

October 2010

London's Wasted Resource
The Mayor's Draft Municipal Waste Management Strategy
Public consultation draft



MAYOR OF LONDON

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**Greater London Authority
October 2010**

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Foreword

by Mayor of London, Boris Johnson



London's waste is a lucrative commodity that we can no longer afford to simply chuck away. The rising cost of using landfill sites along with the need to drastically cut global carbon emissions, means there is a real financial and environmental imperative to rethink the concept of rubbish.

The capital produces about four million tonnes of municipal waste every year, most of which comes from households and small businesses. Too much of this currently ends up being buried for millennia, producing polluting gases or incinerated. Not only does this levy a heavy tax on our environment, it is also a massive missed economic opportunity for the capital.

It does not have to be this way. Our vision is to stimulate an income from the development of world leading technologies to produce recycled materials, generate cleaner energy and to create 'green collar' jobs. This will attract investment and dramatically reduce the impact of rubbish disposal on the environment. By 2025 I want London to be sending zero of its municipal rubbish to landfill.

Reaching these ambitious but essential goals requires a radical re-focus. London's waste management is complex, involving many organisations. The current system can be unnecessarily confusing for Londoners. These proposals show how we can develop a coordinated approach to waste management in the capital that will be both clearer for Londoners and more effective.

Reducing and reusing a significant portion of the material we currently throw away is an absolute imperative. We must drive down the volumes of waste produced in the first instance and support both practical and creative ways to reuse products as much as possible. This requires a shift away from a throwaway culture but will liberate a significant portion of taxpayers' money currently committed to dealing with rubbish.

Recycling levels in the capital are steadily improving, with some boroughs achieving commendable results, but we need to do more. I want recycling to rapidly become much more a part of everyday life whether at home, on the move or in the office. Not only should we routinely recycle paper, glass and cans, but also food waste and plastics. I want all Londoners to have a level playing field when it comes to recycling services, whether they live in the suburbs or inner London, in high rise flats or multi occupancy buildings, to make the recycling of waste easier than throwing it away. By 2020, London should be recycling half of the waste coming from households, rising to 60 per cent by 2031. I believe this can be done in part by the introduction of strong incentives - carrots rather than sticks - to encourage residents to do the right thing.

The residual waste which cannot be prevented in the first place, or put to good use, will be harvested to create greener energy and fuel. We estimate the economic value of this to be more than £100 million.

By embracing clever, cleaner technologies, we can also develop a greater capacity to deal with London's waste within our boundaries.

These targets are challenging. They require robust action from everyone in London - those that generate waste and those with a shared responsibility to dispose of it. But the rewards are high.

I want London to become the best big city on earth, boasting a great quality of life. We can only achieve this if we become a world leader in how we manage the waste we generate. I look forward to hearing Londoners' views on the proposals contained here.

A handwritten signature in black ink, appearing to read 'Boris Johnson', with a long horizontal flourish extending to the right.

Boris Johnson
Mayor of London

Executive summary

The world of waste is changing. The past 20 years has seen the public, private and third sector invest considerable amounts of time, money and effort into changing the way we think about and manage our waste.

Reducing the amount of waste produced and reusing waste that cannot be prevented presents the greatest economic and environmental benefits for London. We cannot continue to manage waste by investing in expensive waste collection and treatment infrastructure without implementing an active strategy of reduction and reuse. The Mayor will set out in this document what actions London's households and businesses can take to reduce waste – but will also call on the government and industry to play a role.

Developing a strategy for London's municipal waste

There are a number of key considerations influencing the Mayor's municipal waste management strategy. The overriding one is the need to manage London's municipal waste more effectively and efficiently. The rising cost of landfill, growing concerns around energy and climate change, emergence of new commercially available waste technologies, and changing consumer behaviour have all made a 'business as usual' approach no longer viable. Climate change is one of the key drivers for London's municipal waste management policy. Sending waste to landfill generates greenhouse gas emissions – particularly biodegradable waste, such as food and green garden waste,

which release methane (a powerful greenhouse gas) as it decomposes. In total, the municipal waste that London sends to landfill generates approximately 465,000 tonnes of greenhouse gas emissions each year, expressed as a carbon dioxide equivalent (CO₂eq) figure¹.

There is a massive opportunity for London to achieve significant greenhouse gas savings by diverting more municipal waste away from landfill. Most of the waste we throw away could be reused, recycled or composted, or used to generate renewable energy, which would achieve significant CO₂eq savings. By first reducing the amount of municipal waste produced and then selecting the optimal means for dealing with the municipal waste sent to landfill, London could save approximately 1.5 million tonnes of CO₂eq emissions each year. This significant saving is a combination of avoiding the emissions that would have occurred from sending waste to landfill plus further savings of approximately one million tonnes achieved by avoiding emissions involved in manufacturing from virgin materials, and in generating energy from coal or gas. This is equivalent to avoiding the emissions associated with powering London's Underground Network each year, plus avoiding emissions from all of London's registered taxis².

Another key driver for changing the way we manage our municipal waste is the increase in costs due to landfill tax. The main effect the landfill tax has had over the past six years is to make the cost of recycling (including collection costs) cheaper than landfill – approximately £109 per tonne for recycling compared to £128 per tonne for landfill. Today landfill tax stands at £48 per tonne. This will increase by £8 each year until at least 2014, when it will be £80 per tonne. This will increase London's annual bill for sending municipal waste to landfill from about £250 million now to roughly £310 million. Landfill tax has also made the cost of energy recovery from waste more comparable to landfill and in some cases more commercially attractive, depending on contractual arrangements.

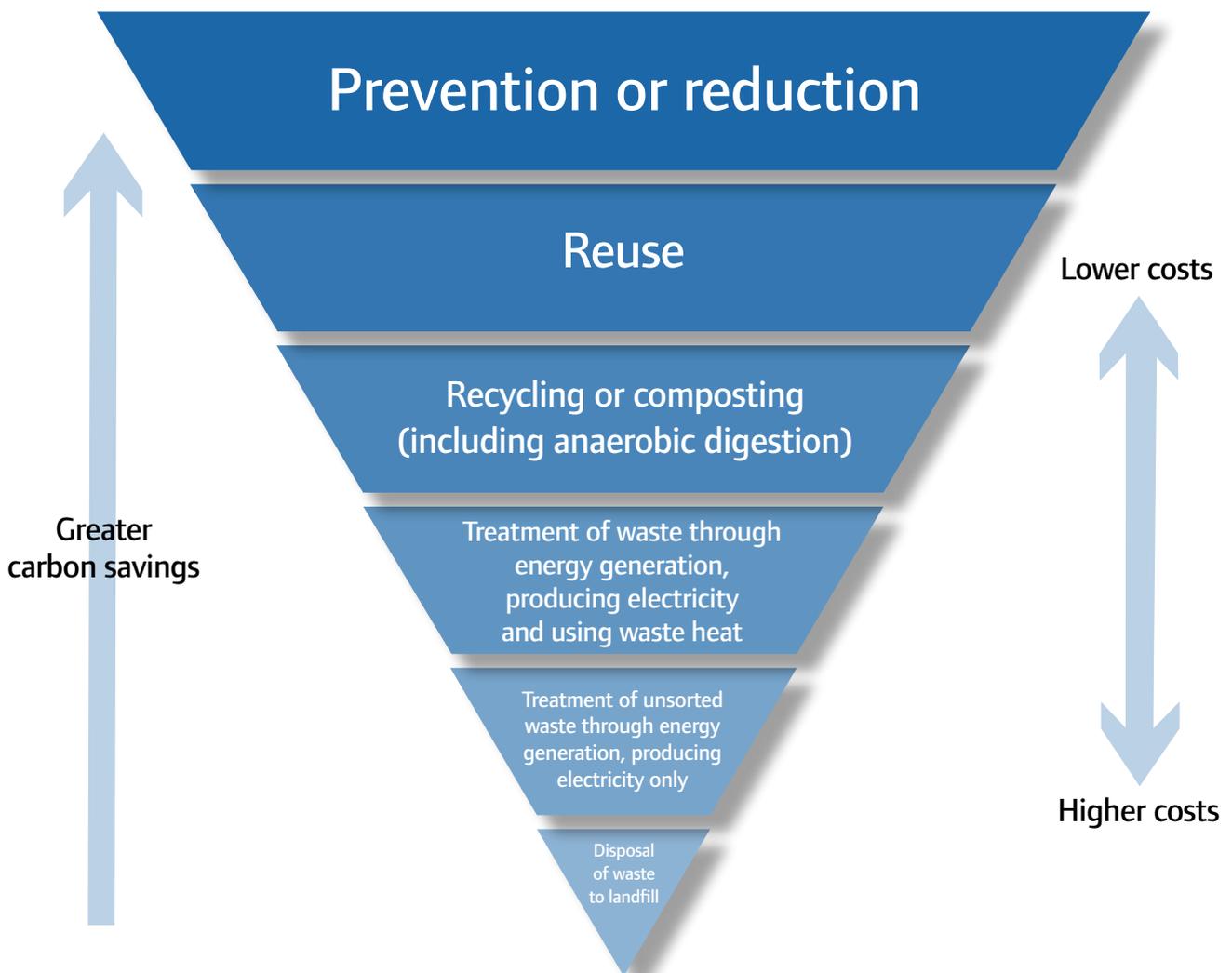
In addition to the increase in landfill tax, the Department of Environment, Food, and Rural Affairs (Defra) is revising the definition of municipal waste, which will include a lot more commercial waste, to ensure the UK is meeting landfill diversion targets under the European Landfill Directive. Implementing this new measure will put considerable pressure on local authorities, communities and businesses to manage more of their waste better.

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

Ultimately, the Mayor wants London to become a world leader in municipal waste management, utilising innovative techniques and technologies to minimise the climate change impact of municipal waste and to fully exploit its massive economic value. The aim is to reduce the amount of municipal waste generated by the capital, significantly increase recycling and composting performance, and to generate energy from rubbish that cannot be reused or recycled, in the most environmentally friendly way possible.

The Mayor's vision is built upon his waste hierarchy, applied from the top down. The Mayor's waste hierarchy supports those activities further up the hierarchy that can achieve the greatest cost savings and environmental benefits over those activities further down it.

The Mayor's waste management hierarchy



If there is a tension between implementing the waste hierarchy and achieving greater climate change mitigation benefits, preference should be given to those options achieving greater climate change benefits.

The following objectives and targets support the Mayor's vision:

Objectives

1. Provide Londoners with the knowledge, infrastructure and incentives to change the way they manage municipal waste: to reduce the amount of waste generated, encourage the reuse of items that are currently thrown away, and to recycle or compost as much material as possible.
2. Minimise the impact of municipal waste management on our environment and reduce the carbon footprint of London's municipal waste.
3. Unlock the massive economic value of London's municipal waste through increased levels of reuse, recycling, composting and the generation of clean energy from waste.
4. Manage the bulk of London's municipal waste within London's boundary, through investment in new waste infrastructure.
4. To recycle or compost at least 45 per cent of municipal waste by 2015, 50 per cent by 2020 and 60 per cent by 2031.
5. The management of London's municipal waste to achieve annual greenhouse gas emissions savings of approximately:
 - 1.2 million tonnes of CO₂eq in 2015
 - 1.4 million tonnes of CO₂eq in 2020
 - 1.6 million tonnes of CO₂eq in 2031
6. To generate as much energy³ as possible from London's organic and non-recyclable waste in a way that is no more polluting in carbon terms than the energy source it is replacing. This is estimated to be possible for about 40 per cent of London's municipal waste after recycling or composting targets are achieved by 2031.

To achieve the Mayor's objectives and targets, the strategy will focus on the following six policy areas, each containing a number of proposals.

Targets

1. To achieve zero municipal waste direct to landfill by 2025.
2. To reduce the amount of household waste produced from 970kg per household in 2008/09 to 790kg per household by 2031. This is equivalent to a 20 per cent reduction per household.
3. To increase London's capacity to reuse or repair municipal waste from approximately 6,000 tonnes a year in 2008 to 40,000 tonnes a year in 2015 and 120,000 tonnes a year in 2031.

Policy 1: Informing producers and consumers of the value of reducing, reusing and recycling municipal waste

Reducing or preventing the amount of waste we produce is the most cost-effective and environmentally beneficial way to improve London's municipal waste position. With the number of households in London expected to increase by 22 per cent to four million by 2031, the Mayor is committed to ensuring population growth does not result in any more growth in the amount of household waste generated.

The Mayor proposes a London wide 20 per cent reduction in the amount of waste produced per household in 2008 by 2031. This equates to approximately one per cent per year reduction, in line with recent trends. The Mayor welcomes waste authorities setting their own waste reduction targets to help achieve his reduction target for London.

The Mayor believes he can best influence waste reduction and the value of reuse and recycling in London by supporting local and regional education programmes and initiatives. The London Waste and Recycling Board has awarded funding between 2010 and 2013 to deliver a Londonwide reduction, reuse and recycling programme.

The Mayor wants London to lead the way in waste reduction and believes that reducing the amount of unnecessary packaging through better product design and smarter purchasing habits is the key to achieving this. The Mayor will seek to work with London's businesses and manufacturers to deliver this through his Business Waste Strategy.

