue will have been designed and/or operated by a range of different technology providers. The goal of the catalogue is not to

provide an exhaustive list of reference facilities, but rather to identify those technologies that are configured in the most appropriate way for London and to demonstrate that there are a significant number of plants of this nature operating outside of London, in the UK, in other EU Member States and beyond.

Action 3.3.2

As part of its remit to act as a best practice co-ordinator, the LWARB will steer potential investors and other partners towards the relevant knowledge and data sources to help improve understanding of new waste treatment technologies and the level of risk associated with such technologies, particularly advanced thermal treatment technologies, such as gasification and pyrolysis. The LWARB will also help to identify and bring together the parties with the existing strengths, skills, knowledge and experience necessary to bring new waste infrastructure to market with the minimum level of risk.

Proposal 3.4 Identify additional opportunities for development of business waste infrastructure

Through the work of the LWARB and the GLA Group, the Mayor is developing a series of tools that will enable potential investors in the waste sector to identify opportunities with the potential to increase the value, and lower the risk, of the investment to be made. These tools should assist with site selection and assessment and help to identify co-location efficiencies and options for secondary and tertiary processing.

The Mayor, particularly, is targeting a significant increase in the proportion of energy generated from renewable sources within London. Energy generation using advanced thermal conversion technologies is considered to be one of three main opportunities to increase renewable energy generation in London, alongside large-scale, biomass heat and power and wide-scale deployment of small and medium-scale renewable heat and power technologies (such as photovoltaic panels, solar thermal systems and heat pumps).

The Mayor is supporting the development of a market for heat, as well as regulatory reform of the electricity market to support access for decentralised energy generators. The Mayor is doing this by:

- enabling the identification and development of decentralised energy opportunities
- delivering decentralised energy through the planning system
- enabling the commercialisation of the decentralised energy market.

The Mayor will progress with several initiatives in this direction, including ensuring funding is available via the London Green Fund, continuing to host the London Heat Map and helping project development via the Decentralised Energy Masterplanning Programme (DeMAP).

Decentralised Energy Masterplanning Programme

In 2008, decentralised energy contributed around 2.5 per cent of the overall supply of energy in London. EU and national policies are geared towards moving to low- and zero-carbon sources for supplying electricity via the national grid, and the Mayor has set a target to generate 25 per cent of London's energy from decentralised sources by 2025.

Decentralised energy is defined as low-carbon electrical power or heat generated and delivered within London. The primary opportunity in London is for low- and zero-carbon heat networks fed by combined heat and power (CHP) systems at a range of scales. These systems can be fed by a mix of

Table 6 Projected commercial and industrial waste infrastructure capacity gap for London at 2015, 2020 and 2031 ('000 tonnes)

Facility Type	2015	2020	2031
Materials Reclamation Facility (MRF)	1,835	2,259	2,282
Composting and Anaerobic Digestion	648	819	880
Mechanical-Biological Treatment	542	505	1,904
New Energy Generation	338	238	1,175
Thermal Treatment	361	302	479
TOTAL	**3,724**	**4,123**	**6,720**

Notes:
Anaerobic digestion (AD) element includes source-segregated AD capacity and back-end capacity required after mechanical-biological treatment (i.e. for non-source segregated organic waste). Mechanical-Biological Treatment: Based on all waste inputs to the mechanical-biological treatment process.
New Energy Generation is back-end thermal treatment capacity required for refuse-derived fuel produced following mechanical-biological treatment of waste. Thermal treatment: Excludes thermal treatment capacity required for refuse-derived fuel produced following mechanical-biological treatment of waste.

energy sources, including waste derived fuels. Waste heat from residual waste processing facilities can be distributed using a heat network infrastructure to provide low-carbon heat to neighbouring homes, public buildings and businesses. This will enable new and existing developments to meet tighter CO_2eq reduction requirements and contribute to London's climate change mitigation targets.

The Decentralised Energy Masterplanning Programme (DEMaP) is a resource designed to facilitate and accelerate delivery of decentralised energy projects across London and help London boroughs and the commercial sector to produce local heat maps and energy masterplans. Decentralised energy projects and district heating networks require extensive and complex infrastructure and long development timescales, but they can provide heat and power in a low-carbon way, and can offer a return on investment. Decentralised energy masterplans can identify opportunities, provide technical feasibility information and help make the business case for projects, to enable viable projects to gain funding. As of May 2011, 24 boroughs have received DEMaP support.

More information about the DeMaP programme is available from www.londonheatmap.org.uk/Content/home.aspx.

Action 3.4.1

The GLA and the LWARB are working together to identify the potential capacity gap between LACW and C&I waste infrastructure required in London and known projects under development. It is estimated that there may be a shortfall in waste infrastructure capacity for C&I waste of around 3.7 million tonnes in 2015 rising to 4.1 million tonnes in 2020 and 6.7 million tonnes in 2031 if no new infrastructure is developed within this time period[21].

Table 6 provides a breakdown of the estimated level of capacity required for different types of C&I waste infrastructure. This is based on projected C&I waste arisings for each of the

years 2015, 2020 and 2031, and projections for the capacity of existing and planned facilities. The GLA and LWARB's work in this area, to be completed in 2012, will help to identify waste infrastructure requirements in London in more detail, including the extent and geographic location of infrastructure required. The outcomes will also be used to inform the decision-making process of the LWARB, in considering which projects should be offered assistance. The information is also being used as part of a web-based Geographic Information System (GIS) tool developed by LWARB in conjunction with the GLA Group, further details of which are provided in Action 3.4.2.

Action 3.4.2

LWARB has worked with the GLA Group to develop the London Waste Map which is a Londonwide web-based GIS map of London's waste infrastructure. The system maps the main opportunities and constraints for the future development of waste infrastructure in London and will help to identify the best areas for this development. The Mayor will seek to increase awareness and use of this important resource and keep it updated, to help London's waste industry operate as efficiently as possible in establishing locations and finding partners.

The London Waste Map is now publicly available to registered users and uses work already undertaken within the GLA Group on mapping London's brownfield sites and heat and power networks. More information about London's heat networks is provided in Box 3.6.

The London Waste Map includes:

- existing waste arisings for both LACW and C&I waste
- existing and proposed waste management facilities
- brownfield sites
- Strategic Industrial Land identified in the *London Plan*
- existing and proposed heat and power networks (the London Waste Map is complementary to the London Heat Map)
- potential demand for off-takes, including heat, power, recyclate and fuel
- transport infrastructure networks
- planning boundaries and strategic planning areas, including, for example, strategic industrial and employment locations, Opportunity Area Planning Frameworks and the Green Enterprise District.

Constraints mapped include:

- environmental and heritage interactions, such as Sites of Special Scientific Interest (SSSI) and listed buildings
- human interactions, such as proximity to housing
- physical interactions, such as ground conditions and the flood risk.

The London Waste Map

The London Waste Map provides a Londonwide GIS of all of London's waste management infrastructure and, by mapping the opportunities and constraints, helps users to identify opportunities for waste infrastructure development, industrial symbiosis and closed-loop waste solutions. Some non-mapped information is also provided as part of the GIS, relating to waste collection and disposal contracts in London, contact information and links to specific waste policies.

The London Waste Map helps the LWARB in its aspiration, set out in its 2010/11 Business Plan, to act as a 'best practice coordinator – working with aligned organisations to create a knowledge and data management centre along with best practice positions (such as project structuring and contracting)'. This map will contribute to the knowledge needed

Screenshot of London Waste Map showing waste sites, waste site applications and electricity network infrastructure. © London Waste & Recycling Board *(data sources are listed on the London Waste Map)*.

for decision-making in the area of waste infrastructure development.

The London Waste Map is publicly accessible at www.londonwastemap.org.

CASE STUDY 3.2
Thames Gateway Heat Network

The idea of the Thames Gateway Heat Network is to create an area-wide (large-scale) decentralised energy scheme, demonstrating how multiple heat generators could supply low-carbon heat to multiple consumers in the future. Located within the Thames Gateway, Europe's largest regeneration area, the Thames Gateway Heat Network would involve the construction of a 23km transmission network capturing low-carbon and renewable heat from a number of heat generating facilities, including some of the new waste treatment facilities planned for development in East London. The concept behind this approach is that heat could be delivered to a variety of buildings within the London Thames Gateway, giving CO_2eq savings of an estimated 100,000 tonnes of per year.

More information about the Thames Gateway Heat Network vision can be found in the Mayor's report, *Powering Ahead: delivering Low-Carbon Energy for London,* available at http://legacy.london.gov.uk/mayor/publications/2009/docs/powering-ahead141009.pdf, and at www.ltgheat.net/.

Proposal 3.5 Facilitate the delivery of waste infrastructure through the strategic planning process

Local planning authorities have a responsibility to identify land for the purposes of waste management but there are still major uncertainties around the planning process, which act as a substantial constraint for the development of 'merchant' waste infrastructure facilities (those that are able to deal with the ad-hoc waste from businesses that is not covered by long-term contracts). The Mayor proposes to assist the planning process and enable ease of co-location with industry that can make use of off-takes, such as heat and power, recyclate and fuel.

Action 3.5.1

The Mayor will promote the clustering of businesses involved in the waste and low-carbon sectors to create areas of sectoral strength and opportunities for innovation and partnership working. The capital now has a range of emerging geographical clusters that are specialising in waste and other low-carbon industries, including the Green Enterprise District and Sustainable Industries Park. Not only do these areas provide an opportunity to support the development of waste infrastructure in its own right but they are an ideal place for the clustering of other facilities in this sector, leading to the development of integrated resource-recovery parks.

The Mayor has also identified, in his *London Plan*, a series of 33 Opportunity Area Planning Frameworks (OAPF), which he will use to identify and facilitate strategic, cross-borough opportunities for development, including those for waste management. OAPFs allow for a greater degree of planning and co-ordination than would otherwise be realised if an area was developed on a site-by-site basis. This provides an opportunity to integrate waste and decentralised energy infrastructure with complementary light industrial activities.

Complementary activities include those that require low- and high-grade heat for light industrial, commercial or recreational activities and industrial and manufacturing industries

requiring raw materials. Plastics reprocessing is particularly suited to London due to the light industrial nature of the process and the need to reduce transportation (plastic is light and the transportation cost per tonne relatively high). Manufacturing industries that can utilise reprocessed plastics are, therefore, well suited to development within integrated resource recovery parks.

The Mayor will ensure that waste treatment opportunities are fully considered for these areas, with a view to establishing green industry parks and district heating opportunities throughout London.

The Green Enterprise District

Located in the heart of the Thames Gateway regeneration area, the Green Enterprise District is a flagship initiative that aims to attract organisations that are active in the Low Carbon and Environmental Goods and Services sector, particularly those in waste management and low-carbon energy generation. By doing so, the Green Enterprise District aims to capture some of the economic benefits of this growing sector for London. The waste management sector, for example, has been identified as a key employment sector within the Green Enterprise District Framework, which aims to create up to 6,000 jobs overall.

The Green Enterprise District covers the six East London boroughs of Hackney, Tower Hamlets, Newham, Waltham Forest, Barking and Dagenham and Havering and contains the largest concentration of protected industrial land use in London. These sites are typically located alongside the River Thames and inland canals and wharves.

The Green Enterprise District initiative aims to:

- attract green enterprise to East London
- stimulate demand for green infrastructure and a de-carbonised energy supply
- position East London at the forefront of low-carbon innovation, by making use of industrial symbiosis and sustainable industries parks
- maximise the potential of green and open spaces and the District's waterways.

As of May 2011, a significant amount of low-carbon activity has been generated in the Green Enterprise District. Siemens are building their global sustainability pavilion in the Royal Docks, which will showcase cutting-edge environmental technologies to the public. A 'temporary use' competition has been conducted for various sites, and one of the winners is looking to develop a community-based waste reuse and recycling initiative. The Royal Docks area has been granted 'enterprise zone' status by central government – 125 hectares of land in the Royal Docks will benefit from the measure, where reduced business rates and other regulatory concessions will be implemented over five years to boost external investment in the area.

All of this activity is in addition to the new waste infrastructure being developed in the area, described elsewhere in this document, including in the Sustainable Industries Park (see box below).

CASE STUDY 3.3
Examples of waste facilities in the Sustainable Industries Park

Closed Loop

Closed Loop Recycling is the world's first food grade PET and HDPE plastic bottle recycling plant, capable of taking 35,000 tonnes of recovered plastic bottles, including milk and

soft drink bottles, and turning them back into recycled raw material for new food and drink packaging. The plant diverts a significant amount of waste from both landfill and export reprocessing. Using the recycled plastic to make new bottles can reduce the carbon footprint of the bottles by up to 25 per cent.