The Mayor also wants to significantly boost London's reuse performance and has supported the development of a strategic reuse network across London with third sector organisations and public bodies, supporting the repair and reuse of discarded materials.

Policy 2: Setting a CO₂eq emission performance standard for municipal waste management activities to reduce their impact on climate change.

The Mayor wants to achieve significant CO₂eq savings from the management of all London's municipal waste, particularly from waste that currently goes to landfill or for energy generation. This means reusing, recycling, composting or generating renewable energy from as much waste as possible to avoid emissions associated with manufacturing virgin material and generating energy from fossil fuels. The Mayor will set a CO₂eq emission performance standard (EPS) that municipal waste management activities and technologies will need to meet in order to get Mayoral support, rather than prescribing particular waste management activities or treatment technologies. This approach will support waste activities and services that reduce the amount of municipal waste produced, and capture the greatest number and highest quality of materials for reuse, recycling or composting.

Achieving the EPS will ensure London's municipal waste management shifts from being a net contributor to climate change to an industry that plays an integral role in achieving significant climate change mitigation benefits. London will be the first city in the world to set an EPS for municipal waste, incentivising the take up of new technologies and sending a clear message to London waste authorities and the waste industry to focus on waste management activities that achieve the greatest CO₂eq savings.

In addition to setting an EPS, the Mayor proposes that all energy generated from London's municipal waste be no more polluting in carbon terms than new base load electricity generation. This approach will rule out traditional mass-burn incineration techniques of carbon-rich waste and incentivise moving towards cleaner, efficient energy generation from low-carbon waste fuel in the form of heat and power for local use. Generating clean, efficient energy from London's municipal waste in London will play an important role in meeting the Mayor's commitment to a target of a 60 per cent reduction in London's CO₂ emissions (on 1990 levels) by 2025⁴.

Policy 3: Capturing the economic benefits of waste management

This strategy will focus on the economic opportunity that municipal waste in London presents. It is estimated £90 million a year in savings could be realised in London if municipal waste is managed in the optimal way. This represents a massive opportunity for London's waste authorities to share in these savings. Over the last 20 years there has been a tendency for waste authorities to outsource their waste functions. Outsourcing services means outsourcing risk and therefore providing fiscal certainty. However outsourcing risk can be expensive and any potential revenue from the sale of product in the form of recycled materials or energy is lost. The Mayor would like London's waste authorities to explore the opportunities for entering into revenue-sharing waste contracts and joint venture arrangements.

Policy 4: Achieving high recycling or composting rates resulting in the greatest environmental and financial benefits

The Mayor is keen to see that both waste authorities and the waste industry provide recyclable material to the processing and treatment markets, ensuring these materials maintain the best possible prices, highest quality use, and maximum resilience to market fluctuations.

This approach will need to be supported by the provision of high quality, consistent recycling services across London that make recycling hassle-free for the consumer, regardless of which borough or housing type they live in or where they work. The Mayor wants to work with waste authorities to ensure all Londoners can access a core set of cost-effective waste collection, recycling and composting services, particularly to flats and estates where recycling and composting performance is typically low. The London Waste and Recycling Board has allocated £5 million to fund a programme of infrastructure improvement to boost recycling rates from flats, in particular from high rise housing estates.

Policy 5: Catalysing waste infrastructure, particularly low carbon technologies

London must manage as much of its municipal waste as practicable within London. The Mayor is keen that this has a particular focus on new low-carbon technologies where possible. The London Waste and Recycling Board represents a new dawn for the capital and the way it tackles rubbish. It will mean, for the first time, the Mayor of London and London's

councils working together in partnership finding innovative solutions to tackle this complex environmental challenge. London will strive to be the beacon of good practice, leading the way on innovation for next generation waste facilities, providing positive benefits to local communities in the form of new products, employment and low-carbon energy.

The board has committed £54 million to support recycling, composting, and energy infrastructure in London from 2009 to 2012 and has leveraged £18 million from the Joint European Support for Sustainable Investment in City Areas (JESSICA) scheme as part of the London Green Fund. The GLA and the board estimate four million tonnes of additional municipal waste capacity is needed by 2031 requiring capital costs in the area of £800 -900 million and operational costs of £60 -70 million. The board's funds alone will not be sufficient. The board hopes to leverage additional funding from other infrastructure funds and through private investment to help fill the capacity gap.

The board will play a significant role in the development of new municipal waste infrastructure in London, keeping the value of London's waste in the capital and achieving greater regional self-sufficiency. Waste apportionment and regional self-sufficiency will be addressed in the revisions to the Mayor's spatial development strategy for London - The London Plan. The Mayor, in revising his London Plan, is reviewing his self-sufficiency targets for the management of London's municipal and commercial waste. The Mayor wants London's waste sites to move up the value chain, moving

away from low-value bulking and transfer facilities to state-of-the-art resource recovery parks, providing benefits to local communities in the form of new products, employment, and heat and power. The board will develop a London-wide site framework in partnership with the GLA Group and waste authorities, bringing together data on current, planned, and potential waste sites at a local and regional level. For the first time in the UK the public and private sector will be able to identify waste management solutions that can be mapped alongside opportunities for energy use and sustainable transport.

Policy 6: Achieving a high level of street cleanliness

The Mayor wants Londoners and visitors to enjoy a consistently high quality of life. One factor affecting quality of life is litter and cleanliness. Come 2012, the world's eyes will be on London and we must ensure that litter does not mar memories of London. Chewing gum, cigarette butts, and coffee cups are a particular blight and the Mayor will work with London boroughs and manufacturers to minimise the impact this waste and all other street litter has on our local environment.

The Mayor is keen for communities to develop a feeling of pride for the areas that they work and live in and will encourage community groups, boroughs, the third sector and businesses to get involved in cleaning up London.

The Mayor believes his policies and proposals will put London on the path towards achieving zero municipal waste to landfill by 2025, by which time landfill sites currently used for

London's municipal waste are expected to have closed. Today London relies heavily on the southeast regions for the majority of its landfill needs, with only 23 per cent going to London's own landfill sites in Rainham and Beddington. The Mayor has no desire to continue sending municipal waste to landfill outside London and will work with neighbouring counties to agree a roadmap for reducing London's exported

municipal waste. The Mayor expects in the immediate future that landfill will continue to play an important role in the disposal of some municipal waste materials. Some materials, such as bonded asbestos, are currently only suitable for landfill, and for others, the technology is not yet there to reuse, recycle or recover energy from them.

End notes

1. Greenhouse gases have different global warming impacts. For example, one tonne of methane is 21 times stronger than one tonne of CO₂. Sulphur hexafluoride is 23,900 times stronger than CO₂. A CO₂-equivalent figure is used to represent the warming impact of greenhouse gases as a whole.
2. London's Underground tube network and registered taxis make up approximately 10 per cent of London's annual CO₂ emissions from Transport (9.6 million tonnes). Source: Climate Change Mitigation and Energy Strategy, public consultation draft, GLA, October 2010.
3. Energy generation means the production of electricity and heat through energy from waste technologies
4. Mayor's climate change mitigation and energy strategy, public consultation draft, October 2010.

Introduction

The Mayor's vision for London's municipal waste: To become a world leader in municipal waste management

The Mayor's vision for London is that it excels among global cities – expanding opportunities for all its people and enterprises, achieving the highest environmental standards and quality of life and leading the world in its approach to tackling the urban challenges of the 21st century, particularly that of climate change.

The Mayor wants London to be a city that becomes a world leader in improving the environment locally and globally, taking the lead in tackling climate change, reducing pollution, developing a low carbon economy and consuming fewer resources and using them more effectively.

In order to achieve this London needs to become a world leader in waste management, utilising innovative techniques and technologies to minimise the impact of waste on our environment and fully exploit its massive economic value. The aim is to reduce the amount of municipal waste generated by the capital, significantly increase recycling and composting performance, and to generate energy from rubbish that cannot be reused or recycled, in the most environmentally friendly way possible.

The challenge London faces

In 1989, London's boroughs recycled just 2.1 per cent of the waste they collected. In 1999 they recycled only eight per cent. London's boroughs now recycle 25 per cent. This is a

significant improvement – but still much more can and should be done. Whilst we have been moving away from a culture of waste disposal and indiscriminate incineration to one of recycling, we must now move to a culture of waste minimisation and reuse, high rates of recycling and low-carbon energy generation.

With climate change a key consideration in what we do, the potential associated benefits in terms of carbon savings, reduced energy costs, energy security and job creation are becoming ever more apparent.

Although London's recycling performance has improved dramatically in the last ten years we still have a long way to go. London's municipal recycling rate is the lowest of all English regions, reflecting the challenges a dense urban environment presents. London's recycling rate also compares poorly to other international cities like Berlin (41 per cent), and Sydney (29 per cent), although it is better than Paris (19 per cent). Recycling performance is not consistent across all London boroughs, ranging considerably from the low teens to the low fifties. However all London boroughs face challenges in providing good quality, convenient, cost-effective recycling collection services for flats and multi-occupancy buildings – which account for about 50 per cent of London's housing stock. Improving recycling rates from flats – currently around ten per cent – will therefore be essential to improving London's recycling rates.

Nearly half of London's municipal waste still gets sent to landfill. Sending waste to landfill is costly, and releases harmful greenhouse gas emissions (mostly methane) damaging the environment and contributing to climate change. London's municipal waste sent to landfill produces approximately 465,000 tonnes of greenhouse gases a year, expressed as a carbon dioxide equivalent figure¹. After waste reduction, selecting the optimal means of dealing with London's municipal waste sent to landfill through reuse, recycling or composting, or efficient energy generation, London could save approximately 1.5 million tonnes of CO₂eq emissions each year², turning London's waste into a positive carbon outcome. These significant savings can be achieved by avoiding emissions that would otherwise have occurred from sending waste to landfill, manufacturing virgin materials, or from generating energy using fossil fuels (e.g. coal or gas).

Landfill taxes are also rising, making it increasingly expensive to deal with waste in this way. Landfill tax will increase until at least 2014, when it will be considerably more expensive to landfill waste than it is to recycle it, even taking the higher collection costs of recycling into account.

Unlocking the economic opportunity to improve London's waste position

In addition to the significant climate change mitigation benefits London's waste can achieve, the Mayor believes that London is missing the huge economic opportunity contained

within the city's waste. The cost to London of managing its municipal waste, including the collection, transport, treatment, and final disposal is approximately £580 million every year. The greatest economic opportunity exists by preventing waste arising in the first place, then in diverting waste from landfill: it is estimated that the cost to London of landfilling municipal waste will be in the region of £310 million³ per year by 2014.

Reducing the amount of waste produced and reusing waste that cannot be prevented presents the greatest economic and environmental opportunity for London. Reducing London's municipal waste by only five per cent could reduce the cost of managing waste by almost £30m each year. To continue to manage waste by investing in expensive waste collection and treatment without an aggressive strategy of reduction and reuse is lunacy – especially in the current economic conditions. This Mayor will set out what actions London's households can take to reduce waste – but will also call on the government and industry to review the role they can play.

Reusing three per cent of London's municipal waste could reduce London's municipal waste bill by a further £15m each year. Putting a greater emphasis on reuse within the municipal sector is essential, and the London Waste and Recycling Board is already making investments to help increase waste reuse.

Where waste is produced, if that material was treated in the best way to minimise greenhouse gas impact (in most cases recycling) then this could save around £90m each year, generate 350 new green collar jobs and contribute £13 million of direct Gross Value Added (GVA) to the economy each year to 2025.

In addition to the savings made through optimising treatment we estimate that waste can also contribute significantly to a reduction in London's energy bill. Based on the wholesale cost of electricity and gas, London's municipal waste after maximising recycling could contribute £90 million of savings to London's £4.4 billion electricity bill and take £24 million off London's £2.5 billion gas bill.

A time for change

Increasingly there is a greater acceptance that we need to move away from traditional mass-burn incineration of untreated waste and towards the use of cleaner, more efficient energy-recovery techniques, whereby any valuable materials are recovered from the waste stream and as much of the energy produced is recovered. New opportunities exist for using advanced conversion technologies such as anaerobic digestion, gasification and pyrolysis. These are now available commercially and the government is offering incentives for their use through mechanisms such as Renewable Obligation Certificates.

A number of the major waste management companies have anaerobic digesters operating in the UK. More anaerobic digesters have received planning approval or are under construction, including two facilities in Manchester with capacity for treating 130,000 tonnes of waste a year. One gasification facility with capacity for 400,000 tonnes of waste per year has been granted planning permission in Eastham, Merseyside. One major waste management company has recently announced plans to develop six gasifiers in the UK, and London has approved planning for its first gasification facility.

London's existing incinerators in Lewisham and Enfield along with the planned Belvedere incinerator in Bexley will continue to play an important role for generating energy from London's municipal waste. There are massive opportunities for retrofitting these facilities to make use of the vast amounts of heat produced for local homes and businesses, improving their overall efficiency and reducing their carbon impact. This strategy will identify how these opportunities can be implemented. The aim is that London's incinerators, over the lifetime of this strategy, turn towards generating energy from non-recyclable waste, and that all energy generated from London's municipal waste becomes less carbon-emitting than the energy source it replaces.

The Mayor's objectives for municipal waste

The Mayor's municipal waste management strategy has been developed on the basis of four strategic objectives:

Objective 1: *To provide Londoners with the knowledge, infrastructure and incentives to change the way we manage municipal waste: to reduce the amount of waste generated, encourage the reuse of items that are currently thrown away, and to recycle or compost as much material as possible.*

Objective 2: *To minimise the impact of municipal waste management on our environment including reducing the carbon footprint of London's municipal waste.*

Objective 3: *To unlock the massive economic value of London's municipal waste through increased levels of reuse, recycling, composting and the generation of clean energy from waste.*

Objective 4: *To manage the bulk of London's municipal waste within London's boundary, through investment in new waste infrastructure.*

The Mayor's targets for municipal waste in London

1. To achieve zero municipal waste direct to landfill by 2025.
2. To reduce the amount of household waste produced in 2008/09 from 970kg per household to 790kg per household by 2031. This is equivalent to a 20 per cent reduction per household.
3. To increase London's capacity to reuse or repair municipal waste from approximately 6,000 tonnes each year in 2008 to 40,000 tonnes a year in 2012 and 120,000 tonnes a year in 2031.
4. To recycle or compost at least 45 per cent of municipal waste by 2015, 50 per cent by 2020 and 60 per cent by 2031
5. The management of London's municipal waste to achieve annual greenhouse gas emissions savings of approximately
 - 1.2 million tonnes of CO₂eq in 2015
 - 1.4 million tonnes of CO₂eq in 2020
 - 1.6 million tonnes of CO₂eq in 2031
6. To generate as much energy as possible from London's organic and non-recyclable waste in a way that is no more polluting in carbon terms than the energy source it is replacing. This is estimated to be possible for about 40 per cent of London's municipal waste after recycling or composting targets are achieved by 2031.

The Mayor's Municipal Waste Management Strategy

The Mayor's municipal waste management strategy is set out as follows:

- o Chapter 1: Legislative and policy context
- o Chapter 2: Current performance on managing London's municipal waste
- o Chapter 3: The Mayor's approach for delivering his strategy
- o Chapter 4: Rationale for the Mayor's approach
- o Chapter 5: Policies and proposals for implementing the strategy (this will contain short action plans for each of the 6 policy sections)
- o Appendices including Implementation Plan (Appendix 2)

The main audience for the strategy is – waste authorities, waste industry, government departments, voluntary and third sector, the London Waste and Recycling Board, the GLA Group and Londoners.

The Mayor's Business Waste Strategy

Mayor has also produced a Draft Business Waste Strategy for London's commercial and industrial waste, and construction demolition and excavation waste – waste collected and disposed of by waste operators under private contracts with businesses. Waste produced by businesses, be it from shops, restaurants and offices, industrial processes or construction and demolition sites makes up 80 per cent of London's waste - 16 million tonnes a year.

Although the Mayor only has statutory powers with regard to municipal waste, he believes we should look at all of London's waste in order to get the greatest benefits for London economically and in climate change terms.

His Business Waste Strategy will set out non-statutory policies and proposals to help London's businesses improve their waste position, with a particular focus on waste reduction and managing resources more efficiently to reduce their economic and environmental impact. The Mayor's draft Business Waste Strategy is currently out for consultation and this can be found at www.london.gov.uk. The final version will be adopted in early 2011.

The London Plan

In addition to the Mayor's waste strategies, the Mayor's spatial development strategy for London, the London Plan, has planning policies for all waste. Both strategies will be supported by, and should be read in the context of, the London Plan. The London Plan is currently under review and key policies and proposals have been set out in The London Plan – consultation draft replacement plan, October 2009. This can be found at www.london.gov.uk/shaping-london/london-plan/docs/london-plan.pdf. The key waste policy areas in this Plan include:

- Working towards zero waste to landfill by 2031
- Setting new recycling/composting targets

- Promoting waste management activities achieving the greatest possible climate change mitigation benefits
- Managing as much of London's waste within London as practicable
- New, independent borough level projections of London's waste arisings. This arisings data will be used to update London borough waste apportionment using existing waste apportionment methodology.
- Reviewing the definition of waste to be managed within London

Other Mayoral strategies

The Mayor is also developing other Mayoral strategies including the Economic Development Strategy, Climate Change Adaptation Strategy, Climate Change Mitigation and Energy Strategy, Transport Strategy, Water Strategy and Air Quality Strategy. The Mayor's Municipal Waste Management Strategy will be consistent with relevant policies and proposals in these documents.

End notes

1. Greenhouse gases have different global warming impacts. For example, one tonne of methane is 21 times stronger than one tonne of CO₂. Sulphur hexafluoride is 23,900 times stronger than CO₂. A CO₂-equivalent figure is used to represent the warming impact of greenhouse gases
2. GLA, 2009. Based on modelling of carbon savings from diverting the eight most common materials (aggregates, paper/card, food and green garden waste, wood, textiles, plastics, metals and glass) in London's waste stream from landfill and using the optimal treatment method.
3. Based on current average collection and disposal costs with landfill tax at 2014 rate of £80 / tonne, refer: Kerbside Recycling: Indicative costs and performance, WRAP, 2008; Gate Fees Report, WRAP, 2009.

Next steps

The Mayor is consulting on this strategy with the public and stakeholders until 14 January 2011. The Mayor would welcome comments from stakeholders and the public via the online consultation questionnaire. This can be found at www.london.gov.uk.

Alternatively a PDF version of the questionnaire can be downloaded and sent by post to:

Mayor's Municipal Waste Management Strategy Consultation
 Post Point 19B
 FREEPOST LON15799
 City Hall
 The Queen's Walk
 London SE1 2BR

The Mayor will then consider the responses to the consultation and make any necessary changes to his strategy before publishing the final strategy for adoption in March 2011.

1 Legislative and policy context

The Mayor is required to produce and keep under review a Municipal Waste Management Strategy. The Mayor in developing his strategy has to be consistent with the government's Waste Strategy, which sets out the government's approach for the UK to achieve its commitments under the 1999 European Landfill Directive. To comply with the Landfill Directive, the UK must meet the following stringent targets on the amount of biodegradable municipal waste that can be landfilled:

- 75 per cent of that produced in 1995 by 2010
- 50 per cent of that produced in 1995 by 2013
- 35 per cent of that produced in 1995 by 2020.

There are no waste targets set by government for London or any other UK region to achieve. In April 2005, the government introduced the Landfill Allowance Trading Scheme (LATS) providing the mechanism for UK local authorities to reduce the amount of biodegradable municipal waste sent to landfill in order for the UK to achieve the European Directive landfill diversion targets. Under LATS, each waste disposal authority is given a landfill allowance, which decreases annually up to 2020, setting out how many tonnes of biodegradable municipal waste it can send to landfill.

The government's Waste Strategy 2007 sets the following targets for the UK:

- To reduce the amount of household waste

not reused, recycled or composted in 2000 by 29 per cent in 2010 with an aspiration to achieve a 45 per cent reduction on 2000 levels by 2020

- To recycle and compost household waste - at least 40 per cent by 2010, 45 per cent by 2015 and 50 per cent by 2020
- Recovery¹ of municipal waste - 53 per cent by 2010, 67 per cent by 2015 and 75 per cent by 2020.

In April 2008 the government introduced a set of 198 National Indicators (NIs) reflecting national priority outcomes for local authorities. The NIs replace Best Value Performance Indicators (BVPIs) previously set for local authorities. NI standards have been set for every UK local authority. There are four NIs directly relating to waste:

- NI 191 – number of kilograms of residual waste (waste not reused, recycled or composted) collected per household
- NI 192 – percentage of household waste sent for reuse, recycling, composting or anaerobic digestion
- NI 193 – percentage of municipal waste sent to landfill
- NI 195 - percentage of land surveyed that is of a poor or unsatisfactory standard of cleanliness.

Local authorities meeting their standards set for NIs 191, 192 and 193 would deliver the government's national targets set out in Waste Strategy 2007.

There are also two climate change NI indicators relevant to CO₂ emissions, which apply to local authorities undertaking their waste functions:

- NI 185 - percentage CO₂ reduction from local authority operations
- NI 186 - per capita reduction in CO₂ emissions in the local authority area.

London's first Municipal Waste Management Strategy was published in 2003. In addition to the increase in landfill tax, introduction of LATS, NIs, and the government's waste targets, there have also been a number of other significant policy developments, making it timely for a new Municipal Waste Management Strategy for London. These policy developments include:

- revisions to the European Waste Framework Directive, which require Member States, including the UK, to bring into force its laws, regulations and administrative provisions by 12 December 2010. Government has consulted² on how it will transpose the revisions into UK law. The revisions to the directive are summarised in Appendix 1
- new provisions in the GLA Act 2007, which require the London waste authorities to act in 'general conformity' with the Mayor's Municipal Waste Management Strategy, and a new duty on the Mayor to tackle climate change
- the creation of the London Waste and Recycling Board, which must 'act in accordance' with the Mayor's Municipal

Waste Management Strategy. The London Waste and Recycling Board's objectives are to promote and encourage a reduction in waste, to increase the proportion that is reused or recycled, and to use methods of collection, treatment and disposal of waste that are more beneficial to the environment

- the waste policies in the Draft Replacement London Plan, October 2009 (currently under review) which require boroughs to plan for their waste by identifying suitable sites.

Appendix 1 summarises the key legislation taken into consideration when developing the Mayor's Municipal Waste Management Strategy.

Government is carrying out a full review of waste policy in England, looking at the most effective ways of reducing waste and maximising cost benefits from waste and recycling, and how waste policies affect local communities and individual households. Key elements of the government's review³ include:

- the effect of waste policies on local communities and individual households, and how local authorities can best work with people to make the best decisions
- maximising the contribution of the waste and recycling industries to the UK economically and environmentally
- how we work towards the 'zero waste economy', and drastically reduce the amount of waste created and valuable resources sent to landfill, looking at the entire process from source to end of life.

- new approaches to dealing with commercial waste and promoting ‘responsibility deals’, reducing the amount of waste generated by production and retail
- changing the approach for calculating the EU Landfill Directive targets to reduce the amount of biodegradable municipal waste sent to landfill. The new approach will include much more commercial waste than currently and will bring the UK approach into line with the general approach adopted by other Member States implementing the Landfill Directive. Changing the way municipal waste is counted will mean amending the baseline on which the landfill diversion targets were set, and thus the 2010/2013/2020 targets for the UK.

Implementing the Mayor’s policies and proposals and achieving targets

The Mayor’s strategy provides a framework of policies and proposals to ensure London makes an effective contribution towards meeting the UK’s commitments under the Landfill Directive 1999. The Mayor’s policies and proposals provide a clear lead to London’s waste authorities on the actions it is expected they will need to undertake to meet and exceed their local targets. The implementation plan in Appendix 2 sets out in detail how his policies and proposals will be implemented and monitored. The Mayor will also publish an annual monitoring report on the progress of his policies and proposals

The Mayor will work in partnership with London’s waste authorities and other stakeholders to implement his strategy. However London’s waste authorities are largely responsible for implementing the strategy, as they deliver local waste services and procure the necessary waste treatment capacity. London’s waste authorities have to act in general conformity with the strategy when undertaking these functions. The Mayor, in implementing his Municipal Waste Management Strategy and determining local authority waste management contracts, will consider the impact contracts may have on the implementation of any of his other strategies, in particular the London Plan and his air quality, climate change adaptation and climate change mitigation and energy strategies. The London Plan and the Mayor’s environment strategies collectively set out the optimal approach London should take to becoming a world leader in improving the environment locally and globally. Each document is complementary to the other and therefore consideration of the potential impact of each waste contract on any strategy will be considered.

The Mayor has set his own targets for London’s municipal waste, which are more ambitious than those set for the UK by government. The Mayor believes stronger targets than those set by government are necessary, in particular to reduce the amount of municipal waste produced, and to reduce the amount sent to landfill, to achieve greater environmental and economic benefits.

In transposing the revisions to the European Waste Framework Directive, the coalition government is proposing to change the definition of recycling. The proposed changes include compost and output from anaerobic digestion having to meet minimum quality standards in order to be counted as recycling. It is also proposed that metals recovered from incinerator ash will now count as recycling. These changes may mean the Mayor has to revise his recycling or composting targets in the final version of this strategy to be consistent with the new definition of recycling. However, the new definition is not expected to have significant impact on the Mayor's targets. More information on the consultation for transposing the European Waste Framework Directive can be found at: www.defra.gov.uk

The Mayor has not set specific municipal energy generation targets. In line with the Mayor's waste hierarchy, recycling or composting waste generally achieves the greatest environmental benefits, and therefore should be given priority over energy generation.

Endnotes

1. For the purposes of achieving this target, 'recovery' of municipal waste includes recycling, composting and energy generation. The Government's consultation finished September 2010.
2. Taken from DEFRA press release <http://ww2.defra.gov.uk/2010/06/15/waste-policy-review/>
3. The previous government undertook separate public consultations on the EU Landfill Directive targets and a Landfill Ban, finishing June 2010. Responses to both consultations will be taken into consideration in the review of national waste policy.