The first customers to purchase recycled food grade plastic from the plant include Britvic, Marks & Spencer and Solo Cup Europe. Using cutting-edge technologies, Closed Loop Recycling turns the waste that may have been previously exported to developing countries at low value, or discarded into landfill, into new material suitable for food and drink packaging. This creates a circle of constantly recycled plastic and fits the 'Closed Loop' philosophy.

Closed Loop Recycling, which is also part of the 25-hectare Thames Gateway Sustainable Industries Park, has already announced its expansion within the UK demonstrating its position as a leader in high-grade plastics recycling. More information about the Sustainable Industries Park can be found at www.closedlooprecycling.co.uk/ and www.londonsip.com.

Thames Gateway Power

In July 2010, Thames Gateway Power, a subsidiary of Cyclamax, was granted planning permission for the development of a gasification facility at the Sustainable Industries Park by the London Thames Gateway Sustainable Development Corporation. This will be used to treat 120,000 tonnes per year of, primarily, non-recyclable C&I waste, serving a main catchment area of seven miles. The facility will generate an estimated 15 megawatts of electricity - enough to power 31,500 homes locally. The plant is due to be operational in 2013 and is expected to provide low-carbon heat, cooling and power to other businesses occupying the Sustainable Industries Park.

It is predicted that the £75 million investment will generate 35 new jobs covering management, technical, engineering, administration and operations roles. It will save an estimated 46,400 tonnes of CO_2eq emissions per year, by diverting waste from landfill and avoiding fossil-fuel use.

For further details about Thames Gateway Power, see www.thamesgatewaypower.co.uk/.

Source: Let's Recycle[22] and Thames Gateway Power[23]

TEG Environmental

TEG, an established green technology company, will use £1.9m loan funding from the LWARB along with other funding to develop a 30,000 tonne anaerobic digestion (AD) plant, the first of its kind in London. The facility will also incorporate in-vessel composting (IVC) technologies capable of processing 20,000 tonnes of organic waste. This technology mix means that the plant will divert up to 50,000 tonnes of food and garden waste from landfill each year.

The facility will turn food and garden waste from London households, businesses and industrial catering companies into organic fertiliser to be used on farms and agricultural land. The plant will also be capable of generating 1 MW of renewable energy for export to the National Grid and TEG is also exploring the potential to export the additional heat produced by the process into local heat networks.

It is expected that the plant will displace over 185,000 tonnes of CO_2eq over the 20- year life of the project, generate power sufficient

CASE STUDY 3.3 The interior from Closed Loop. © Closed Loop Recycling Ltd.

to light 2,000 homes, create eight permanent jobs, and be up and running in 2012[24].

Proposal 3.6 Integrate waste facilities into the urban environment

London needs to make better use of its rivers and canals, particularly for waterborne freight, including waste. This can also provide an opportunity for the waste sector to reduce its own transport-related environmental impacts. Water transport is particularly suited to bulk movements of relatively low value cargoes, including waste and recyclates, and waste and materials associated with construction and demolition activities. In the Olympic Park at Stratford, waterways have been upgraded so that construction material can be transported by water rather than road. There may also be opportunities for CDE waste generated by the proposed Thames Tideway Tunnel project to be transported by water.

The majority of waste transported via water in London is LACW but as new infrastructure is developed, particularly for business waste, there is an opportunity for the waste sector to integrate sustainable modes of transport into their operations at the planning and development stage.

Action 3.6.1

The Mayor will examine opportunities for transporting waste by rail or water. Transport for London will, as appropriate, support businesses to explore opportunities to open up the rail and navigable water network for the transportation of waste, to allow the waste sector to reduce its vehicle mileage and the associated environmental and social impacts, including emissions, air quality, health impacts, noise and dust.

This action supports various elements of the Mayor's Transport Strategy, such as Policy 4 which says 'The Mayor, through TfL, and working with the DfT, Network Rail, train operating companies, London boroughs and other stakeholders, will seek to improve people's access to jobs, business' access to employment markets, business to business access, and freight access by seeking to ensure appropriate transport capacity and connectivity is provided on radial corridors into central London. The Mayor will also explore opportunities to make greater use of the Thames for eastwest passenger and freight transport across the city.'

There has already been some good work done towards transporting waste by rail or water. For example, Transport for London has undertaken research on opportunities on multi-modal refuse collection vehicles (MMRCVs). These vehicles are effective as part of a waste collection and transportation system combining road, water and rail transport modes[25]. Also, businesses are already making use of London's water network for transporting waste e.g. Cantillon, a specialist demolition company, have reduced greenhouse gas emissions from a demolition project in Chamber's Wharf by transporting waste by barge down the Thames[26].

Action 3.6.2

Through Policy 5.17 of the *London Plan*, the Mayor will continue to require that wharves with an existing or future potential for waste management should be identified and safeguarded specifically for that use.

Proposal 38 from the Mayor's Transport Strategy builds upon this safeguarding: 'The Mayor, through TfL, and working with the Port of London Authority, London boroughs and operators, will seek to ensure that existing safeguarded wharves are fully utilised for waterborne freight (including waste), and will examine the potential to increase the use of the Thames and London's canal network for waterborne freight transport.'

Endnotes

1. Low Carbon and Environmental Goods and Services: An Industry Analysis, INNOVAS (2009), BIS, © Crown Copyright 2009.
2. Ibid. Waste management includes construction and operation of waste treatment facilities, equipment for waste treatment, technologies, research and development, consultancy, training and education. Recovery and recycling includes waste collection, engineering and equipment, consultancy training and education, technologies, research and development, feedstock processing and recycling.
3. Ibid.
4. Prospectus for London: The Low Carbon Capital (Detailed Report), Ernst & Young (2009), [Online] available at www.lda.gov.uk/Documents/Prospectus_for_London,_the_Low_Carbon_Capital_5608.pdf (accessed 09 August 2010). Study to understand the wider economic opportunity arising from a low-carbon economy for London.
5. The State of the Nation Report: Infrastructure 2010 (London), Institution of Civil Engineers (2010), available www.ice.org.uk/getattachment/0ca75ad4-f824-48aa-a4b6-601def484ac6/State-of-the-Nation--Infrastructure-2010-brief-(2).aspx (accessed 12 August 2010).
6. Waste Management Sector Report 2008, Catalyst Corporate Finance (2008), available at www.catalystcf.co.uk/uploads/document_assets/bf54c124fa1fd1bf6d7b5039aaff4a1e.pdf (accessed 16 June 2010). The appetite for integrated waste management contracts is illustrated by the volume of transaction deals undertaken by the waste sector across a three-year period from 2004/05 to 2006/07. Integrated waste management deals increased from 9 per cent in 2004/05 to 18 per cent in 2005/06 and 20 per cent in 2006/07. Traditional storage, collection and transportation deals fell from 49 per cent to 29 per cent and 27 per cent across the same time period.
7. Waste Management Sector Report 2008, Catalyst Corporate Finance (2008), available at www.catalystcf.co.uk/uploads/document_assets/bf54c124fa1fd1bf6d7b5039aaff4a1e.pdf (accessed 16 June 2010).
8. Prospectus for London: The Low Carbon Capital (Detailed Report), Ernst & Young (2009), available at www.lda.gov.uk/Documents/Prospectus_for_London,_the_Low_Carbon_Capital_5608.pdf (accessed 09 August 2010).
9. Ibid.
10. The Intergovernmental Panel on Climate Change (IPCC) is a body of scientists from over 130 countries including over 2,500 scientific expert reviewers, 800 contributing authors and 450 lead authors. In November 2007, the IPCC published its Fourth Assessment Report that concluded that warming of the climate system is unequivocal and that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the increase in man-made greenhouse gas concentrations.
11. UK Landfill Methane Emissions Among Highest in Europe, Reynolds R (2010), available at www.mrw.co.uk/news/uk-landfill-methane-emissions-among-the-highest-in-europe/8601196.article (accessed 17 June 2010).
12. In aligning his strategies on municipal waste management and climate change mitigation and energy, the Mayor proposes that all of London's municipal waste used for energy generation should have a carbon intensity less than, or equal to, the source of energy generation it displaces (otherwise known as the 'marginal source' of generation), regardless of the location of the facility. Based on Defra guidance for studies of this nature, and in line with the approach taken in the Waste Strategy for England 2007, the 'marginal' source of generation which is considered to be displaced for the purposes of this study is the combined cycle gas turbine (CCGT) plant. Such facilities are assumed to generate electricity at a carbon intensity of 387kgCO_2 per kilowatt hour (kgCO_2/kWh), and therefore facilities generating energy from London's municipal waste must perform at a level equal to or below this 'floor'. Performance against the 'floor' must therefore be expressed in terms of kgCO_2/kWh (of electricity generated).
13. Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy, GLA (2011), available at www.london.gov.uk.
14. Prospectus for London: The Low Carbon Capital (Detailed Report), Ernst & Young (2009), available at www.lda.gov.uk/Documents/Prospectus_for_London,_the_Low_Carbon_Capital_5608.pdf (accessed 09 August 2010).
15. Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy, GLA (2011), available at www.london.gov.uk.
16. Aggregate of LACW and C&I waste.
17. WRATE 2 emission factors, Environment Agency, 2010.

18. The Food Waste to Fuel Alliance does not deliver any funding to potential projects; it is merely a brokerage service. Projects may submit applications to LWARB for funding through its Infrastructure Fund.
19. Life Cycle Analysis of Road Transport Biofuels, Sustainable Transport Limited (2008), available at http://camden.gov.uk/ccm/content/environment/air-quality-and-pollution/air-quality/research.en?page=5 (accessed 12 May 2011).
20. Consultancy and professional service providers are not permitted to register on the system.
21. Based on GLA unpublished figures.
22. Approval Granted for East London Gasification Plant, Let's Recycle (2010), available at www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=5581&listitemid=55817&section=waste_management (accessed 12 August 2010).
23. Thames Gateway Power (2010) available at www.thamesgatewaypower.co.uk/ (accessed 12 August 2010).
24. London Waste and Recycling Board (2011) available at www.lwarb.gov.uk/releases/item.php?id=40 (accessed 07 April 2011).
25. Transport for London (2008), Developing a Multi-Modal Refuse Collection System for London available at www.tfl.gov.uk/microsites/freight/documents/publications/multi-modal-refuse-system-london-nov-2008.pdf (accessed 02 August 2011).
26. Cantillon, available at www.cantillon.co.uk/New%20PDFs/Demolition/Chambers%20Wharf.pdf (accessed 02 August 2011).

POLICY 4
DRIVE IMPROVEMENTS IN RESOURCE EFFICIENCY IN THE CONSTRUCTION AND DEMOLITION SECTOR WHILE CONTINUING TO MAINTAIN THE GOOD LEVELS OF REUSE AND RECYCLING PERFORMANCE ALREADY BEING ACHIEVED

Vision

Building and infrastructure projects within London will consider, at all stages of development from design through construction and maintenance, how to:

- design out waste at source: design out waste that might otherwise be generated during excavation, demolition and construction
- drive improvements in resource efficiency: maximise use of reclaimed materials or components with recycled content
- maintain existing reuse and recycling performance of CDE waste in London: design with end-of-life impacts in mind, so that opportunities for reuse, refurbishment and recycling of structures or components are maximised in the future.

Vision to policy

The Mayor will use the planning regime in London and supporting planning guidance to engage developers, architects and designers in looking for the opportunities to design out waste at source and improve the overall resource efficiency of buildings and infrastructure projects.

The planning regime will also be used to ensure that developers and their contractors make plans to maximise the opportunities for reuse and recycling of waste that might be created, so that London's good reuse and recycling performance in CDE waste can be maintained. To support this, the Mayor will work with partners, such as the LWARB, to help fund delivery of the necessary infrastructure for CDE waste reuse and recycling, if possible. The Mayor will also encourage the adoption of exemplar materials and waste management practices adopted for major development projects such as the Olympic Park.

Policy to action

- **Proposal 4.1:** Use policy and regulatory requirements to encourage designing out waste at source and drive resource-efficiency improvements.
- **Proposal 4.2**: Engage developers, architects and designers in taking a leading role to design out waste at source.
- **Proposal 4.3**: Support London's construction and demolition sector in raising existing levels of reuse, recycling and composting.