Separate recycling and composting targets will be set, but the Mayor believes setting specific energy generation targets could cause confusion for waste authorities.

Chapter 3 sets out the Mayor's preferred approach for managing London's municipal waste to 2031 to achieve his overall targets. This includes energy generation in the most environmentally beneficial way from any waste remaining after reuse, recycling and composting options have been exhausted. The government's recovery targets, which includes recycling and composting of, and energy generation from, municipal waste, will be achieved as a result of this approach.

Appendix 3 sets out in detail how the Mayor's policies and proposals contribute to achieving his targets, and how achieving these targets means London will meet or exceed its waste authorities' LATS requirements, and the government's national targets.

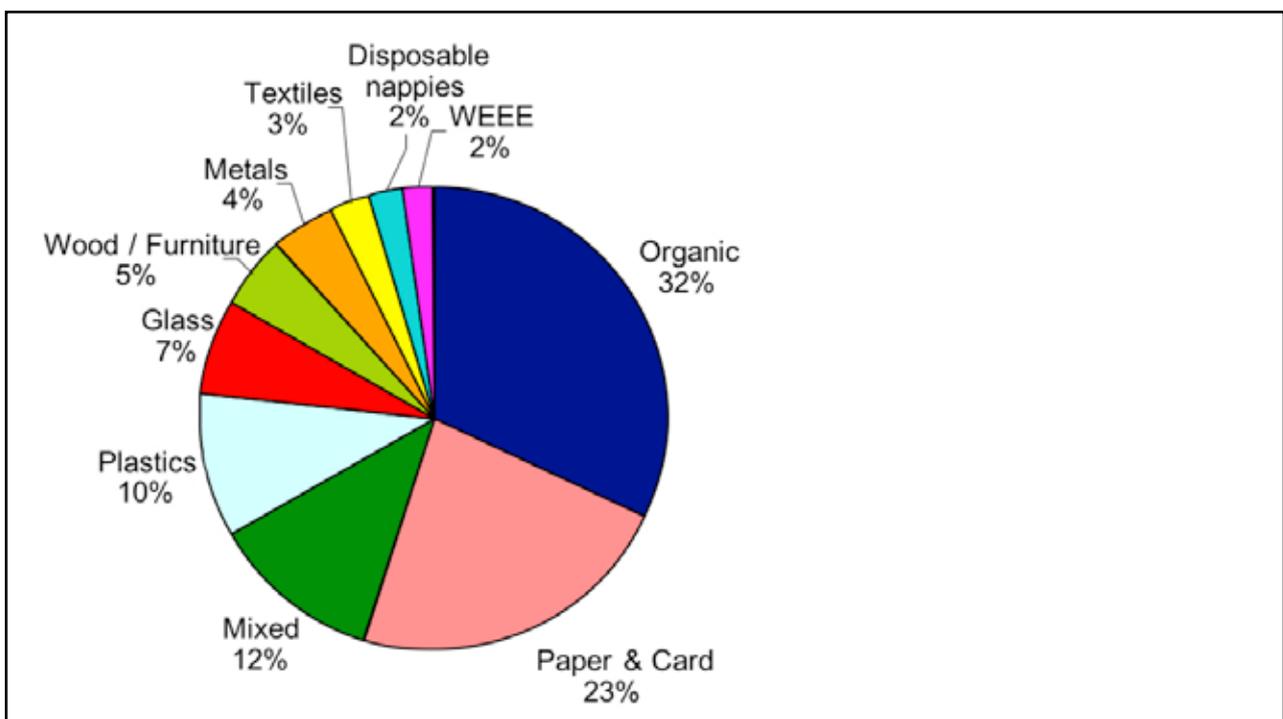
2 Current performance on managing London's municipal waste

London's municipal waste management performance

In 2008/09, London produced 3,975,000 tonnes of municipal waste, mostly made up of paper and board and organic waste (food and green garden waste). Municipal waste is waste in the control of a waste collection or waste disposal authority. Household waste makes up 79 per cent (3.14 million tonnes) of municipal waste and includes recycling and black bag waste collected from flats and houses, street

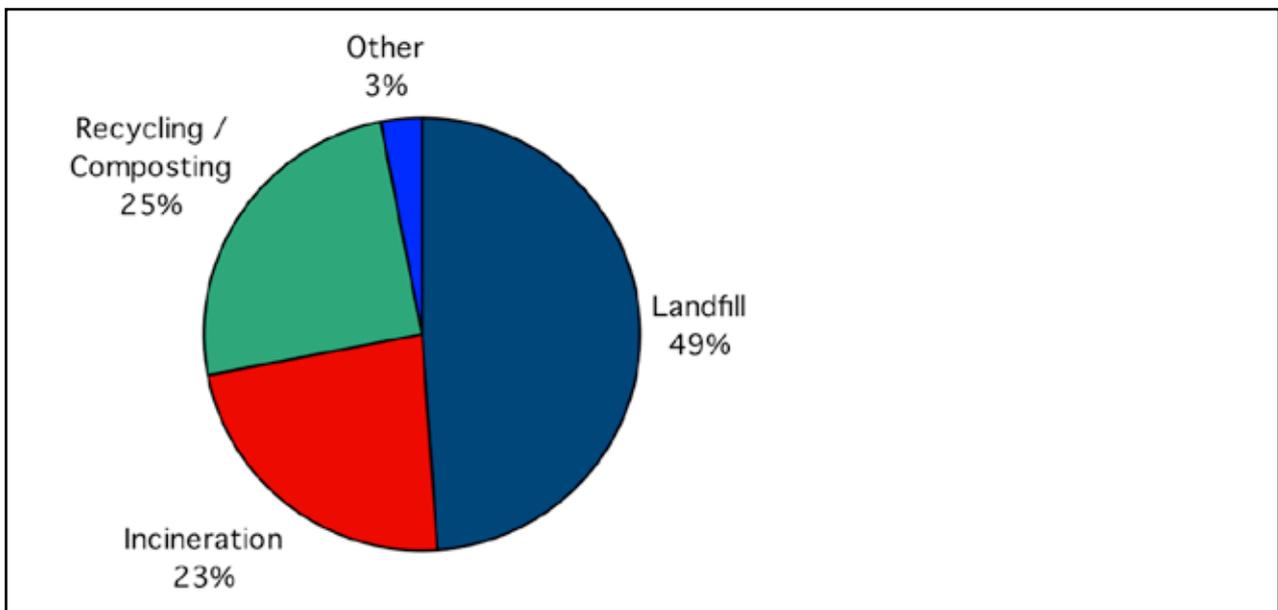
litter, bulky household waste and waste delivered to local authority reuse and recycling centers. The remaining 21 per cent (835,000 tonnes) comes from some small and medium-sized businesses, where boroughs have waste collection agreements in place to serve these businesses. The breakdown of London's municipal waste by material is shown in figure 1. The breakdown of London's municipal waste by management method is shown in figure 2.

Figure 1: Municipal waste by material



Source: Defra, 2009 Refer: <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=15133>. 'Mixed' waste includes household sweepings and soil. WEEE refers to Waste Electrical and Electronic Equipment.

Figure 2: Breakdown of London's municipal waste by management method in 2008/09



Source: Defra Waste Statistics, 2009, see www.defra.gov.uk/evidence/statistics/environment/wastats

Notes: 'Other' is waste material sent for some form of pre-treatment or unknown destination. Recycling or composting includes organic waste sent for anaerobic digestion. Less than one per cent of London's municipal waste is treated using anaerobic digestion. Approximately five per cent of municipal waste to landfill is used for land reclamation (for example landfill capping).

London's municipal waste governance framework

There are 33 London boroughs (including the City of London Corporation). Although the responsibility for collecting waste in London has always been with boroughs, the responsibility for disposing of waste has been dispersed since the abolition of the Greater London Council in 1986 (see figure 3).

Figure 3: London's municipal waste governance framework



Source: GLA 2010

There are 12 boroughs in London that are responsible for both collection and disposal of their waste (and are known as unitary authorities). They are Bexley, Tower Hamlets, City of London, Westminster, Southwark, Lewisham, Greenwich, Sutton, Merton, Kingston, Croydon and Bromley. The remaining 21 London boroughs are responsible for the collection of their waste, but with waste disposal operations arranged across four statutory waste disposal authorities. These are:

- East London Waste Authority (ELWA) – Newham, Redbridge, Barking and Dagenham, Havering
- North London Waste Authority (NLWA) – Camden, Islington, Hackney, Waltham Forest, Haringey, Barnet, Enfield
- Western Riverside Waste Authority (WRWA) – Kensington and Chelsea, Hammersmith and Fulham, Wandsworth, Lambeth
- West London Waste Authority (WLWA) – Richmond upon Thames, Hounslow, Ealing, Brent, Harrow, Hillingdon.

Management methods for London's municipal waste

Between 2003/04 and 2008/09, London's municipal waste actually decreased from 4.4 million tonnes to just less than four million tonnes, despite an increase in population from 7.39 million¹ to 7.52 million² over the same period. There are a number of possible reasons for this including:

- more restrictions on the trade waste accepted at household waste reuse and recycling centres
- changes in behaviour, as a result of direct and indirect education on waste reduction, such as smarter shopping campaigns to reduce waste, campaigns to increase use of real nappies, and home composting programmes
- reductions in the waste and recycling collection services offered to small businesses
- changes to consumer packaging, such as the use of lighter materials (for example, using plastic or Tetra Pak in place of glass)

London's municipal waste arisings in 2008/09 were about four per cent lower than in 2007/08. However, they are expected to increase slightly again as London's population grows and the capital comes out of the recession, albeit at a slower rate than previously expected. Despite these reductions, there is still too much waste being produced unnecessarily and not enough being reused, repaired or recycled. Instead, most of it ends up in landfill where its value rots away.

Research³ undertaken for the GLA shows the majority of growth in municipal waste will come from a rise in the number of households, which is predicted to increase by 12 per cent by 2020 and 22 per cent by 2031 from the 2008 baseline of 3.2 million⁴. This means that, without any policy intervention, there will still be a small but steady increase in total municipal waste over time.

London's municipal waste recycling and composting performance

London's municipal recycling and composting performance has improved threefold since 2000/01, from eight per cent to 25 per cent in 2008/09. London's performance on household dry recycling (which includes paper, card, plastics, glass and tins/cans) is similar to other UK regions (see figure 4), despite the challenges of a highly diverse, dense and transient population.

Despite considerable improvements, London is the worst performing region on overall municipal recycling and composting in England and well below the average for England of 37 per cent (see figure 5). London also compares poorly on municipal recycling rates to other international cities like Berlin (41 per cent) and Sydney (29 per cent), although it is better than Paris (19 per cent)⁵.

Recycling and composting play an important role in climate change mitigation by avoiding greenhouse gas emissions that would otherwise be produced in manufacturing from virgin materials.

Figure 4: England's regional dry municipal recycling performance 2008/09

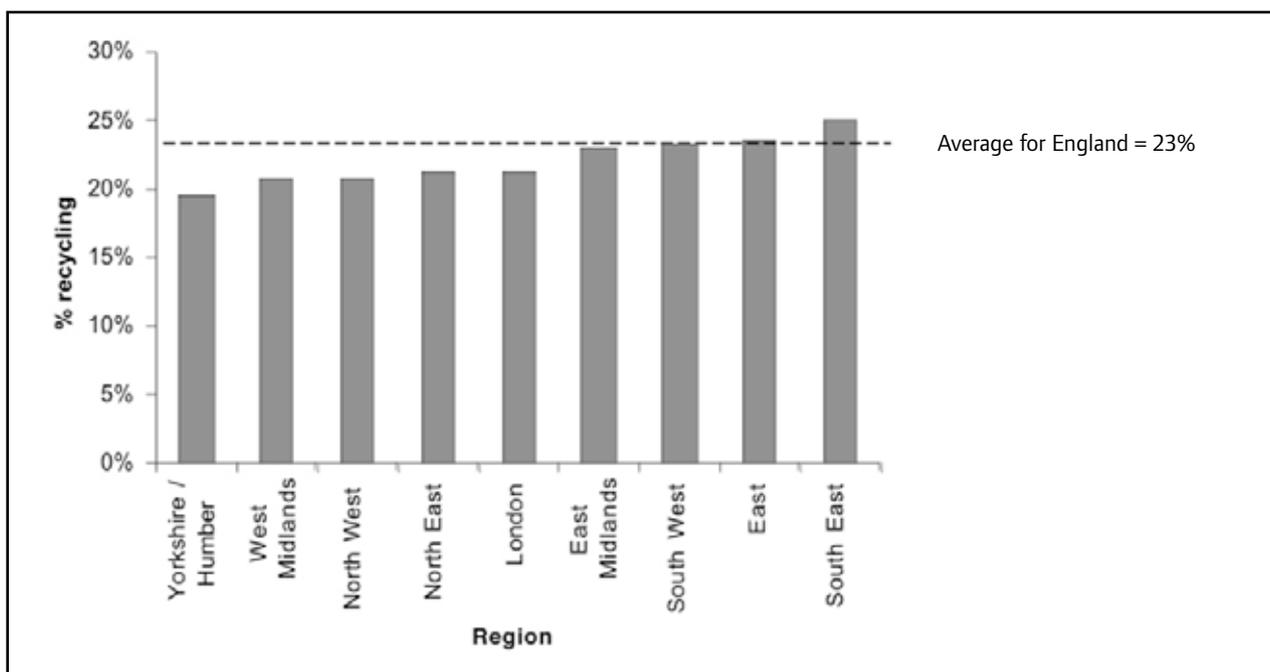
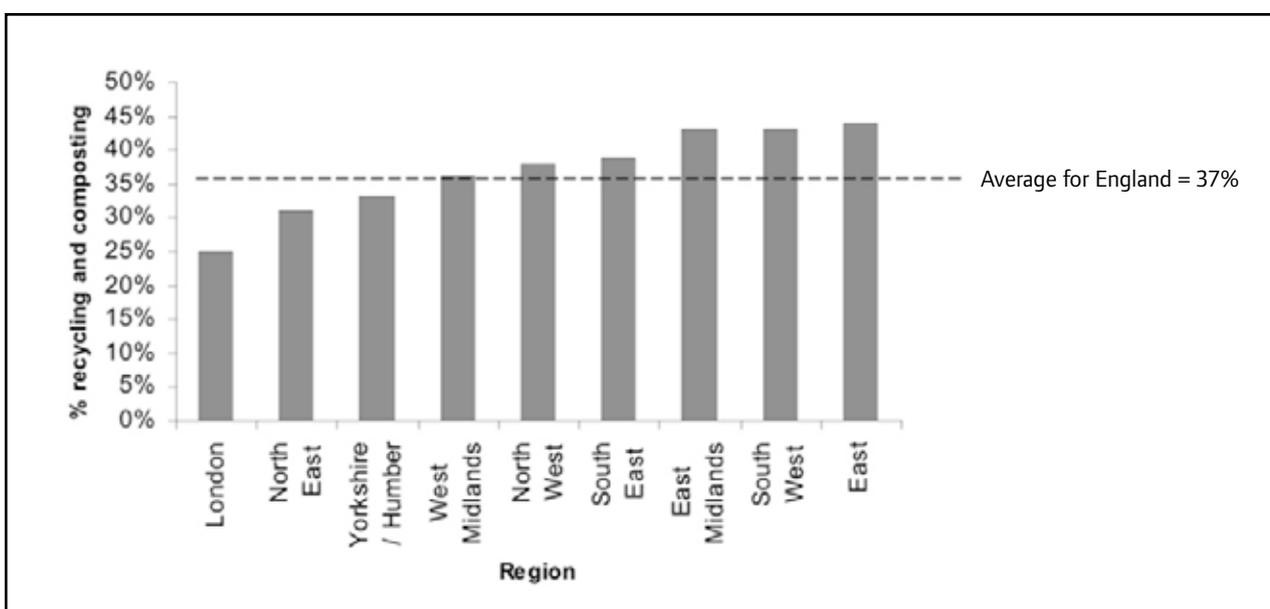


Figure 5: England's regional municipal recycling or composting performance 2008/09

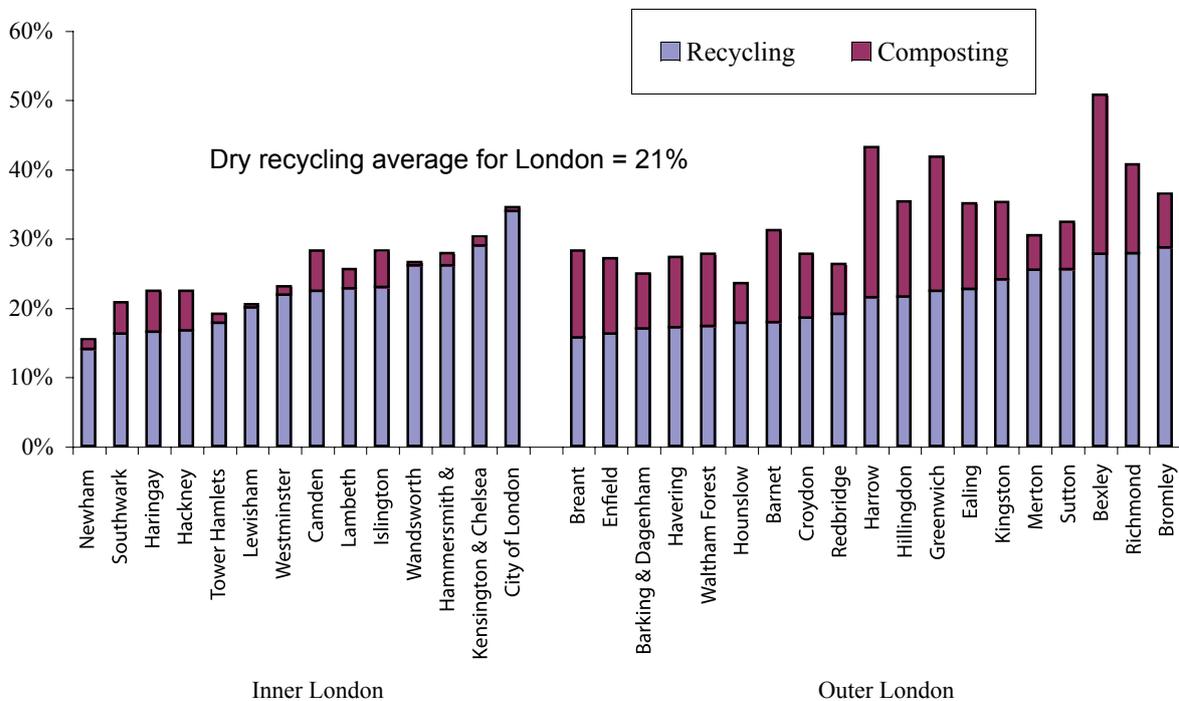


London borough household recycling and composting performance

There is considerable variation in household recycling and composting across London's 33 boroughs ranging from 15 per cent to just over 50 per cent, in 2008/09. Figure 6 shows this variation by borough separating inner and outer London borough for ease of comparison. Thirteen boroughs achieved recycling or composting rates over 30 per cent, with four of these achieving over 40 per cent and one

reaching over 50 per cent. Two boroughs recycled or composted less than 20 per cent. The average household rate for recycling or composting was 29 per cent in 2008/09. Most inner London boroughs are achieving good dry recycling rates often exceeding the dry recycling rates being achieved by the outer London boroughs, and many outer London boroughs have benefitted from organic waste collection services to boost their overall recycling and composting rates.

Figure 6: London's household recycling performance by borough 2008/09



Source: Defra waste statistics, 2008/09, refer: www.defra.gov.uk/evidence/statistics/environment/wastats.

All 33 London boroughs offer at least a basic household kerbside⁶ dry recycling collection service although there is large disparity between the boroughs on which materials are collected

and the methods of collection. London's household recycling and organic waste collection services are summarised below.

Figure 7: Household recycling and composting services provided by London boroughs



Source: Recycling and organic waste collection service information taken from London borough websites and: www.capitalwastefacts.com as of April 2009. Some services may have changed or may only be trial services. Updated service information will be available on www.capitalwastefacts.com in November 2010.

Figure 7 shows the main household recycling and organic waste collection services offered by each London borough. A full list of household recycling and composting services provided by London boroughs can be found at: www.capitalwastefacts.co.uk

London's household recycling and composting services have the following characteristics:

- All boroughs provide kerbside collection services for paper, mixed cans, and plastic bottles. All except two boroughs collect glass at the kerbside and all except one collect cardboard.
- Nineteen boroughs provide a kerbside co-mingled (mixed) recycling collection service. Twelve boroughs provide a kerbside sort service, and two boroughs provide a mix of the two collection services.
- Seventeen boroughs collect dry recyclables in a box or wheelie bin. Eight boroughs use a sack, and eight boroughs use a combination of boxes, sacks and wheelie bins. The colour of recycling containers varies across boroughs.
- Twenty-six boroughs provide a weekly recycling collection service. Five boroughs provide a fortnightly recycling collection service. Two boroughs provide daily recycling collection services.
- All boroughs provide near entry (close to block or estate entrances) or bring site recycling banks for flats and estates, although there is great variation between boroughs on what materials are accepted.
- All except one borough provide a green

garden waste collection service. Eleven boroughs provide separate weekly kerbside collections for food waste, and nine boroughs collect food and green garden waste together. Some boroughs provide food and green garden waste collections for flats and estates.

The variations in household recycling and composting collection services across London can cause confusion for residents, particularly when moving to other boroughs. One of the key complaints Londoners regularly cite when asked about London's environment is the confusing nature of recycling services. Furthermore, very few boroughs offer any kind of financial incentives to increase participation in household recycling or composting services. In most cases, it costs residents less to recycle their waste than it does to put it in their black bag for landfill or incineration.

Recycling performance in flats and estates

Despite extensive efforts, few boroughs have successfully tackled the problems of providing recycling and composting services to flats and other households that are not easily accessed from the street. Many boroughs continue to undertake trials on recycling or composting for flats and estates, but some schemes have been withdrawn due to being too expensive, too difficult, and having low levels of participation.

Indicative survey work with London boroughs showed average recycling or composting rates in flats and estates to be around ten per cent or less. Common barriers to achieving high recycling or composting in flats and estates

include the lack of space for recycling storage and the difficulty of transporting materials to a collection point, often located externally to flats or estates. Targeting flats presents a huge opportunity for increasing London's recycling and composting performance, given that nearly half of London's households are flats⁷.

Recycling performance for non-household municipal waste

In 2008/09, just ten per cent of non-household waste from London's small businesses was recycled or composted, against a national average of 31 per cent⁸. Under the Environmental Protection Act 1990, boroughs are obliged to make arrangements for the collection of non-household municipal waste where a business requests it. A charge can be made to cover costs associated with the management of this waste.

Boroughs are not obliged to provide recycling or composting services, although about two-thirds of London's boroughs do provide such services, most commonly for paper and/or glass⁹. The charges to businesses for recycling collections are typically less than those for mixed (black bag) waste, due to it being more expensive (depending on collection costs) to send waste to landfill or incineration than to send it for recycling or composting¹⁰. Indicative survey work with some boroughs showed that starting up (and running) cost-effective recycling services can be difficult where there are not enough businesses participating to offset collection costs. This is further compounded by the private sector targeting more lucrative waste contracts from

large businesses, leaving smaller, less profitable waste contracts to be picked up by boroughs.

Considering non-household waste made up 21 per cent of municipal waste collected by London's waste collection authorities in 2008/09, the potential for making savings this way is considerable. As it is such a significant proportion of London's municipal waste, it is important that recycling or composting of non-household municipal waste is made a priority. Defra are in the process of changing the definition of municipal waste to include other commercial waste that is similar in composition to household waste. The Mayor is keen to work with Defra and the boroughs to understand the implications of changing the definition of municipal waste, and what this means for providing municipal waste collection services.

Furthermore, small and medium-sized businesses that want to recycle see their local authority as their first port of call for such a service¹¹. Well publicised and widely used business waste recycling services could offer significant opportunities to boroughs to tackle climate change, improve their recycling rates, and off-set some of their collection costs. A recent survey completed by the Federation for Small Businesses for the 2010 local body elections¹² found that small businesses wanted their local boroughs to provide a cheaper, more efficient, waste collection service and help them to become greener businesses. Both of these ends could be achieved through a comprehensive business recycling service.

RRCs play an important role for achieving high local recycling and composting rates. A report¹³ commissioned by the GLA on best practice design of RRCs showed the average recycling and composting rate¹⁴ of London's RRCs improved from 19 per cent in 2001/02 to 40 per cent in 2006/07. Some RRCs today achieve as high as 80 per cent. The report concluded there was great scope for further improvement and that 60 per cent recycling or composting levels were achievable in the short term through good design measures, with minimal costs. Given the strategic importance of these sites, it is important that the current network of RRCs is safeguarded. The Mayor's draft London Plan states that existing RRCs should be protected and their use maximised.

London's municipal waste used for energy generation

London sends 23% of its municipal waste for incineration to its two large incinerators at Enfield and Lewisham, managing approximately 912,000 tonnes in 2008/09 and generating energy in the form of heat and electricity.

Neither of London's incinerators currently use the vast amounts of heat generated, making this an inefficient energy generation process and releasing significant amounts of CO₂. Research¹⁵ undertaken for the GLA demonstrated that incineration of mixed waste operating in combined heat and power mode (CHP) could be carbon neutral in that it displaces as much CO₂ as it creates. This is a result of avoiding CO₂ that would otherwise have been produced from generating the same amount of heat and electricity using fossil fuels, such as coal and gas. Heat makes up two-thirds of energy generated from incineration, so capturing it would greatly improve the overall efficiency and carbon performance of London's existing incineration facilities. More information on reducing the climate change impact of London's municipal waste can be found in policy 2 of this strategy.

London is second only to the West Midlands in the proportion of municipal waste sent for incineration. This proportion will increase when London's third incinerator at Belvedere comes online in 2011.