The CDE waste stream in London is already achieving high levels of reuse and recycling. While there is a need to help maintain and increase this level of waste management performance, greater emphasis is required in specific areas, such as reducing the overall quantity of CDE waste generated in the first place; reducing 'downcycling' of construction wastes such as converting unused bricks and blocks into aggregates; and increasing reuse within the industry. The Mayor's policy proposals for the CDE waste stream are focused on driving improvements in resource efficiency by designing out waste at source, and by promoting best practice in reuse and recycling of all materials.

The construction industry is both the UK's largest user of natural resources and the largest producer of waste. WRAP estimates that, each year, around 400 million tonnes of material is used and 120 million tonnes of waste is

generated, equivalent to one third of the UK's waste arisings[1]. WRAP has also identified within its 2008-2012 business plan that there is a need to tackle high levels of resource consumption and wastage within the sector.

In London, CDE waste arisings are estimated to be 9.7 million tonnes per year, with reuse and recycling levels of 82 per cent being achieved[2]. This level of reuse and recycling performance has been driven by flagship projects leading the way such as the Olympic Park, and by developments in waste policy and regulation affecting the construction sector within the last few years. In particular, the Strategy for Sustainable Construction[3], which contains a voluntary target to halve waste to landfill, and the Site Waste Management Plan Regulations 2008 have had an impact on this sector.

While these measures have been successful in driving more effective management of CDE waste, the Mayor considers that there is still room for improvement for London's CDE sector, which could make a valuable contribution to London's economic and environmental sustainability. Ultimately, the Mayor aims for London's construction sector to reduce its resource consumption and use of virgin building materials by:

- using resource-efficiency tools to enable designers and architects to reduce waste at source and optimise use of reclaimed and recycled materials, making use of materials found on-site and sourcing new components containing a specified level of recycled content
- using procurement processes to drive resource efficiency in the supply chain and set targets for on-site waste management
- limiting product damage and lowering material wastage rates through use of construction consolidation centres, just-in-time deliveries, improved ordering procedures and better component and materials storage.

Designing out waste at source and driving improvements in resource efficiency

Designing out waste at source and driving improvements in resource efficiency reduces the environmental impacts associated with production of new materials, including waste and carbon emissions generated during the extraction and manufacturing processes. WRAP's *Reclaimed Building Products Guide*, for example, details the carbon and overall environmental impact savings that can be achieved for a range of construction materials when substituted with reclaimed materials or products, often at little or no additional expense[4].

Financially, WRAP estimates that £1.5 billion is wasted in unused materials, as a result of over-ordering, poor storage or damage to materials while in transit or on-site[5]. Much of this waste could be avoided with better procurement and materials management practices. These opportunities need to be taken into consideration at the design and planning stage of development where they can be most effectively addressed. To this end, WRAP has developed a range of tools and guidance documents to help clients work with design teams, contractors and the supply chain to ensure that resource efficiency is considered as early on in the design and procurement process as possible[6].

The Mayor's policy approach to CDE waste management is consistent with WRAP's renewed focus on working with designers and architects to design out waste at source. WRAP also plans more work to target the role of smaller businesses, particularly sub-contractors and trades, in improving resource efficiency and halving waste to landfill. Two of WRAP's specific project areas for construction in 2010/11, for example, include developing resource-efficiency plans for manufacturers and raising the profile of resource efficiency in the construction supply

chain[7]. The Royal Town Planning Institute, in its response to the consultation on the *London Plan*[8], has also called for more to be done on waste reduction in the sector, with clear guidance provided for developers.

Maintaining existing reuse and recycling performance of CDE waste

Despite the already high levels of reuse and recycling of CDE waste in London, recent case studies have shown that it is possible to achieve higher levels still of up to 95 per cent, particularly for larger construction projects such as the Olympic Park and Heathrow Terminal 5. With major infrastructure projects such as Crossrail underway and proposed Thames Tideway Tunnel on the horizon, London needs to ensure that city-wide levels of reuse and recycling are improved even further and that high-profile projects continue to set the highest possible standards.

CASE STUDY 4.1
Olympic Park CDE reuse and recycling

The Olympic Delivery Authority (ODA) is responsible for building the venues and infrastructure for the London 2012 Olympic and Paralympic Games. With a commitment to using sustainable design and construction principles, key targets for materials and waste management were developed. These targets were set out in the ODA's Sustainable Development Strategy (SDS) published in January 2007:

- 20 per cent by value of construction materials from a reused or recycled source
- 25 per cent by weight of recycled aggregate for permanent venues and associated Olympic Park wide infrastructure
- 90 per cent of waste, by weight, arising from demolition works to be reused or recycled
- Diversion of 90 per cent of construction waste from landfill through reuse, recycling and recovery.

The design process

Designing out waste has been a fundamental aspect of the ODA's approach to venue development, for both the temporary and permanent venues. Project design teams used WRAP's *Designing out Waste: A Design Team Guide for Buildings and the Design-Out Waste Quantification Methodology Toolkit* to identify quick-win solutions. This produced a number of notable achievements, including:

- use of a new blockwork technique, which incorporated a Y-beam system of windposts, reduced the amount of steel support required, saving £40,000
- bridges and structural frames were prefabricated off site to reduce construction waste
- toilet facilities for the International Broadcast Centre were manufactured off-site and simply lifted into place, which reduced wastage by an estimated 70-90 per cent.

Given the temporary nature of some venues, design for deconstruction has been integrated into the design process to enable a high rate of recovery of materials during disassembly in the post-Games period. Designers have also been encouraged to consider waste-efficient procurement with supply chain contractors.

To date, 38 per cent by value of construction materials have come from a reused or recycled source and 51 per cent (by mass) of recycled and/or secondary aggregate has been used for construction of venues and infrastructure, exceeding both targets set at the start.

Excavation and demolition

Over 1 million cubic metres of excavated soil was cleaned and processed by five on-site soil-washing and stabilisation plants, enabling 86.7 per cent to be reused on site. The Olympic development also reused or recycled 98.5 per cent of demolition materials, by weight, with

a total of eight buildings being dismantled for reuse off site. In order to ensure that materials for reuse were identified prior to demolition, contractors were required to complete a Demolition and Site Clearance Materials Management Plan based on recommendations from the ICE Demolition Protocol and WRAP's Quality Protocol for the Production of Aggregates from Inert Waste. Over 220 buildings were demolished and materials such as granite and concrete kerbs, sandstone paving, lampposts and manhole covers were stored centrally and where possible, reused or recycled on site. Material from the site has also been used as engineering fill and in designs of the Greenway and gabions, diverting waste from landfill.

Waste management

Approximately 98 per cent of construction waste, by weight, is currently being reused, recycled or recovered. This has been achieved by a number of means, including:

- development of a reuse strategy with BioRegional Development Group, whereby excess or unused construction materials are shared with other contractors or donated to local community projects
- on-site crushing of brick and concrete for use in construction
- encouraging contractors to segregate at source and charging extra if mixed skips are collected.

Over 95 per cent segregation rates are being achieved on a number of the London 2012 projects, well above industry standards; and establishing a construction consolidation centre with an on-site compactor has helped to save around 20,000 lorry movements taking waste off-site.

Key benefits

The key benefits of employing such rigorous sustainability criteria to the development of the Olympic Park are:

- the overall carbon footprint of the development has been significantly reduced
- the Olympic Park development can now provide a model for future developments;
- fly-tipping has been reduced through central control of waste on site
- less waste has been sent to landfill.

Targets for both recycled content and construction waste management are currently being exceeded and the Olympic Park is now recognised as an exemplar in the construction industry, setting a benchmark for materials resource efficiency and waste management performance.

Further information is available from the Commission for a Sustainable London 2012's report, *No Time to Waste: A Review of Waste and Resource Management Across the London 2012 Programme*[9].

Proposal 4.1 Use policy and regulatory requirements to design out waste at source and drive resource-efficiency improvements.

Action 4.1.1

The Mayor will revise the *London Plan's* Supplementary Planning Guidance (SPG) on Sustainable Design and Construction to contain up-to-date best practice requirements for achieving sustainable design and construction with respect to waste prevention and materials resource efficiency on buildings and infrastructure projects. Using the *London Plan* to direct planning requirements at borough level will ensure that sustainable design and construction principles are incorporated by developers into their plans. Planning applications will then need to demonstrate how these design principles will be met.

The *London Plan* and SPG on Sustainable Design and Construction

The *London Plan* is the Mayor's Spatial Development Strategy for London that sets the strategic planning context for the capital. The local plans established by London boroughs should be in *general conformity* with the *London Plan* and its policies. Policies are designed to help guide decisions on planning applications by boroughs and the Mayor. Thus, it is important in establishing resource efficiency and waste management in new developments and in developing new waste infrastructure in London.

The SPG on Sustainable Design and Construction contains additional information to support the implementation of the Mayor's *London Plan* policies on resource efficiency and waste. It contains a list of essential and preferred standards to be used by the Mayor to assess planning applications that are referred to him. These can also be taken into account by local planning authorities, as further material consideration, when considering applications for new developments[10].

The SPG was published in 2006, and some industry standards that were then considered *good*, or *best practice*, might now be the industry norm. One example is the Mayor's preferred materials standard, which states that 10 per cent of the total value of materials used should be derived from reused and recycled content. Now, WRAP's standard, good and best practice levels are set at 10 per cent, 20 per cent and 30 per cent respectively and WRAP has showcased a number of case studies to illustrate what can be achieved (see case study examples at www.wrap.org.uk/construction/case_studies/index.html).

The Mayor intends to update his SPG on Sustainable Design and Construction by 2012 to take account of new industry best practice. His existing essential and preferred standards on materials and waste, which should be considered for new developments, are summarised below. These principles should be taken into account from the design process onwards and throughout the remainder of the development life-cycle.

The Mayor considers that the best way to influence the up-take of sustainable design and procurement principles is through the planning system and the provisions contained within his spatial development strategy, the *London Plan*, and the associated SPG on Sustainable Design and Construction[11].

The SPG on Sustainable Design and Construction sets out the Mayor's essential and preferred standards that should be taken into consideration in the design of major new development. These cover waste reduction, reuse and recycling, use of materials, and design of storage and access to facilitate waste handling operations. His existing essential and preferred standards that are of relevance to materials and waste are summarised in the box below.

The Mayor's essential and preferred standards

Mayor's essential standards[12]

- existing buildings reused where practicable
- minimise use of new aggregates
- minimise, reuse and recycle demolition waste on site where practical
- specify use of reused or recycled construction materials
- by 2010, design for the provision of facilities to recycle or compost at least 35 per cent of household waste by means of separated,

dedicated storage space (in applicable developments)
- reduce waste during construction and demolition phases and sort waste stream on-site where practical.

Mayor's preferred standards[13]
- before demolition, appraisal of maximising recycling of materials by use of ICE's Demolition Protocol
- 10 per cent of the total value of materials used to be derived from reused and recycled content in products and materials selected
- use prefabricated and standardised modulation components to minimise waste or, where this is not feasible, use low-waste fabrication techniques
- by 2015, design for the provision of facilities to recycle or compost at least 60 per cent of household waste by means of separated, dedicated storage space (in applicable developments)
- by 2020, design for the provision of facilities to recycle or compost at least 70 per cent of C&I waste by means of separated, dedicated storage space (in applicable developments)
- incorporate or provide access to new waste recovery facilities to provide a renewable source of energy to new developments.

Action 4.1.2

Through the *London Plan* and SPG on Sustainable Design and Construction, the Mayor will set out the level of information that should be submitted at the planning stage so as to encourage resource efficiency and waste management measures to be considered as early on in the design process as possible. This may be as an initial Site Waste Management Plan Statement in the first instance, to highlight where the opportunities for sustainable resource and waste management are likely to arise within a development.

The Site Waste Management Plan Regulations 2008 came into force in April 2008 and require that a site waste management plan (SWMP) be prepared for all construction projects over the value of £300,000 (excluding VAT). However, there is a disparity between the requirement to prepare a statutory SWMP and levels of checking and enforcement of this requirement by the Environment Agency and local authorities. Research commissioned by WRAP found that 84 per cent of planning permissions for new developments did not require a SWMP to be submitted and only six per cent of those submitted were inspected by local planning authorities as part of a planning application[14].

The requirement to prepare and submit a SWMP alongside planning applications for building and infrastructure projects is not, in itself, a legal requirement. There are, however, economic and environmental benefits to be gained in ensuring that resource efficiency and waste management measures are considered as early on as possible in the design and planning process. A requirement to do this through the planning regime presents an ideal opportunity to achieve this. More information on Site Waste Management Plans is available in Box 4.3.

Studies undertaken by WRAP, consulting firm AEA, BRE, the Chartered Institute of Building, South East Centre for the Built Environment, Constructing Excellence and Envirowise have identified that cost savings, better on-site management of waste and improved legal compliance are the key benefits to be gained from the use of an SWMP[15]. However, to make sure these benefits are realised, all stakeholders in a project need to be aware of their responsibilities and have had the training required to implement the actions in an SWMP. Further awareness by clients, would also help to ensure that SWMPs are prepared earlier in the development project life-cycle so that potential

Figure 11 Site Waste Management Plan steps

Project Stage		SWMP Section
Policy and setup	1	Enter Basic Details ▼
Preparation and concept design	2	Record Waste Prevention Actions ▼
Detailed design	3	Forecast Waste ▼ Record Waste Reduction Actions ▼
Pre-construction	4	Specify Waste Carriers ▼ Plan Waste Destinations ▼ Record Waste Management and Recovery Actions ▼
Construction	5	Enter Actual Waste Movements ▼
Post completion and use	6	KPIs Reporting Sign Declaration

Source: WRAP www.wrap.org.uk/construction/tools_and_guidance/site_waste_management_planning/site waste.html (accessed 09-05-11)

savings from design decisions can be identified and implemented.

More than two-thirds of respondents to the WRAP survey[16] said that designing out waste generated the most cost savings, but WRAP found that only one third of SWMPs reviewed contained actions to design out waste. This suggests that SWMPs are still only being prepared shortly before the construction process begins when most of the opportunity to reduce waste and improve resource efficiency has been lost. Some of the other findings of the WRAP survey were:

- 20 per cent reported that an SWMP was useful in highlighting further resource efficiencies
- 53 per cent reported an increase in the use of recycled materials
- more than half of respondents reported reduced costs as a result of SWMP implementation, with 19 per cent of respondents reporting a cost saving in excess of £10,000
- apart from cost-savings, other benefits identified included improvements in site management, data handling, procurement, project planning and compliance, as well as reduced storage requirements and an increased awareness among staff regarding resource efficiency and waste management
- three-quarters stated that benefits outweighed costs of implementation[17].
-

Site Waste Management Plans

The requirement to prepare an SWMP for all construction projects over the value of £300,000 (excluding VAT) was introduced by the Site Waste Management Plan Regulations

2008. The purpose of the SWMP is to record the amount and type of waste produced during all phases of construction and how that waste should be managed in terms of reuse, recycling and disposal. At the planning stage, an SWMP can be used as a tool to steer the detailed design of the development in a way that minimises waste and identifies opportunities for waste minimisation, reuse and recycling.

Various tools and non-statutory guidance notes are available to assist in the production of an SWMP, including SWMP templates produced by WRAP and the Environment Agency, the BRE SmartWaste Toolkit and the WRAP Net Waste Tool[18]. SWMPs must be updated throughout the duration of the project to record actual types and quantities of waste generated, the management methods employed and any deviations between forecast and actual data.

CASE STUDY 4.2
Site Waste Management Plans in Brighton and Hove

Brighton & Hove City Council has begun tighter regulation of construction sites to ensure that statutory SWMPs are being prepared and implemented on construction sites. The enforcement plans, which came into force on 22 June 2010, involve visits from the council in conjunction with the South East Centre for the Built Environment to local development sites to ensure that they are complying with the SWMP. These enforcement plans are additional to the existing requirements for contractors to file SWMPs along with planning applications[19].

Proposal 4.2 Engage developers, architects and designers in taking a leading role to design out waste at source.

Action 4.2.1

The Mayor will work with partners including WRAP and construction sector bodies, such as CIRIA (The Construction Industry Research and Information Association), BRE and Constructing Excellence, to raise awareness of the benefits and methods of designing out waste in London's new developments.

The concept of designing out waste at source has become pivotal in the construction process[20]. WRAP, for example, has launched two sets of guidance for development design teams on designing out waste in buildings[21] and in infrastructure[22] projects. The first of these two guides, *A Design Team Guide for Buildings*, was launched in conjunction with an international open ideas competition to promote the five key principles that design teams should consider in the design process to reduce waste. The Mayor is keen to capitalise on the success of this initiative for London to ensure that developers, architects and designers are incorporating best practice into their projects. The Mayor will promote best practice by presenting the Olympic Park achievements and the SPG requirements at key events targeted at the design and construction sector.

CASE STUDY 4.3
WRAP Designing out Waste competition

In 2009, WRAP developed a series of new design tools and guidance to help design out waste in buildings and civil engineering projects. These were produced on the basis of five key principles that design teams can use during the design process to reduce waste:

- design for reuse and recovery

- design for off-site construction
- design for materials optimisation
- design for waste efficient procurement
- design for deconstruction and flexibility.

In order to highlight the important role of designers and architects in reducing waste in construction, WRAP launched a Designing out Waste International Open Ideas Competition. Hosted in association with the Royal Institute of British Architects (RIBA), the purpose of the competition was to explore, develop and showcase the ideas outlined in WRAP's designing out waste guide for buildings.

Open to students and qualified professionals of architecture, design and other construction-related subjects, a prize fund of £20,000 was made available to successful entrants, who were required to base their designs on one example taken from a choice of three: mixed-use redevelopment, office development or primary school. In addition to demonstrating the five key design principles, competition entries were also required to consider 'buildability' and the commercial viability of the design.

More information about WRAP's Designing out Waste International Open Ideas Competition can be found at www.designingoutwaste.org.uk/.

WRAP has also prepared a series of case studies and cost-benefit analyses to illustrate how design decisions taken by architects and designers during the development of a building or civil engineering project can be important in reducing the level of waste generated.

An introduction to designing out waste in construction, along with design tools and guidance for use in buildings and civil engineering projects, can be found at www.wrap.org.uk/construction/tools_and_guidance/designing_out_waste/.

Proposal 4.3 Support London's construction and demolition sector to increase existing levels of reuse, recycling and composting.

Action 4.3.1

Help to maximise the reuse and recycling potential of CDE waste through supporting investment in CDE waste infrastructure and raising the profile of London's existing performance levels. A proportion of the funding available from the LWARB will be used to support the development of facilities for CDE waste. This may also include an assessment of the feasibility of developing a trading hub for reused and recycled materials within London, thus providing strategic co-ordination between new sources of supply and reprocessing.

Action 4.3.2

Building on the achievements at the Olympic Park, where at the time of writing, approximately 98 per cent of construction and demolition waste was being reused, recycled or recovered, the Mayor will develop a 'London 2012 Standard' pledge for London's developers and construction contractors, which will contain a commitment to meeting the *London Plan* target of 95 per cent reuse and recycling of CDE waste. This will form part of a wider sustainability commitment for the construction sector that includes procurement of reclaimed materials and/or construction components with recycled content. The Mayor will look at extending the award categories of the Mayor's Green Procurement Code and BBP specifically to reflect this.

The BBP brings together 14 of the largest and most influential commercial landlords in London. They are focused on developing sustainability solutions for their own portfolios but also with the intention of rolling these out to the wider market. Given that the Mayor's policies on new development can strongly influence the way in which London manages its resources and waste, he will look to organisations such as the BBP to continue their work on developing exemplar opportunities in resource and waste management through the estates of member organisations.

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CHAPTER THREE

LEADING BY EXAMPLE, THE GLA GROUP

In addition to its role as a strategic authority, delivering the Mayor's policies and programmes for London, the GLA group has a responsibility as an employer, a consumer of goods and services, and a waste producer itself to demonstrate good practice in procurement, resource efficiency and waste management.

This section sets out how the GLA Group intends to lead by example with respect to the responsible procurement of goods and services, resource efficiency and waste management, illustrating some of the many initiatives currently being undertaken.

All members of the GLA Group have set targets for the reuse, recycling and composting of their waste, with many extending their recycling schemes to collection of food waste. The GLA Group is also leading on reuse initiatives, including repair and refurbishment of existing office furniture and chairs using local companies in London.

Finally, the GLA Group's procurement expenditure amounts to more than £3 billion per year and covers a diverse range of goods and services[1]. Its spending power is such that it is able to drive demand for environmentally sustainable goods and services within its supply chain and its Responsible Procurement delivery plan contains targets relating to low-carbon, resource-efficient and environmentally responsible procurement. In 2010/11, all members of the GLA Group achieved the gold standard in the Mayor of London's Green Procurement Code assessment. The GLA Group has encouraged suppliers to become members of the programme and the Mayor has now established his Responsible Procurement Awards, a competition that is open to suppliers of the GLA Group and GLA staff.

THE GLA

Reuse and recycling

The GLA in partnership with its waste contractor, Bywaters, has developed an innovative waste and recycling programme in City Hall that has resulted in an increase in its recycling rate from 45 per cent in 2006 to 80 per cent in 2010. During this time the GLA has reduced the amount of waste sent for landfill or incineration from approximately 115,000 tonnes per year to 54,000 tonnes a year.

The introduction of a new recycling system in 2007 has seen the removal of individual, under-desk bins and one central, residual waste bin provided instead on each floor. Each floor is also provided with two recycling bins: one for mixed, dry recyclables and one for glass. A separate, kitchen work-top caddy is provided for the collection of food waste at each kitchen-point and additional recycling bins are provided within each photocopier room for the collection of clean, white waste paper.

The success of the GLA's office waste recycling scheme is such that other organisations within the More London Estate, to which City Hall belongs, have come to view the system with a view to implementing a similar arrangement within their own premises.

Chairs and tables that are still in good working condition are reupholstered and refurbished using two local companies in London: Hunters Contracts of Dagenham and Howe UK Limited of Wandsworth.

Managing Food Waste

The GLA has sought to influence best practice waste management at the procurement stage by stipulating that food waste management should be part of the new recycling contract with Bywaters. The food waste collected as

part of the City Hall recycling scheme is sent for composting by the East London Community Recycling Partnership (ELCRP). Founded as a not-for-profit community organisation, ELCRP operates an in-vessel composting system operating in accordance with Animal By-Products Regulations and approved by Defra that deals with food waste, including cooked meat and fish. Some of the compost generated by this process is returned to City Hall and given away to GLA staff for use in their gardens.

Engaging with Employees

An active and highly visible Environmental Champions programme, led by volunteers and endorsed by the Mayor, has been established to promote behaviour change to reduce the environmental impact of the GLA's operations. This includes an inter-floor competition for the most environmentally friendly-floor, with prizes awarded as incentives. Monthly recycling performance for City Hall as a whole is monitored and the results published on the staff intranet.

TFL

Transport for London (TfL) has set targets to recycle 70 per cent of C&I waste by 2017/18 and to reuse or recycle at least 90 per cent of CDE waste over the period to 2017/18. It has achieved very good performance in its procurement of materials as well as its management of station, operational, office and construction waste.

Recycling

London Underground's new waste management process (introduced in May 2010) has seen 73 per cent of waste collected from trains and litter bins in stations recycled. The waste is taken to a Materials Recycling Facility in London, where recyclable material is separated out from other waste before being sent for recycling.

While London Overground accounts for only seven per cent of TfL's C&I waste, the proportion it recycles is at 49 per cent for the second year, having risen there from six per cent. This follows the introduction of newspapers and plastics recycling bins at almost all stations, ongoing recycling efforts during train and station cleaning, and projects at the depots and operator's head office. Mixed recycling bins will also be installed at Victoria Coach Station in the near future.

Last year, London Buses and Dial-a-Ride recycled 100 per cent of their office waste. This includes office waste from staffed bus stations. Regarding passenger waste from London buses, the aim is to achieve recycling rates of at least 80 per cent in the near future.

Construction Waste

Crossrail will use material excavated during construction works to create a large wildlife reserve at Wallasea Island, eight miles north of Southend-on-Sea in Essex. Clay, chalk, sand and gravel will be transferred by ship to the island. The RSPB will then use it to create 1,500 acres (nearly 2.5 square miles) of tidal wildlife habitat. It will form one of the largest new wetland nature reserves in Europe for some 50 years and is expected to support a wide range of waterfowl, saltwater fish and plant species. Development of Wallasea Island, expected to start in 2011, will be the most important coastal habitat creation scheme in the UK.