Table 1: Waste management method by UK region 2008/09

Region	% landfill	% incineration	% recycling	% other
London	49%	23%	25%	3%
East	54%	2%	44%	0%
East Midlands	50%	7%	43%	0%
Northeast	52%	15%	31%	2%
Northwest	59%	3%	38%	0%
Southeast	46%	15%	39%	0%
Southwest	56%	0%	43%	1%
West Midlands	33%	32%	36%	0%
Yorkshire and Humber	56%	10%	33%	1%

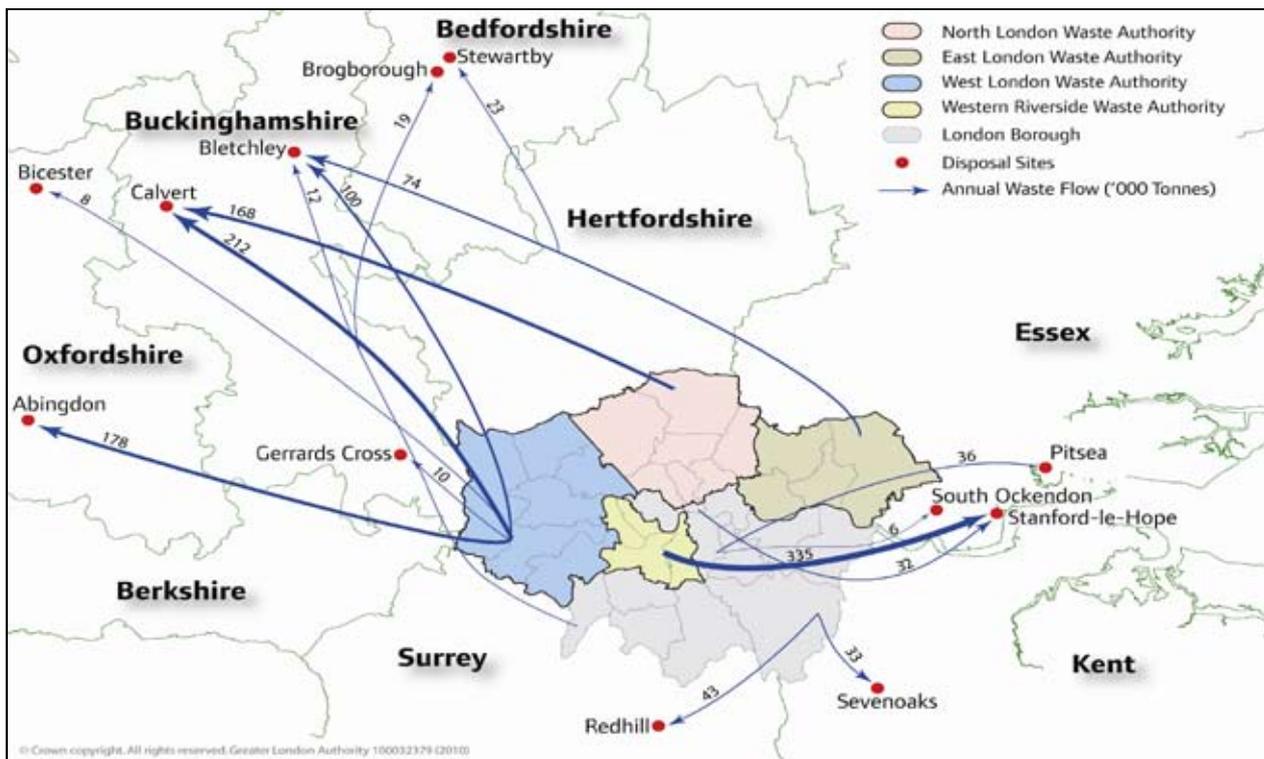
Source: Defra Waste Statistics, 2009. Note: "Other" includes small amounts of pre-treatment of waste

London's municipal waste to landfill

London relies heavily on its surrounding regions for disposing of its waste to landfill (see figure 9). About 77 per cent of London's landfilled waste goes to landfill sites outside London, mainly in the south and east of England. These regions are increasingly reluctant to accept

London's waste and this landfill capacity is due to expire by 2025¹⁶. The remainder is sent to London's two municipal waste landfill sites in Rainham (Havering) and Beddington Farm (Sutton). However, these sites are expected to close by 2018 and 2021 respectively¹⁷ with no new landfill capacity planned within London.

Figure 9: Distribution of municipal waste to landfill sites around London

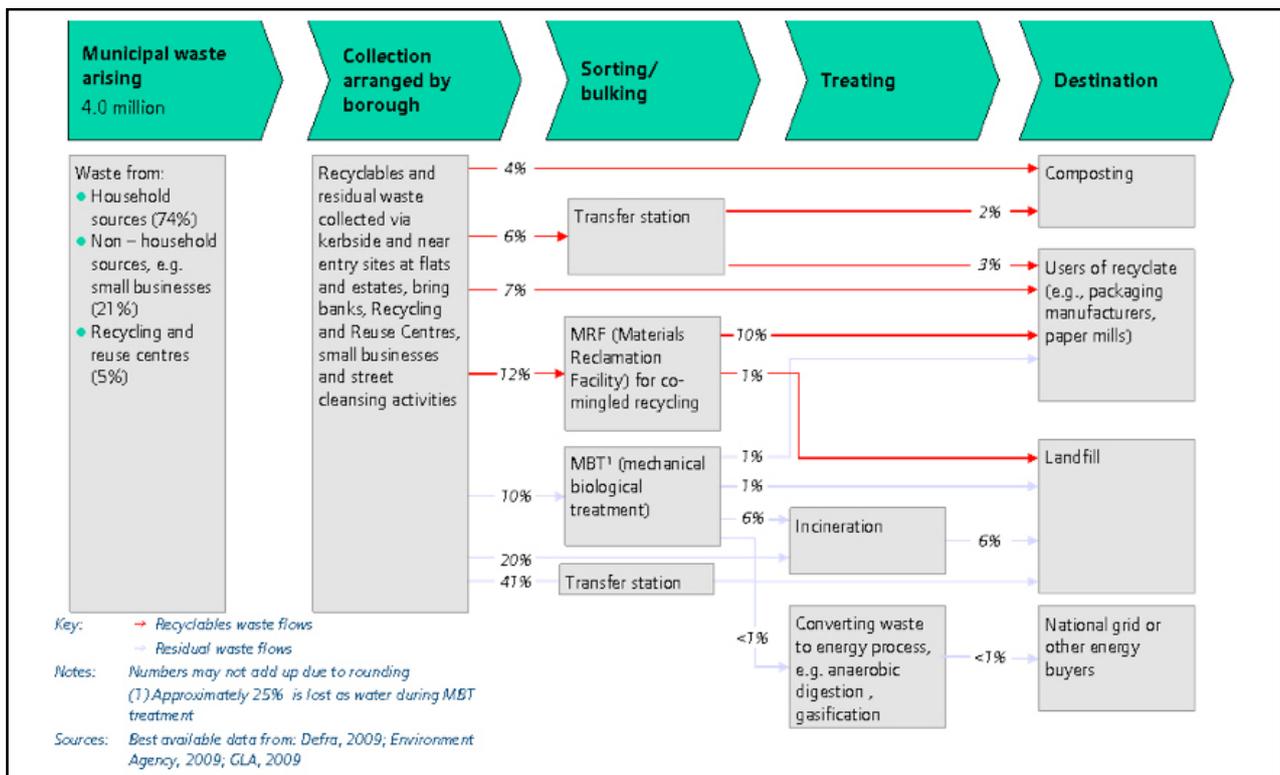


London's municipal waste flows

Figure 10 shows that approximately 60 per cent of London's municipal waste goes to landfill or incineration, often without any form of pre-treatment to recover materials that could be reused, recycled or composted.

Approximately 40 per cent of municipal waste comes from flats and estates. Almost 21 per cent is collected from small and medium-sized businesses, adding to the complexity of analysing and tracking municipal waste.

Figure 10: London's municipal waste flows



End notes

1. Populations trend (at mid-year), DMAG briefing 2005/17, Focus on London's Demography, 200 Table 1: Populations trend (at mid-year), DMAG briefing 2005/17, Focus on London's Demography, 200 3.
2. Table 1: Population by Country of Birth: United Kingdom and London: 2004 to 2007-08: thousands and percentages, GLA Demography, Update, 2002-2009, February 2009.
3. "Future waste arisings in London 2009-2031", GLA, Dec 2009
4. Source: GLA, 2010
5. GLA survey, 2008. Note: differing governance arrangements for municipal waste in other cities makes direct comparison on recycling rates difficult.
6. Properties where waste is collected at the kerbside – usually excludes blocks of flat and large multi-occupancy properties.
7. London housing statistics: <http://www.ons.gov.uk/census/index.html>
8. Source: Defra waste statistics, 2008/09, see: www.defra.gov.uk/evidence/statistics/environment/wastats
9. Business waste collection services offered by London's waste authorities; www.capitalwastefacts.com
10. The overall costs for providing waste collection services depend on a number of variables including the cost of collection (including transport), participation levels in the service, the quality of materials for recycling or composting, and the spot market price for recycled or composted material.
11. SMEs and sustainable waste management in London research findings, GfK for the London Assembly, July 2007 (<http://www.london.gov.uk/assembly/reports/environment/business-waste-strategy-response-app-a-gop-research.pdf>).

12. The Federation of Small Businesses compiled 32 local manifestos, one for each London borough (excluding the City of London), outlining what local councils can do to give a better deal for small businesses. see: www.fsb.org.uk/CouncilManifestoIntro.
13. 'London Reuse and Recycling Centre Best Practice'. Resource Futures, March 2008.
14. Recycling rates exclude inert waste (e. g. rubble, soils)
15. Greenhouse gas performance of waste management scenarios, GLA, January 2008.
16. Source: East of England landfill capacity: East of England RTAB (2002) East of England Regional Waste Management Strategy (consultation draft) Table 12 and 14. South East England landfill capacity report: http://www.southeastra.gov.uk/sustain_publications_research.html
17. Source: GLA Planning Decisions Unit, 2009

3 The Mayor's approach for developing a municipal waste strategy for London

London needs to reduce the amount of municipal waste generated and move away from its reliance on landfill and incineration. This can be achieved by significantly increasing the amount of waste reused, recycled and composted, and generating renewable energy from the remaining waste using a range of technologies. It is particularly important that London stops sending mixed untreated or unsorted waste to landfill or incineration.

In preparing this draft strategy the GLA considered ten different waste management scenarios which were independently modelled on their economic performance. The ten scenarios were compared against an 11th "Do nothing new" baseline scenario to see how each could help London to improve its waste position and make an effective contribution towards meeting the UK's commitments under the Landfill Directive 1999. The modelling considered various options for managing London's municipal waste, including landfill, recycling, composting, anaerobic digestion, incineration and new waste to energy technologies. Judging the outcomes of the model against a number of criteria and sensitivities, a preferred approach (the Mayor's preferred approach) has been selected. The criteria and sensitivities include:

Criteria

- achieving a reduction in the amount of municipal waste produced
- achieving an increase in the amount of municipal waste reused
- achieving high recycling and composting performance, reliant on:
 - a) providing recycling or composting services to every London household; and
 - b) providing recycling and composting collections to local businesses
- a declining reliance on landfill as recycling or composting performance and energy generation from non-recyclable waste increases
- achieving government targets set for the UK.

Sensitivities

- London waste authority contractual requirements for using existing waste facilities
- the GLA's knowledge of new waste infrastructure that London's waste authorities are planning for in the near future
- time necessary to plan, procure, build and operate new waste facilities
- estimated cost and benefits of waste management options, including new waste facilities
- availability and environmental performance of waste management options, including their climate change impact
- the strategy applies the same growth rate used to update London's municipal waste arisings set out in the 2009 minor alterations to the Mayor's strategic plan for London, The London Plan
- More information on these minor alterations can be found at <http://www.london.gov.uk/mayor/planning/london-plan-review/alt-dec09.jsp>.

The economic modelling undertaken for the GLA estimated London's current annual municipal waste management bill to be about £580 million.

The economic modelling concluded a "Do nothing new" approach would increase London's annual municipal waste management bill to about £680 million by 2031.

This figure includes all costs associated with the collection, transport, treatment, and final disposal of London's municipal waste. It also includes capital and operational costs associated with new infrastructure to treat London's municipal waste. This figure does not include project development and consenting costs as these vary greatly depending on the project and location. This £100 million increase will largely be a result of the increase in landfill tax pushing up total disposal costs.

The costs and potential benefits represented in the modelling are indicative only and are based on national research undertaken by WRAP (Waste Resources Action Programme), consultants, market knowledge and some limited data provided by a handful of London waste authorities. It is therefore difficult to fully understand the actual costs of managing London's municipal waste which is likely to be quite different from the rest of the country. Some of London's special circumstances include:

- London's sub-optimal waste governance arrangements. London has 33 waste collection authorities¹ providing 33 different waste and recycling collection services procured through multiple and varied contracts

- London's diverse and transient population, which presents various challenges, including the potentially higher costs involved in effectively communicating details about local waste and recycling services
- London's diverse housing stock and, in particular, the number of flats and multi-occupancy properties where provision of recycling services can be expensive.