As London Underground progresses in delivery of its investment programme, opportunities are being taken to reuse and recycle significant amounts of material. Almost all ballast taken from the railway is recycled, over 90 per cent of the Victoria line trains have been recycled as part of the decommissioning programme and over 96 per cent of construction and excavated waste material was recycled and reused from the

project works at Tottenham Court Road in 2010-11. In future, London Underground will look to improve construction and demolition waste management and recycling on smaller projects and maintenance activities; where practical and affordable, this will include identifying opportunities for purchase of recycled materials for projects and maintenance activities.

Last year TfL recycled 98.5 per cent of construction waste arising from maintenance works of the TfL Road Network. A review of waste recycling performance carried out by WRAP found that existing recycling rates are at the leading edge of best practice.

Head Offices

During 2010-11, TfL Head Office staff recycled over 12,000 tonnes of commercial waste – representing some 71 per cent of its total office waste. Additionally, the total amount of waste generated was reduced by 13 per cent on 2009/10 levels.

These achievements were made through a combination of strategic improvements in the way waste is reused by TfL, better access to recycling facilities for Head Office staff and an ongoing occupancy engagement campaign. New buildings are built with recycling facilities in mind – the Palestra and Pier Walk sites both operate bin-sharing environments, where no individual has a personal waste bin and recycling facilities are located in accessible and clear hubs. TfL has also been trialling the roll-out of bin sharing environments in existing building stock with great success – one site has increased its recycling rate from 67 per cent to 87 per cent. The organisation is also investigating the feasibility of food recycling in office kitchens.

Occupants are kept informed of their building's progress via the Head Office Waste and Recycling Leagues, which present information in a clear and obvious way. Additionally, TfL has created dedicated intranet pages that show staff how to reduce, reuse and recycle at work.

MPS

The Metropolitan Police Service (MPS) is the UK's largest police service, serving a population of 7.2 million and covering an area of 620 square miles. The MPS is a large, diverse organisation covering a wide variety of activities, which are undertaken and managed through approximately 52,000 staff, 900 buildings and 5,750 vehicles. In 2010/11, the MPS generated 7,043 tonnes of office waste, of which 52 per cent was recycled – exceeding the organisation's target for 2011 of 50 per cent. Overall, 64 per cent of this waste was diverted from landfill. In 2009/10, the organisation's recycling rate for all wastes generated across the MPS estate, including WEEE, batteries, mobile phones, cooking oil, vehicles, furniture and other unusual waste streams, was 68 per cent. This recycling rate is expected to increase in future.

Waste reuse

In 2009/10, an online swap-shop resource was formally launched across the MPS. Designed originally for Resources Managers, the swap-shop enables unwanted or surplus stock to be redistributed to other MPS sites or departments for reuse. In the 2009/10 financial year, over 2,356 items were redeployed resulting in estimated savings of over £11,000. In addition to this, 22 tonnes of ICT equipment was supplied to external organisations and almost 40 tonnes of clothing were exported to Africa and Eastern Europe for reuse. In 2010/11, at least 95 per cent of construction wastes from new MPS developments have been diverted from landfill (reused off or on site), and the MPS have saved £320,000 by reusing fleet vehicle parts.

The MPS has arranged for delivery of its redundant furniture to 'Waste to Wonder', an organisation that reallocates unwanted goods via schools, groups and charities. This has so far resulted in the removal of 30 tonnes of redundant furniture across the MPS estate. Benefiting organisations include a church in Swindon and a project sending furniture (40 tables and 40 chairs from MPS) to Jamaica. A school in Southampton has also expressed an interest in 80 desks. Further waste amnesties are being conducted throughout the year due to their success.

Recycling Unusual Waste Streams

In addition to standard office wastes, a variety of unusual materials are gathered and recycled. In an innovative scheme, weapons have been melted down to construction-ready steel by an organisation providing materials to a number of construction projects, including the London 2012 Olympic Park. In 2010/11, around 28 tonnes of metals including guns, knives and keys were collected and melted down for new uses, raising an income of £6,470.

The waste from the organisation's mounted branch also continues to be recycled. In 2009/10, around four tonnes of horseshoes were fully recycled, as were around 2,000 tonnes of horse manure and bedding, which were used for soil improvement in arable farms and small-scale allotments in and around Greater London. Fleeces, sweatshirts, metals from badges on police uniforms and body armour have been recycled and put to creative end uses, including seat belts for new cars. In the near future, custody blanket recycling will be introduced, ensuring that even less waste is sent to landfill.

Linking Waste Management and Climate Change

Used cooking oils are collected and converted to a B30 bio-diesel mix (30 per cent bio-fuel and 70 per cent diesel) which fuels vehicles that deliver supplies to the MPS. Over 45,000 litres were collected from the organisation's catering services during 2010/11 resulting in an income to the MPS of approximately £11,000 and a saving of 65 tonnes of carbon emissions in the supply chain. Moving forward, the organisation's new corporate print management strategy will focus on reducing the amount of printing and ICT materials used, resulting in associated energy and waste savings.

Procurement

With a procurement budget of £850 million, Responsible Procurement is a key element of the MPS's overall procurement strategy, in line with the GLA's Responsible Procurement Policy and Action Plan. The waste hierarchy principles 'reduce, reuse, recycle' have been integrated within the MPS's furniture contract to ensure items which can not be reused internally or externally are dismantled and sorted into categories for recycling.

Further information regarding waste and recycling performance will be included in the MPS's Corporate Social Responsibility Report 2010/11, which will be published on the organisation's website at www.met.police.uk/about in September 2011.

LFB

The London Fire Brigade (LFB) is run by the London Fire and Emergency Planning Authority (LFEPA) and is one of the largest firefighting and rescue organisations in the world, serving London's 7.5million residents as well as those who work in, or visit the City. It has a spending power of around £430 million every year and employs some 7,200 people, of whom about 6,000 are uniformed operational staff. The LFB Sustainable Development Strategy and

Sustainable Development Framework were approved in November 2009.

Recycling

In 2010/11, LFB produced 2,236 tonnes of waste and reached an all-time high recycling rate of 57 per cent. This exceeded the organisation's target to recycle 55 per cent of all waste generated from LFB sites by 2011.

The LFB has had an organisation-wide trade waste and recycling contract with Bywaters since July 2008. Waste is separated into three main streams: dry recyclables (paper, cardboard, cans, tins, plastic, cartons/tetra packs), general waste and glass. Presentations to cleaning staff and fire-fighters were undertaken to improve understanding of what could be recycled to enhance recycling rates within the new waste management system; the challenge now is to meet the target of 60 per cent recycling by 2012.

More recently LFB has signed up to WRAP's campaign: Halving Waste to Landfill for construction waste and has set a target of reducing construction waste by 20 per cent by 2013 from its 2010 baseline.

Managing Unusual Waste Streams

Given the nature of its operations, the LFB is required to manage a number of more unusual waste items. For example, the LFB has donated 213 waste hoses, or approximately 3.8 tonnes, to a social enterprise that uses the material to produce handbags, luggage, corporate gifts and belts. The LFB also has a new textiles recycling scheme and in 2010/11, recycled 1.6 tonnes including shoes, boots, station work-wear, undress uniform and sleeping bags and other bedding items such as pillow slips. To date, £1,300 has been donated to the Fire Fighters Charity from profits of sales, and a further £3,000 is expected to be donated in the next year.

Procurement

The LFB is a signatory to the Mayor of London's Green Procurement Code (MGPC), having attained MGPC Gold standard since its inception and most recently being awarded Gold standard again through its 2011 external audit of the previous year's expenditure. LFB has revised its spend on sustainable goods reporting to include areas identified by the MGPC criteria; this now includes larger spend items such as BREEAM excellent construction and those that are not recorded by its Purchase Order Management System (POMS) such as IT and energy efficiency works. In 2010/11, LFB's spend on green products was £7.05m, up from £399k in 2008/09. It is also actively encouraging suppliers to sign up to the MGPC.

Future Activity

Future LFB activities include reviewing the feasibility of introducing a food waste collection from LFB sites as part of the renewal of its waste contract. Early trials towards this have been conducted and have delivered positive results. Work is ongoing to identify new opportunities for recycling through procurement and to reduce waste production.

Endnotes

1. Delivering Value for London: using Procurement to Make a Positive Difference, GLA (2009), available at www.london.gov.uk/rp/docs/value-for-london09.pdf (accessed 30 September 2010).

GLOSSARY

Advanced conversion/thermal treatment technologies: defined by the Renewable Obligation Order 2002 as meaning anaerobic digestion, gasification or pyrolysis technologies used for the treatment of waste. Use of such technologies may require pre-treatment by means such as mechanical biological treatment (MBT) or autoclave to prepare the waste for use.

Aggregates: granular material used in construction. Aggregates may be natural, artificial or recycled.

Anaerobic digestion: biological degradation of organic material in the absence of oxygen, producing biogas (typical composition of which is 65 per cent methane and 35 per cent CO_2) and digestate (liquid and solid), suitable for use as a soil improver.

Autoclave: a steam sterilisation process to treat mixed waste and includes mechanical components to separate out materials suitable for recycling. The heat in the autoclave (up to 150 degrees Celsius) changes the physical characteristics of the waste. This can lead to greater recovery rates of higher quality recyclable materials than with MBT technologies. Autoclave is also known as mechanical heat treatment (MHT).

Biodegradable waste: defined in Council Directive 1999/31/EC on the landfill of waste as meaning any waste that is capable of undergoing anaerobic or aerobic decomposition, such as organic kitchen and green garden waste, and paper and paperboard.

Biomass: defined in the Renewables Obligation Order 2009 as fuel used in a generating station of which at least 90 per cent of its energy content is derived from relevant material (that is to say, material which is, or is derived directly or indirectly from, plant matter, animal matter, fungi or algae).

Biomass waste: materials derived from plant or animal matter including wood, paper, card, and organic waste (food and green garden waste).

Borough/London boroughs: there are 33 London boroughs, administered by borough councils, which are elected every four years. The boroughs are the principal local authorities in London and are responsible for running most local services in their areas, such as schools, social services, waste collection and roads. Local authorities is a more general term for the local areas that run these services; boroughs is a term that generally refers to local authorities in metropolitan areas.

Bring site: a group of containers for the collection of a variety of dry recyclable materials for recycling. Bring sites are located in public spaces, such as in supermarket and station car parks, thereby providing continuous access to users.

Brownfield: any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or used. The land may also be vacant, derelict or contaminated. It excludes parks, recreation grounds, allotments and land where the remains of previous use have blended into the landscape, or have been overtaken by nature conservation value or amenity use.

Business Improvement Districts: a business-led and business-funded organisation set-up to improve a defined commercial area. BIDs provide services in return for a financial contribution and a say in the decision-making process about how these funds should be spent. Financial contributions are collected as levies – in addition to the existing business rates – by the local authority governing a specific BID area.

Business waste: consists of waste from the commercial and industrial sector, and from construction, demolition and excavation activities that is collected by private contractor (that is, not by a local authority).

Capital Growth programme: a partnership initiative between London Food Link, the Mayor of London, and the Big Lottery's Local Food Fund. It is championed by the Chair of the London Food Board Rosie Boycott and aims to create 2012 new community food growing spaces across London by the end of 2012. Capital Growth offers practical help, grants training and support to groups wanting to establish community food growing projects as well as advice to landowners. These new food growing spaces along with existing allotments, city farms and community gardens could be the ideal location for the by-products of composting facilities.

Carbon dioxide (CO_2): a naturally occurring gas comprising 0.04 per cent of the Earth's atmosphere. It is essential to photosynthesis in plants and is also a prominent greenhouse gas. The burning of fossil fuels such as coal or gas, and some waste materials including plastics, releases carbon dioxide into the atmosphere. It is currently the predominant scientific opinion that carbon dioxide emissions are the main cause of global warming, contributing to climate change.

Carbon dioxide-equivalent (CO_2eq): the universal unit of measurement used to indicate the global warming potential (GWP) of greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases. For example, the GWP of methane is 23 times that of CO_2, which has a GWP of 1. Sulphur hexafluoride has a GWP of 23,900.

Combined cycle gas turbine (CCGT) plant: a combined cycle gas turbine (CCGT) plan uses a gas turbine to generate electricity. The waste heat also produced is used to make steam to generate additional electricity via a steam turbine. This last step enhances the efficiency of electricity generation.

Combined heat and power: the combined production of electricity and usable heat. Steam or hot water, which would otherwise be rejected when electricity alone is produced, is used for space or process heating.

Commercial and industrial (C&I) waste: refers to waste from premises which are wholly or mainly for trade, business, sport, recreation or entertainment, as defined in Schedule 4 of the Controlled Waste Regulations 1992.

Composting: the biological degradation of organic materials, such as garden and kitchen waste, in the presence of oxygen-producing gas, where the residue is suitable for use as a soil improver.

Construction, demolition and excavation (CDE) waste: refers to waste from the construction, repair, maintenance and demolition of buildings and infrastructure. It consists mostly of brick, concrete, hardcore, subsoil and topsoil, but it can contain quantities of timber, metal, plastics and occasionally hazardous waste materials.

Digestate: The nutrient-rich residues of anaerobic digestion that can be used as a soil improver or fertiliser.

Dry recyclables: refers to dry materials suitable for recycling including paper, card, metals, plastics and textiles. Does not include organic waste (food and green garden waste).

Embodied carbon: refers to the CO_2 emitted at all stages of a good's manufacturing process, from the mining of raw materials through the distribution process, to the final product provided to the consumer. Depending on the calculation, the term can also be used to include other greenhouse gases.

Emissions Performance Standard (EPS): a requirement that sets specific limits to the amount of pollutants that can be released into the environment. While emissions performance standards have been used to dictate limits for conventional pollutants such as oxides of nitrogen (NOx) this regulatory technique may be used to regulate greenhouse gases, particularly CO_2. The EPS referred to in this document is given in tonnes of CO_2eq emissions per tonne of waste treated. See also definition of carbon dioxide equivalent (CO_2eq).

Energy generation: the generation of energy in the form of heat and/or electric power. Energy generation from waste includes combined heat and power, combustion of landfill gas, and energy generated using gas produced during anaerobic digestion. Energy generation technologies include incineration, gasification, pyrolysis, and anaerobic digestion.

Fly-tipping: the illegal deposit of waste on land.

Gasification: defined by the Renewables Obligation Order 2009 as meaning the oxidation or steam reformation of a substance to produce a gaseous mixture containing two or all of the following: oxides of carbon, methane and hydrogen. Gas fuels produced by this process can be burnt to produce steam or used as a fuel for gas engines to generate energy. The gas fuels can also be used in hydrogen fuel cells to generate renewable energy.

General conformity: A legal term, referring to the way in which statutory documents are complied with by certain parties. In this strategy, the term refers to the relationship between the boroughs and GLA's planning requirements. The GLA Act 1999 (Section 344) introduced the general conformity statutory requirement to London by amending the 1990 Act. Under the new development plan system introduced by the Planning and Compulsory Purchase Act 2004, the requirement for general conformity now applies to Local Development Plan Documents. Section 24(1) of the Act specifies that local development documents must be in general conformity with the spatial development strategy. This means that at the point of adoption, local development documents must be in general conformity with the *London Plan* otherwise section 24(1) is infringed.

Gate fee: also known as the tipping fee, the charge levied upon a given quantity of waste received at a waste processing facility. In the case of a landfill, it is generally levied to offset the cost of opening, maintaining and eventually closing the site. Landfill gate fees may also be inclusive or exclusive of landfill.

GLA Group: The organisations known collectively as the GLA Group - the Greater London Authority (GLA), Transport for London (TfL), the London Development Agency (LDA), the London Fire and Emergency Planning Authority (LFEPA) and the Metropolitan Police Authority (MPA) / Service (MPS).

Global Warming Potential (GWP): a measure of how much a given mass of greenhouse gas, when emitted, will contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of CO_2 (whose GWP is by definition 1).

Global warming: the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century and its projected continuation. Global surface temperature increased 0.74 ± 0.18 °C between the start and the end of the 20th century. The Intergovernmental Panel on Climate Change (IPCC) concluded that most of the observed temperature increase since the middle of the 20th century has been caused by increasing concentrations of greenhouse gases, resulting from human activity such as fossil fuel burning and deforestation.

Greater London: geographical area encompassed by the 32 London boroughs and the City of London, representing most of the continuous built-up area of London and covering 1600 km2.

Greater London Authority (GLA): organisation responsible for carrying out the functions set out in the Greater London Authority Act, including the Mayor, Assembly and functional bodies: Transport for London, the Metropolitan Police Authority and the London Fire and Emergency Planning Authority. There is a clear separation of powers within the GLA between the Mayor – who has an executive role, making decisions on behalf of the GLA – and the London Assembly, which has a scrutiny role.

Greenhouse gases: atmospheric gases that absorb and emit radiation within the thermal infrared range. Increased amounts of anthropogenic greenhouse gases (derived from human activities such as burning fossil fuels and deforestation) are seen as the fundamental cause of the greenhouse effect causing climate change. The main greenhouse gases in the earth's atmosphere are water vapour, ozone, CO_2, methane, and nitrous oxide. In addition to the main greenhouse gases, others include sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons. Although these gases are less prevalent in the earth's atmosphere, they have very high global warming potential. Methane and CO_2 make up about 98 per cent of greenhouse gas emissions from waste activities.

Green industries/sector: the business sector that produces goods or services which compared to other, generally more commonly used goods and services, are less harmful to the environment.

Gross Value Added (GVA): the difference between output and intermediate (or average) consumption for any given sector/industry. That is, the difference between the value of goods and services produced and the cost of raw materials and other inputs which are used up in production.

Hazardous waste: waste that displays one or more of the hazardous properties listed in Annex III of the Waste Framework Directive (2008/98/EC). Waste may be classified as hazardous if it is explosive, highly flammable, toxic, carcinogenic, or ecotoxic (harmful to the environment or an ecosystem).

Household waste: waste collected from residential properties by Waste Collection Authorities under section 45(1) of the Environmental Protection Act 1990. Household waste accounts for approximately four-fifths of London's LACW waste.

Incineration: the controlled burning of waste in the presence of air to achieve complete combustion. Energy is usually recovered in the form of electrical power and/or heat. Plants are generally large-scale, having an annual capacity of 100,000 tonnes or more.

Industrial waste: waste from any factory or any premises occupied by industry (excluding

mines and quarries) as defined in Schedule 3 of the Controlled Waste Regulations 1992 (as amended).

Inert waste: defined by Council Directive 1999/31/EC on the landfill of waste as waste that does not undergo any significant physical, chemical or biological transformation. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health.

Joint European Support for Sustainable Investment in City Areas scheme (JESSICA): an initiative of the European Commission in co-operation with the European Investment Bank and the Council of Europe Development Bank. An independent fund managed by the European Investment Bank that allows EU member states to invest a proportion of EU Grant Funding to make repayable investments in projects, thereby creating a revolving investment fund for the regeneration of urban areas.

Landfill: areas of land used for the deposit of waste, usually in disused quarries or mines. In areas where void space is limited, the practice of land raising is sometimes carried out, where some or all of the waste is deposited above ground and the landscape contoured for restoration purposes.

Landfill tax: a tax paid in addition to landfill gate fees, by businesses and local authorities that want to dispose of waste using a landfill site. It is designed to encourage businesses to produce less waste and to use alternative forms of waste management. There are two rates of tax: £2.50 per tonne for inert waste such as rocks and soil; and a standard rate of £56 per tonne from 1 April 2011, increasing by £8 per tonne each year until at least 2014, when it will be £80 per tonne.

Local authorities: see 'boroughs/London boroughs'.

Local authority collected waste (LACW): this includes all waste under the control of local authorities or agents acting on their behalf. It includes all household waste, street litter, waste delivered to council recycling points, waste from municipal parks and gardens, council office waste, Civic Amenity waste, and some commercial waste from shops and smaller trading estates where local authorities have waste collection agreements in place. Previously this was generally known as municipal waste. Since April 2011, Defra has been using the new term LACW.

London Assembly: directly-elected London regional body comprising 14 constituency members and 11 pan-London members. A component of the Greater London Authority.

London Plan: see Spatial Development Strategy.

London Waste and Recycling Board (LWARB): formally constituted in September 2008 with funding of £73.4 million from both central government and the GLA Group, with the objectives of using that fund in Greater London to promote and encourage a reduction in waste, an increase in the proportion of waste that is reused or recycled, and the use of methods of collection, treatment and disposal of waste that are more beneficial to the environment.

Life cycle assessment (LCA): Life cycle assessment techniques measure the environmental and economic costs and benefits of products and activities (in this case waste) at every stage of its existence, from production

to final disposal. Such techniques can provide a basis for making strategic decisions on the ways in which particular waste can be most effectively managed in a given set of circumstances, for example to reduce costs or greenhouse gas emissions from waste activities.

Material Reclamation/Recycling Facilities (MRFs): a transfer station for the storage and segregation of recyclable materials. Also known as Material Recycling Facility or Material Recovery Facility.

Mayor's Green Procurement Code: The Mayor's Green Procurement Code was launched up in 2001 to support London's businesses and organisations to buy products made from recycled materials. Since its inception, the Mayor's Code aims to increase the procurement of products with recycled content, stimulating the development of markets for recycled materials.

Mechanical Biological Treatment: systems consisting of a mechanical stage, where recyclable and reject material are separated to leave an organic fraction. This fraction is then sent for treatment using composting or anaerobic digestion techniques.

Methane: a greenhouse gas, 23 times stronger as a global warming gas than carbon dioxide. Methane is the predominant greenhouse gas from waste, mostly from biodegradable waste decomposing in landfill. Methane emissions from landfills make up approximately 40 per cent of UK greenhouse gas emissions.

Municipal Waste: See definition of 'Local authority collected waste (LACW)'. Before 2011, LACW was referred to as 'municipal waste'. More information is available online at www.defra.gov.uk/statistics/environment/waste/la-definition/

Non-biomass waste: refers to fossil-fuel based waste materials including plastics, metals and textiles.

Non-household LACW: refers to waste generated through local authority activities including waste from local authority premises, parks and gardens, and waste collected from businesses by local authorities. Non-household LACW makes up about 20 per cent of LACW.

New and emerging technologies: technologies that are either still at a developmental stage or are recently operating at a commercial scale. May include new applications of existing technologies. In relation to waste, these include anaerobic digestion, MBT, autoclave, pyrolysis and gasification.

On-the-go recycling: a way for members of the public (including office workers, tourists and visitors) to recycle as they move around the city, using various easily accessible recycling bins in strategic locations on the streets, in public buildings, at key venues and in work.

Organic waste: biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants.

Pre-treatment: for waste to be considered as pre-treated it must comply with the three-point test for the definition of 'treatment'. Treatment must be a physical, thermal, chemical or biological process, which can include sorting, that alters the characteristics of the waste and does so in order to reduce its volume; reduce its hazardous nature; facilitate its handling; or enhance its recovery. One of the simplest forms of pre-treatment for general waste is categorising a proportion of each waste stream and segregating it for recycling, which could be done either manually or at a sorting facility.

Pre-treatment technologies include mechanical biological treatment and autoclave.

Prevention: minimising the quantity and hazardousness of waste generated. Includes complete avoidance of waste and reduction in the amount of waste generated.

Pyrolysis: defined in the Renewables Obligation Order 2002 as meaning the thermal degradation of a substance in the absence of any oxidising agent (other than that which forms part of the substance itself) to produce char and one or both of gas and liquid.

Recovery: obtaining value from waste through reuse, recycling, composting, other means of material recovery (such as anaerobic digestion) or through energy generation (combustion with direct or indirect use of the energy produced, manufacture of refuse derived fuel, gasification, pyrolysis and other technologies).

Recycling: a recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original purpose (referred to as closed-loop recycling) or other purposes. It includes the reprocessing of organic materials but not energy generation or the processing of materials to be used as fuels or for back-filling operations.

Regional self-sufficiency: managing wastes within the region where they arise. Waste regional self-sufficiency is dealt with in more detail in the *London Plan*, the Mayor's Spatial Development Plan for London.

Renewable Obligation Certificates: certificates issued when electricity is generated from renewable sources. The Electricity Act 1989 requires electricity suppliers to meet a certain percentage of their total sales from renewable sources. Under the Renewable Obligation Order 2002, only plants that generate electricity from biomass will be eligible although the biomass may be a waste. Plants processing wastes must, however, use advanced conversion technologies in order to be eligible, and it is only the biomass component of the waste that will earn Renewable Obligation Certificates or ROCs. Advanced conversion technologies are defined in the Order as anaerobic digestion, gasification and pyrolysis.