The scenarios modelled against the baseline "Do nothing new" scenario involve different approaches to recycling or composting collection systems and different approaches for pre-treating remaining waste (residual waste) to recover more materials for recycling, and to produce solid recovered fuel (SRF) for energy generation. The residual waste approaches consider the performance of pre-treatment waste processes producing SRF with low and high proportions of biomass waste. Biomass waste includes materials such as food and green garden waste, and paper and card. Biomass waste can be used to generate low carbon energy and qualifies for renewable obligation certificates (ROCs). More information on ROCs and the carbon performance of waste management approaches can be found in Chapter 4.

The results from the economic modelling showed that by changing the way we manage our municipal waste London could save between £573 million and £838 million by 2031.

These savings can be achieved predominantly by:

- a) reducing the amount of household waste produced per household each year by approximately one per cent
- b) a gradual decline in municipal waste sent to landfill
- c) achieving 55–67 per cent recycling or composting rates (including reuse)
- d) increasing the amount of non-recyclable waste used for energy generation.

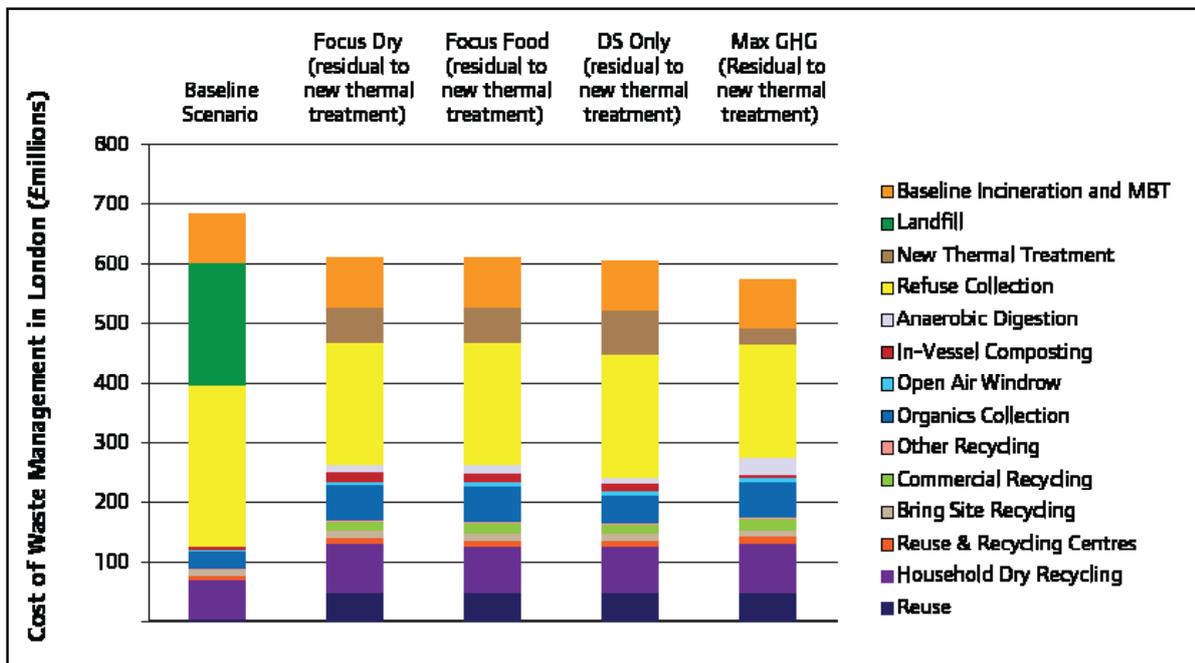
The results from the economic modelling demonstrated there is relatively little difference between the core scenarios that focus on high dry recycling rates and those that focus on collecting food waste. This supports an outcome-based approach applied across the whole waste

management system, allowing flexibility to achieve greatest environmental benefits at least cost. Due to variations in local infrastructure needs and housing stock, it might be appropriate for some waste authorities to focus on food waste collection while others focus on dry recyclables to achieve high recycling or composting rates.

Figure 11 shows the overall annual cost of implementing four of the core waste scenarios split by the various waste management activities. These scenarios can be compared to the baseline scenario for managing London's municipal waste today with no new waste services or infrastructure. The economic performance of all waste scenarios modelled can be found in Table 8.3 in Appendix 4a of this strategy.

Figure 11 shows there is relatively little difference between each of the scenarios, as the greatest savings come from reducing the amount of waste sent to landfill. However, the most cost-effective scenario in 2031 that achieves the best CO₂ eq savings is the "Max GHG savings (residual to new thermal treatment)" scenario, whereby the quantity of residual waste decreases significantly such

Figure 11: Total (annual) costs of waste management in London in 2031



Notes:

- "Incineration and MBT" refers to London's current and planned incineration capacity (Belvedere) plus existing mechanical biological treatment capacity (MBT).
- "New thermal treatment" for the purposes of the modelling undertaken refers to gasification technologies.
- "DS Only" refers to a focus on properties only with door step recycling collection services. These are properties, typically detached or semi-detached properties, with their own dedicated recycling collection container.
- "Max GHG" refers to a focus on providing services achieving the greatest possible greenhouse gas savings. This assumes dry recycling and food waste collection services are provided to every London household.

that the costs of residual waste collection and treatment also fall significantly. This highlights the value of achieving high recycling or composting rates (about 67 per cent). The modelling, however, did show that achieving such high recycling rates would require, on average, greater up-front service investment costs than the other scenarios, where the financial benefits would be realised over a longer timeframe.

The economic modelling suggested the collection and recycling or treatment of source separated wastes (such as the collection of food waste for treatment by anaerobic digestion) can be less expensive than residual waste treatment. This needs to be taken into consideration when developing new infrastructure to strike the balance between recycling, pre-treatment, and residual waste infrastructure, to avoid over-capacity.

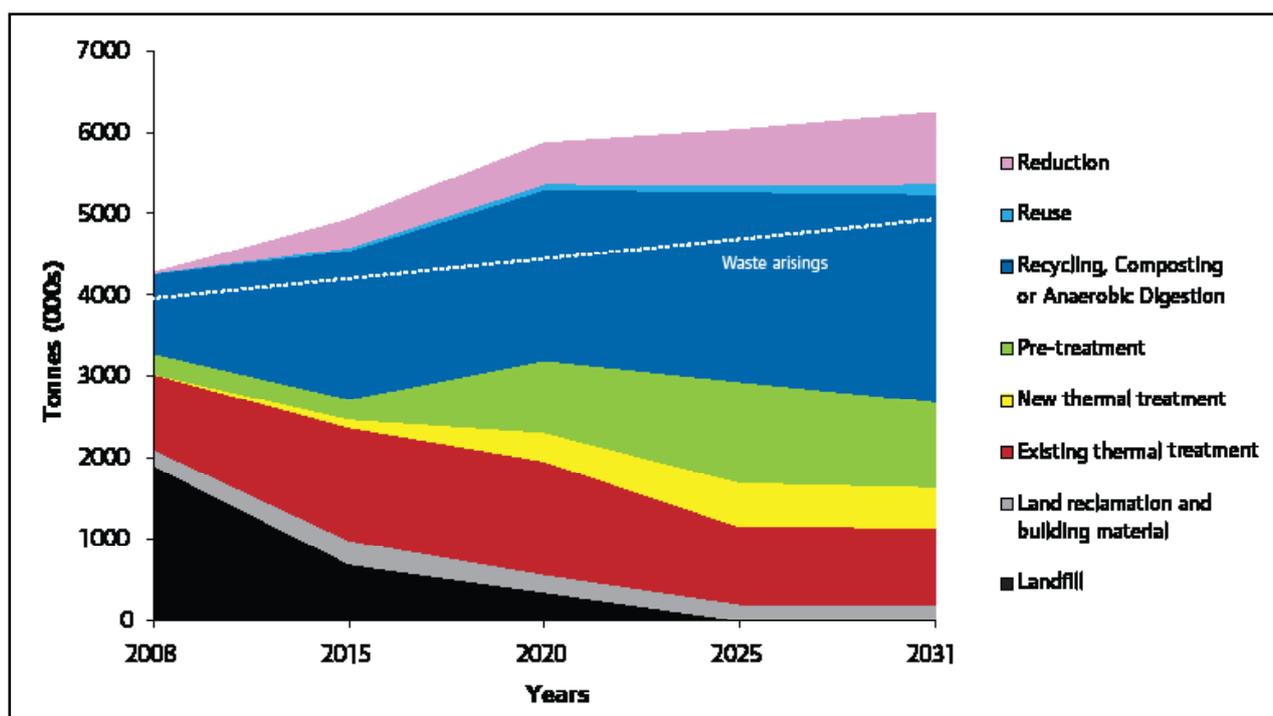
The full economic modelling report informing the Mayor's preferred approach can be found in Appendix 4a. The environmental performance including the climate change impact of waste management activities is set out in Chapter 4 and in Policy 2.

Developing a strategy for London's municipal waste

The Mayor's targets, as set out in the introduction to this strategy, have been set based on a combination of the economically appraised waste management scenarios and the environmental performance of waste management options, including their impact on climate change. From here the Mayor's preferred approach is determined for managing London's municipal waste to 2031.

London's municipal waste is expected to increase from approximately four million tonnes in 2008/09 to five million tonnes in 2031. Figure 12 illustrates the Mayor's preferred approach for how he wants London's municipal waste to be managed, and the estimated infrastructure capacity necessary to implement the Mayor's preferred approach. Chapter 4 of this strategy sets out the amount of current and planned municipal waste infrastructure in London, and sets out the estimated additional waste infrastructure capacity required to implement the Mayor's preferred approach.

Figure 12: The Mayor's preferred approach for managing London's municipal waste by 2031



Source: GLA, 2010.

Notes:

- "Recycling, composting or anaerobic digestion" includes anaerobic digestion capacity for separately collected organic waste and anaerobic digestion of mixed waste following pre-treatment.
- "Pre-treatment" refers to processes such as mechanical biological treatment and autoclave that recover materials for recycling and prepare a solid recovered fuel (SRF) from remaining waste for energy generation.
- "Existing thermal treatment" refers to London's existing incineration capacity plus the Belvedere incinerator expected to be operational in 2011. This figure also includes some pre-treatment infrastructure capacity to recover materials for recycling, with the remaining waste going to incineration.
- New thermal treatment refers to advanced conversion technologies gasification and pyrolysis. It could also include small scale incineration of high-biomass waste generating heat and power.
- As some waste is expected to go through several processes (for example, pre-treatment), the overall capacity required is greater than total waste arisings.
- Modelling used to inform the Mayor's preferred approach is indicative only and focuses on a number of sensitivities and assumptions including waste arising projections, waste flows, collection methods, and improvements in recycling or composting performance. The GLA will continue to update the modelling annually to reflect changes in London's municipal waste position.
- See Appendix 5 for key assumptions of waste flows and waste sources.

Policies 1 to 5 in this strategy set out how London can achieve the Mayor's preferred approach, with a strong focus on waste reduction and developing the new waste infrastructure necessary for London to achieve higher recycling or composting performance and to become more self-sufficient in its waste management. In achieving the Mayor's preferred approach it is assumed that:

- There will be no increase in household waste generated between 2009 and 2031. The Mayor hopes his waste reduction policy and proposals will off-set any growth in household waste, despite an expected 22 per cent increase in the number of households in London. Implementing the Mayor's waste reduction policy and proposals will result in approximately 890,000 tonnes less waste produced than expected that would otherwise require management by 2031. A particular focus will be on reducing the amount of waste produced per household (Policy 1)
- The amount of waste reused each year will increase from approximately 6,000 tonnes today to about 120,000 tonnes a year by 2031 (Policy 1)
- Diverting waste from landfill through increased levels of reuse, recycling, composting, and generating energy more efficiently will achieve significant CO₂ savings, resulting in a carbon positive outcome (Policy 2), and will better capture the economic benefits for London (Policy 3)
- There will be a step change in London's municipal waste recycling or composting performance to achieve 45 per cent performance by 2015, 50 per cent by 2020 and 60 per cent by 2031 (Policy 4). Infrastructure to process London's recyclable and organic waste will need to double from approximately one million tonnes per year today to two million tonnes per year by 2020 to achieve 50 per cent recycling or composting performance. Most of this capacity will be necessary by 2015
- More capacity will be needed for many different aspects of dealing with municipal waste by 2031, particularly in the sorting of materials for recycling, and for reprocessing, composting and anaerobic digestion (Policy 5)
- There will need to be a significant increase in new waste pre-treatment capacity to recover as many materials as possible for recycling from mixed waste, with the remaining waste turned into fuel for energy generation. This capacity will need to increase from approximately 250,000 tonnes per year today to about one million tonnes per year by 2031
- It is assumed that overall thermal treatment energy generation capacity will increase from approximately one million tonnes per year in 2008/09 to about 1.5 million tonnes in 2025. There will be a steady increase in new thermal treatment capacity, reaching approximately 500,000 tonnes a year by 2025, with a particular focus on combined heat and power (Policy 5). The Mayor expects new thermal treatment capacity to be taken up using advanced conversion technologies such as gasification and pyrolysis

- Demand for thermal treatment capacity is expected to decline from 2025 as recycling and composting performance increases, reducing the quantity of mixed waste requiring treatment (Policy 5)
- With the exception of the Belvedere incinerator, it is assumed there will be no more incinerators in London, and that the Edmonton incinerator will close by 2020, having reached the end of its life. The Mayor expects London's incinerators to utilise waste heat generated by 2031 and move towards the incineration of treated, non-recyclable waste only (Policy 5)
- The Mayor's policies and proposals will

put London on the path to achieving zero municipal waste to landfill by 2025, particularly with respect to untreated waste to landfill. Some of this waste, such as incinerator bottom ash and other wastes from treatment processes, are already used as building materials and for land reclamation and these amounts are expected to increase slightly to 2031. Today landfill is the only suitable disposal method for some wastes such as asbestos and contaminated mixed waste. The Mayor expects that the amount of municipal waste that is currently only suitable for landfill (about 10 per cent) will decline as waste treatment and generation technologies improve

End note

1. Includes the City of London Corporation.

4 The rationale for the Mayor's approach

Reducing the environmental impact of London's municipal waste

There are a number of reasons why we need to manage our waste more effectively and efficiently. The rising cost of landfill, growing concerns around energy security and climate change, emergence of new commercially available waste technologies, and changing consumer behaviour have all made a "business as usual" approach no longer viable. Climate change is a key driver for London's municipal waste management policy. Sending waste to landfill generates greenhouse gas emissions – particularly biodegradable waste, such as food, garden waste, paper and card, which releases methane (a powerful greenhouse gas) as it decomposes. London's sends about 1.95 million tonnes of municipal waste to landfill each year releasing approximately 465,000 tonnes of greenhouse gas emissions, expressed as a CO₂eq figure.