Residual waste: a portion of the waste stream that is not reused, recycled or composted and remains to be treated through the recovery of energy and/or materials or through disposal to landfill.

Reuse: any operation by which products or components that are not waste can be used again for the same purpose for which they were initially conceived.

Reuse and Recycling Centres/Civic Amenity Sites: sites operated by local authorities where residents can take their waste for reuse, recycling and disposal.

Solid Recovered Fuel (SRF) – also known as refuse derived fuel (RDF): a fuel produced by shredding and dehydrating solid waste using a waste converter or treatment technology. The fuel is then typically used to generate energy using a thermal treatment facility. SRF consists largely of non-recycled waste including plastics and biodegradable waste. SRF processing facilities are normally located near a source of solid waste and, while an optional thermal treatment facility is normally close to the SRF production facility, it may also be located at a remote location. SRF can be distinguished from RDF in the fact that it is produced to reach a technical and/or emissions performance standard.

Source-segregated collections: recycling collection schemes from homes or businesses where materials for recycling are collected separately from other materials, either by different vehicle or at a different time to the ordinary household or business waste collection.

Spatial Development Strategy: a planning and development strategy, which the Mayor is required by law (under the Greater London Authority Act 1999) to produce. It is generally known as the *London Plan*. London boroughs, in developing their local development documents have to be in 'general conformity' with the *London Plan*.

Thermal treatment: a term given to any waste treatment technology that involves high temperatures in the processing of the waste for the purposes of generating heat and/or power. Thermal treatment is a generic term encompassing incineration, gasification and pyrolysis. See also 'treatment' definition.

Third Sector: voluntary or not-for-profit organisations, charities, and social enterprises. They are given this term as they offer a different way of working that is neither in the public or private sector entirely.

Treatment: Any recovery or disposal operation, including preparation prior to recovery or disposal, such as through the use of mechanical-biological treatment. Treatment involves the chemical or biological processing of certain types of waste for the purposes of rendering them harmless, reducing volumes before landfilling, or recycling certain wastes.

Waste: legally defined by the waste Framework Directive (2008/98/EC) as any substance or object which the holder discards, intends to discard, or is required to discard.

Waste arising: the amount of waste generated in a given locality over a given period of time.

Waste authority: a collective term to include London unitary, collection, and waste disposal authorities.

Waste collection: the gathering of waste from a waste producer and the preliminary sorting and storage of waste for the purposes of transport to a waste treatment facility.

Waste Collection Authority (WCA): the authority responsible for arranging the collection of household waste in their area (in London this is on a borough-wide basis) and commercial and industrial waste on request.

Waste disposal: waste management operation not involving recovery, even where that operation has a secondary consequence in terms of reclamation of substances or energy (such as the recovery of methane from landfill for the purpose of energy generation).

Waste Disposal Authority (WDAs): the authority responsible for arranging the treatment and/or disposal of waste collected in their area by Waste Collection Authorities.

Waste hierarchy: a conceptual model for the management of waste that advocates, in order of preference, prevention of waste, a reduction in the quantity of waste generated, reuse, recycling and composting, recovery of materials and energy (e.g. through anaerobic digestion or advances thermal treatment technologies), treatment without recovery and landfill disposal as a final resort. This is designed to reflect best environmental outcomes for the management of waste.

Waste management: the collection, transport, recovery and disposal of waste, including the

supervision of such operations and the after-care of disposal sites.

Waste management industry: businesses (and not-for-profit organisations) involved in the collection, management and disposal of waste.

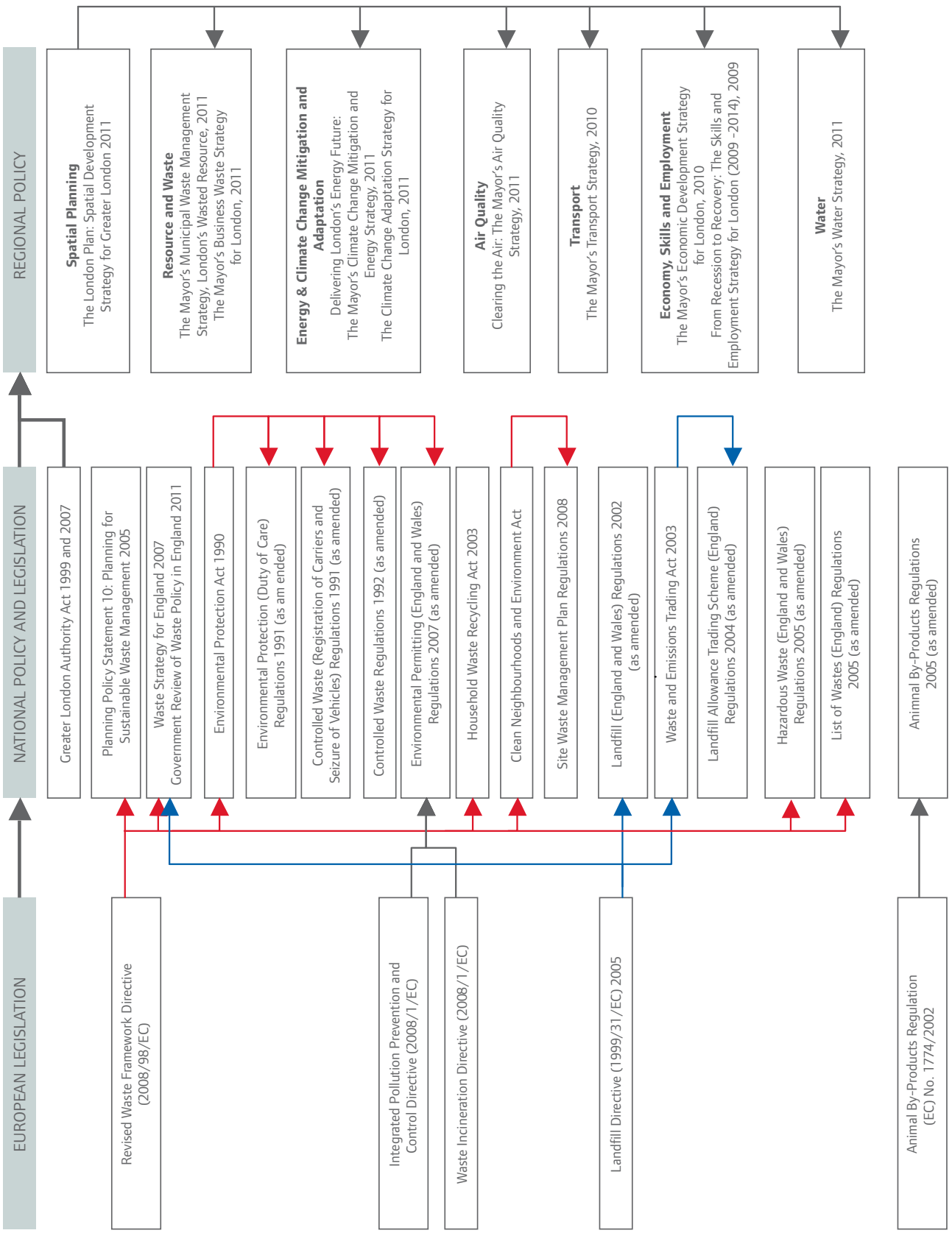
Waste producer: anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste.

ABBREVIATIONS

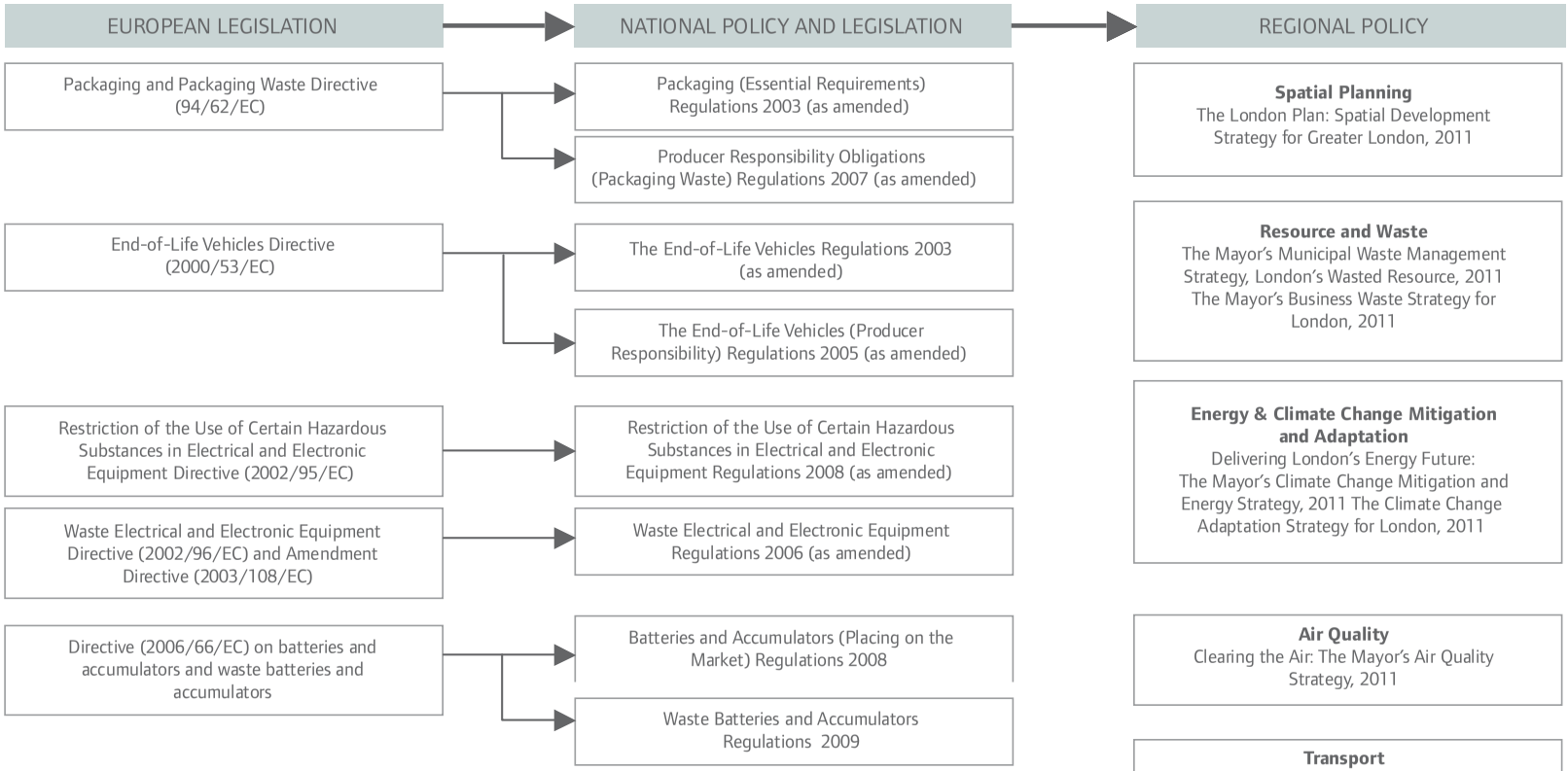
AD	Anaerobic digestion
BIDs	Business Improvement Districts
BIS	Department for Business, Innovation and Skills
BBP	Better Buildings Partnership
CCGT	Combined Cycle Gas Turbine
C&I	Commercial & industrial
CHP	Combined Heat and Power
CDE	Construction, demolition and excavation
CO2	Carbon dioxide
CO2/kWh	Carbon dioxide produced per kilowatt hour of electricity generated
CO2 eq	Carbon dioxide - equivalent
Defra	Department for the Environment Food and Rural Affairs
DEMaP	Decentralised Energy Masterplanning Programme
EA	Environment Agency
ELSEF	East London Sustainable Energy Facility
EPS	Emissions Performance Standard
EU	European Union
GIS	Geographical Information System
GLA	Greater London Authority
GVA	Gross Value Added
HDPE	High Density Polyethylene
ICE	Institution of Civil Engineers
JESSICA	Joint European Support for Sustainable Investment in City Areas scheme
KgCO2 eq	Kilograms of carbon dioxide - equivalent
KWh	Kilo Watt Hour
LACW	Local Authority Collected Waste
LCEGS	Low Carbon and Environmental Goods and Services
LFEPA	London Fire and Emergency Planning Authority
LCRN	London Community Recycling Network
LWARB	London Waste and Recycling Board
MBT	Mechanical biological treatment
MGPC	Mayor of London's Green Procurement Code
MPA	Metropolitan Policy Authority
MPS1	Minerals Policy Statement 1
MPS	Metropolitan Police Service
MRFs	Materials Reclamation / Recycling Facilities
MSW	Municipal Solid Waste
OAPF	Opportunity Area Planning Framework
ODA	Olympic Delivery Authority
PET	Polyethylene Teraphthalate
PFI	Private Finance Initiative
PPS10	Planning Policy Statement 10
ROCS	Renewable Obligation Certificates
SDS	Sustainable Development Strategy
SME	Small to Medium-Size Businesses
SPG	Supplementary Planning Guidance
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
TfL	Transport for London
UDF	Urban Development Fund
WDA	Waste Disposal Authority
WEEE	Waste Electrical and Electronic Equipment
WRAP	Waste Resources Action Programme
WRATE	Waste and Resources Assessment Tool for the Environment

APPENDIX ONE

LEGISLATIVE FRAMEWORK FOR MANAGING LONDON'S BUSINESS WASTE



STRATEGIC DIRECTION


EUROPEAN LEGISLATION
NATIONAL POLICY AND LEGISLATION
REGIONAL POLICY
Packaging and Packaging Waste Directive (94/62/EC)
Packaging (Essential Requirements) Regulations 2003 (as amended)
Producer Responsibility Obligations (Packaging Waste) Regulations 2007 (as amended)
End-of-Life Vehicles Directive (2000/53/EC)
The End-of-Life Vehicles Regulations 2003 (as amended)
The End-of-Life Vehicles (Producer Responsibility) Regulations 2005 (as amended)
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive (2002/95/EC)
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2008 (as amended)
Waste Electrical and Electronic Equipment Directive (2002/96/EC) and Amendment Directive (2003/108/EC)
Waste Electrical and Electronic Equipment Regulations 2006 (as amended)
Directive (2006/66/EC) on batteries and accumulators and waste batteries and accumulators
Batteries and Accumulators (Placing on the Market) Regulations 2008
Waste Batteries and Accumulators Regulations 2009
Spatial Planning
The London Plan: Spatial Development Strategy for Greater London, 2011
Resource and Waste
The Mayor's Municipal Waste Management Strategy, London's Wasted Resource, 2011
The Mayor's Business Waste Strategy for London, 2011
Energy & Climate Change Mitigation and Adaptation
Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy, 2011 The Climate Change Adaptation Strategy for London, 2011
Air Quality
Clearing the Air: The Mayor's Air Quality Strategy, 2011
Transport
The Mayor's Transport Strategy, 2010
Economy, Skills and Employment
The Mayor's Economic Development Strategy for London, 2010 From Recession to Recovery: The Skills andEmployment Strategy for London (2009 2014), 2009
Water
The Mayor's Water Strategy, 2011

APPENDIX TWO

HIGH-LEVEL IMPLEMENTATION PLAN

Policy	Proposal	Action	Partner Organisation	Timescale
Policy 1: Promoting the commercial value of a resource-efficient business	1.1 Support businesses to identify and implement waste prevention opportunities across the supply chain	1.1.1 Support continued provision of business resource efficiency support programmes	GLA Group, industry sector organisations and London business groups	2011 and ongoing
		1.1.2 Work with industry sector organisations to develop sector-specific guidance on waste prevention and business resource efficiency	GLA Group, industry sector organisations and business groups	2012 - 2016
		1.1.3 Work with business liaison groups to help identify issues and actions specific to businesses with respect to waste prevention and business resource efficiency	GLA Group, industry sector organisations and business groups	2012 - 2016
		1.1.4 Launch a designing-out waste competition with the retail and wholesale sector to raise awareness of waste prevention and business resource efficiency	GLA Group, higher education institutions, industry sector organisations and business groups	2011 - 2013
	1.2 Support businesses to close the loop in London and drive the market for use of recovered resources	1.2.1 Stimulate demand for reused and recycled materials through support for initiatives such as the London Reuse Network and the Mayor of London's Green Procurement Code - promoting the opportunities these initiatives present for London's reprocessing and manufacturing sectors	GLA Group	2011 and ongoing
	1.3 Deliver communications campaigns and initiatives to promote the commercial and environmental benefits of resource efficiency to businesses and their employees	1.3.1 Deliver a reduction, reuse and recycling engagement programme for businesses	Recycle for London (GLA Group and WRAP)	2011 - 2013
Policy 2: Boosting reuse, recycling and composting participation in the commercial and industrial sector	2.1 Increase access to reuse, recycling and composting services and collective contracting arrangements, particularly for SMEs.	2.1.1 Support development of tools to help businesses to find and access business waste and recycling collection services	GLA Group, London Waste and Recycling Board, London Community Resource Network, London boroughs	2013 - 15

Policy	Proposal	Action	Partner Organisation	Timescale
		2.1.2 Support role of the London BIDS network and work in partnership to offer support and advice on the delivery of resource efficiency and waste management projects	GLA Group, London BIDS Network, and Smart Green Business Group	2011 and ongoing
		2.1.3 Encourage waste authorities to expand their business waste collection and disposal services	GLA Group, London Councils, London boroughs	Ongoing from 2012
		2.1.4 Work with companies affected by the Producer Responsibility legislation and the compliance schemes to promote a joined up approach between businesses and households	GLA Group, industry partners, London boroughs	2013
	2.2 Target London's food waste producers	2.2.1 Raise awareness and understanding of the 'waste-chain' to help facilitate an understanding of the issues around separation, collection and treatment of food waste to increase demand for food waste collections and infrastructure	GLA Group and the London Food Board Waste Working Group	2011 - 2017
		2.2.2 Assist food waste producers in London to prevent unwanted, edible food going to waste, e.g. through schemes such as the FareShare Community Food Network	GLA Group, food redistribution schemes and London Waste and Recycling Board	2011 and ongoing
		2.2.3 Work with the London Food Board Waste Working Group to develop, launch and promote a food waste hierarchy to help businesses follow best practice in food waste reduction and disposal.	GLA Group and the London Food Board Waste Working Group	2011 - 2013
	2.3 Boost reuse, recycling and composting performance in multi-tenanted buildings and on large estates.	2.3.1 Support through GLA Group funding of the Better Buildings Partnership	GLA Group and Better Buildings Partnership	2011 - 2013
		2.3.2 Investigate possibility of using disused spaces to house small-scale waste treatment options such as balers, shredders and in-vessel composting units.	GLA Group, facilities management sector organisations, estate owners and managing agents, and transport organisations	2013 - 2017

Policy	Proposal	Action	Partner Organisation	Timescale
		2.3.3 Develop partnerships to facilitate sponsorship opportunities for provision of 'trade-waste' bring bank hubs and 'on-the-go' recycling within London's business parks and estates	GLA Group, London boroughs, business groups, retailers and manufacturers, facilities management and property sector organisations, waste sector organisations	2012 - 2014
	2.4 Improve storage capacity and collection access arrangements to business premises	2.4.1 Make use of the *London Plan* and Supplementary Planning Guidance on Sustainable Design and Construction to ensure that new developments consider the need to design-in sufficient waste storage capacity and suitable access for waste collection vehicles	GLA Group, local planning authorities	2012
Policy 3: Supporting the waste infrastructure market in London to grow and deliver for businesses	3.1 Secure new investment for waste infrastructure in London	3.1.1 Invest in new business waste infrastructure for London and use this as a mechanism to leverage private sector investment	GLA Group and London Waste and Recycling Board	2011 - 2015
	3.2 Facilitate business partnerships to help catalyse development of waste infrastructure in London	3.2.1 Develop at least five exemplar food waste treatment infrastructure projects through the Food Waste to Fuel Alliance Programme	GLA Group and other members of the Food Waste to Fuel Alliance	2011 - 2012
		3.2.2 Offer a brokerage and project development service to bring together potential project partners (site operation, feedstock provision, technology supply, use of off-takes and finance provision) in the development of new waste infrastructure	GLA Group and London Waste and Recycling Board	2011 - 2015
		3.2.3 Catalyse development of waste infrastructure in East London as part of the legacy of the London 2012 and Paralympic Games	GLA Group, London Waste and Recycling Board, London boroughs, Olympic Park Legacy Company	2011 - 2013
	3.3 Improve the knowledge base for waste sector investors	3.3.1 Publish a catalogue of commercially operating waste infrastructure facilities to showcase the opportunities for their development in London	GLA Group	By 2012

Policy	Proposal	Action	Partner Organisation	Timescale
		3.3.2 Sign-post potential investors and other project partners to relevant sources of data and information to improve understanding of waste treatment technologies and level of risk involved in bringing merchant capacity to market	GLA Group and London Waste and Recycling Board	2011 and ongoing
	3.4 Identify additional opportunities for development of business waste treatment infrastructure	3.4.1 Identify the capacity gap for C&I waste infrastructure in London	GLA Group and London Waste and Recycling Board	2012 - 2014
		3.4.2 Increase awareness and use of the London Waste Map, and keep it updated so as to help London's waste industry reach optimal efficiencies in terms of location and partnership development	GLA Group and London Waste and Recycling Board	2011 - 2015
	3.5 Facilitate delivery of waste infrastructure through the strategic planning process	3.5.1 Promote clustering of businesses involved in the waste and low-carbon sectors through planning frameworks and enterprise districts	GLA Group and London boroughs	2011 and ongoing
	3.6 Integrate waste facilities into the urban environment.	3.6.1 Examine opportunities for transporting waste by rail or water	GLA Group	2011 and ongoing
		3.6.2 Use the planning process to safeguard wharves with an existing or future potential for waste management	GLA Group and London boroughs	2011 and ongoing
Policy 4: Drive improvements in resource efficiency in the construction and demolition sector while continuing to maintain good levels of reuse and recycling performance	4.1 Use policy and regulatory requirements to design out waste at source and drive resource efficiency improvements	4.1.1 Revise the Supplementary Planning Guidance (SPG) on Sustainable Design and Construction to contain up to date best practice requirements for achieving sustainable design and construction principles with respect to waste prevention and materials resource efficiency within buildings and infrastructure projects	GLA Group and London boroughs	2011 - 2012

Policy	Proposal	Action	Partner Organisation	Timescale
		4.1.2 Better utilise the planning system in London to make the most of Site Waste Management Plans (SWMP) at the design and planning stages of buildings and infrastructure development, including the request to submit statutory SWMPs alongside planning applications for new development in London	GLA and London boroughs	2011 - 2017
	4.2 Engage developers, architects and designers in taking a leading role to design out waste at source	4.2.1 Raise awareness of the benefits and methods of designing out waste in London's new developments to help raise awareness among developers, architects and designers	GLA Group, WRAP and construction industry bodies	2012 - 2015
	4.3 Support London's construction and demolition sector to maintain existing levels of reuse, recycling and composting	4.3.1 Support investment in CDE waste infrastructure to help maximise the reuse and recycling potential of the CDE waste stream in London	GLA Group and London Waste and Recycling Board	2011 - 2015
		4.3.2 Develop a 'London 2012 Standard' pledge for London's developers and construction contractors, which will contain a commitment to meeting the *London Plan* target of 95 per cent reuse and recycling of CDE waste	GLA Group	2012 - 2013

Other formats and languages

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Public Liaison Unit
Greater London Authority
City Hall
The Queen's Walk
More London
London SE1 2AA

Telephone **020 7983 4100**
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Chinese
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Hindi
यदि आप इस दस्तावेज की प्रति अपनी भाषा में चाहते हैं, तो कृपया निम्नलिखित नंबर पर फोन करें अथवा नीचे दिये गये पते पर संपर्क करें

Vietnamese
Nếu bạn muốn có văn bản tài liệu này bằng ngôn ngữ của mình, hãy liên hệ theo số điện thoại hoặc địa chỉ dưới đây.

Bengali
আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি (কপি) চান, তা হলে নীচের ফোন্ নম্বরে বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek
Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος εγγράφου στη δική σας γλώσσα, παρακαλείστε να επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυδρομικά στην παρακάτω διεύθυνση.

Urdu
اگر آپ اِس دستاویز کی نقل اپنی زبان میں چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish
Bu belgenin kendi dilinizde hazırlanmış bir nüshasını edinmek için, lütfen aşağıdaki telefon numarasını arayınız veya adrese başvurunuz.

Arabic
إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى الاتصال برقم الهاتف أو مراسلة العنوان أدناه

Punjabi
ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati
જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.