There is a massive opportunity for London to achieve significant CO₂eq savings by diverting more municipal waste away from landfill. This will also reduce energy bills, create economic value and increase energy security. Most of the waste we throw away could be reused, recycled or composted, or used to generate renewable energy, which would achieve significant CO₂eq savings. By first reducing the amount of municipal waste produced and then selecting the optimal means for dealing with the municipal waste sent to landfill, London could save approximately one million tonnes of CO₂eq emissions each year, resulting in a 1.5 million tonne net positive carbon outcome.

This is because reusing, recycling or composting, or generating energy from waste not only saves emissions from landfill (direct emissions), it also avoids indirect emissions that would have otherwise occurred in manufacturing from virgin materials or generating energy using fossil fuels (such as coal or gas). The net effect would be a substantial positive carbon outcome from London's municipal waste.

Considering direct and indirect emissions is a common approach for determining the overall CO₂eq performance of waste management. This approach uses lifecycle assessment techniques to measure all emissions associated with the production of waste through to its final disposal. A lifecycle approach allows us to better understand how waste can positively contribute to climate change mitigation by focusing on the management methods that achieve the greatest CO₂eq savings as a whole.

Table 2 shows the potential lifecycle CO₂eq performance of different waste management methods for various waste materials. Negative figures in red text represent CO₂ eq emissions avoided that would have otherwise occurred in manufacturing from virgin materials, sending waste to landfill, or generating energy using current UK energy grid mix. UK grid mix is dominated (80 per cent) by energy produced from fossil fuels, such as coal and gas, and therefore has a greater "carbon intensity" than, for example, methods of generating energy from food waste and wood, deemed to be "carbon neutral".

The figures in table 2 can help identify the optimal treatment methods for each material. For example, the optimal treatment method for food waste, after waste reduction, is anaerobic digestion. Each year London landfills approximately 478,000 tonnes of municipal food waste¹. By applying the lifecycle emission factor for landfill, given in Table 2, it can be seen that this waste releases approximately 139,000 tonnes of CO₂eq each year. Using food waste to generate renewable energy instead, through anaerobic digestion, would save about 179,000 tonnes of CO₂eq a year. This figure represents

the combined emissions saved from both landfill diversion (139,000 tonnes) and from energy that would otherwise have been generated (40,000 tonnes) using the current UK energy grid mix.

The figures in Table 2 can give an indication of the emissions generated or avoided by each management method. The true performance will depend on many factors, including the quality of the waste materials, the composition of mixed waste going for treatment, and the configuration and performance of waste facilities. All of these need to be taken into consideration.

Table 2: Lifecycle CO₂eq performance (expressed in kg CO₂eq per tonne of waste)

Waste Material	Waste prevention	Recycling (closed loop*)	Anaerobic Digestion (generating electricity only)	Composting	Landfill
Paper and card	-950	-299	-83		399
Kitchen / food waste	-2428		-83	-47	291
Garden / plant waste	-89			-42	291
Wood	-256	-1			1116 **
Textiles	-19294	-4372			209
Plastic (dense)	-3100	-1182			11
Plastic (film)	-2500	-1000			5
Metals (ferrous)	-3100	-1623			3
Metals (non - ferrous)	-11000	-10721			4
Glass	-840	-169			3
Mixed waste***					251

Source: WRATE 2 emission factors, Defra, August 2010.

* Closed loop recycling refers to recycling materials back into their original form and use; for example, recycling glass back into glass instead of recycling it into aggregate.

** Discussions with the Environment Agency have clarified that the emission factor assigned to wood when sent to landfill represents an error within WRATE 2. It has been presented here as it is what remains in the current version of WRATE 2.

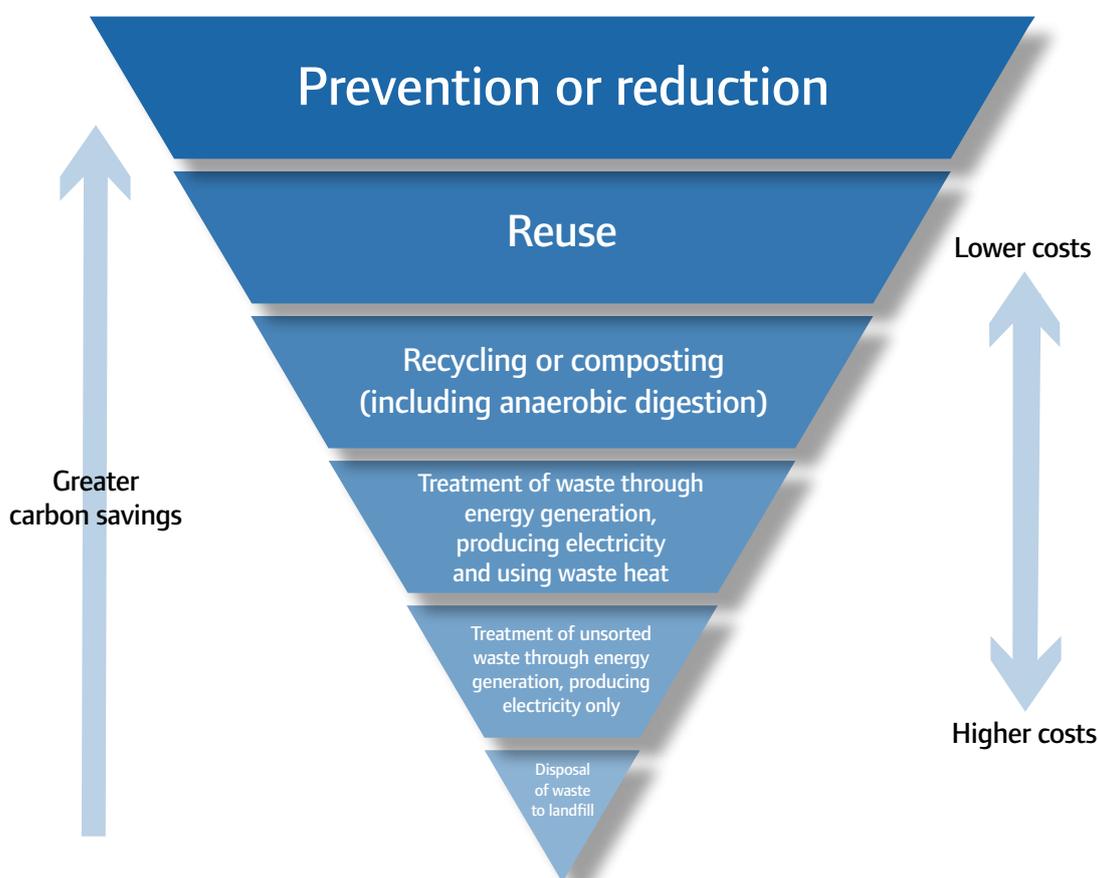
*** Defra has not produced emission factors for treatment of mixed waste. A mixed waste emission factor has been taken from an indicative composition of London's municipal waste contained in "Development of a greenhouse gas emissions performance standard for London's municipal waste", August 2010, GLA.

Implementing the Mayor's waste management hierarchy

To achieve the greatest CO₂eq and cost savings, the Mayor's waste management hierarchy should be applied in sequence from the top down. Each stage provides the optimal method of management based on the composition of the waste stream at that point. The Mayor's waste hierarchy differs from the national waste hierarchy as it separates combined heat and power from electricity generation only. This distinction is important

as generating electricity only from residual or unsorted waste, in almost all circumstances, is a net producer of CO₂eq emissions where as facilities that produce electricity and utilise waste heat perform considerably better in CO₂eq terms. The waste hierarchy is, however, a guide. In terms of energy generation from waste and CO₂eq emissions, the biomass content of the waste is the main contributing factor and therefore the scenario that performs best in CO₂eq emissions terms should be given preference.

The Mayor's waste management hierarchy



If there is a tension between implementing the waste hierarchy and achieving greater climate change mitigation benefits, preference should be given to those options achieving greater climate change benefits.

Reduction or prevention

Waste reduction, or prevention is by far the most cost-effective and environmentally beneficial way to reduce the impact that waste has on the environment. There are two main aspects to this:

- improving London's resource efficiency – reducing or preventing waste minimises the demand for new resources and energy, reducing the size, costs and environmental impact of waste treatment and disposal facilities
- reducing the contribution of waste to London's CO₂ eq emissions – notably methane from landfill sites but also CO₂ (a benefit of more reuse and recycling).

By reducing the amount of municipal waste produced each year by only one per cent, London could save around £5.8 million in waste management costs and 73,000 tonnes of CO₂eq emissions.

Reuse

Reuse should then be considered, because it reduces demand for both new and reprocessed materials, avoiding their associated production costs and environmental impacts. Reuse also delivers substantial value in the form of local employment and training, as well as in the local distribution of items to people in need of support, helping to alleviate poverty.

Voluntary and community groups (third sector groups) have in the past been the pioneers of reuse. The reuse sector in London employs about 450 staff and 1,500 volunteers and trainee placements. In 2008, 16,000

households living in poor conditions were helped by the provision of reusable furniture and appliances, after referrals by social workers and housing officers.

The Third Sector Reuse Capacity Report 2007 (Reuse Capacity Report)² undertaken by the London Community Resource Network (LCRN) for the GLA estimates London households throw away 1.7 million reusable household items every year (mainly bulky waste such as furniture, appliances and small household effects). More recent research³ undertaken by the LCRN of the reuse tonnage available in London shows that at least two-thirds of London's annual bulky waste stream (65,000 tonnes) is reusable. However LCRN estimates that only about ten per cent (or 6,000 tonnes) of this perfectly good material is collected. The greatest reuse opportunities exist for capturing a greater proportion of household bulky waste and old office equipment.

The reuse sector is keen to do more but faces a number of barriers. The Reuse Capacity Report identified the following key barriers faced by the third sector to providing effective reuse services:

- insufficient funding, often under short-term arrangements (typically year to year) making it difficult to secure long-term contracts
- insufficient skills and capacity – many are volunteer-based services, focusing more on delivering social services and not contract and business development
- insufficient storage space despite a full stock of donated materials

- low visibility of reuse and the lack of publicity about reuse options, which are limiting demand
- significant market weaknesses, identified in both the supply and demand side of reuse, with less than ten per cent of items that could be reused in London captured, and less than five per cent of households in need of affordable furniture, appliances and other vital equipment accessing reuse services.

Without a centrally co-ordinated operational reuse network in London, most reuse organisations are unable to tackle these problems.

Recycling or composting (including anaerobic digestion)

Following reduction and reuse, preference should then be given to recycling or composting at source. As shown in Table 2, recycling common household items, particularly plastics, metals, paper/card and textiles, achieves significant greenhouse savings. This is also true, to a lesser extent, of glass and organics.

Particular opportunities exist for treating London's municipal food waste using anaerobic digestion. Anaerobic digestion breaks down organic material (food and green garden waste) in the absence of oxygen, producing a biogas that can be burnt in a gas engine or linked to hydrogen fuel cells to generate renewable energy. Anaerobic digestion also produces compost material⁴ that can be used as a fertiliser substitute in gardens, parks and farms.

To achieve higher recycling or composting performance, the Mayor believes recycling and composting needs to be easy for Londoners to do, whether they are at home, in the workplace or on the street.

Boroughs need to be able to offer a core set of waste collection, recycling and composting services, irrespective of where Londoners live or work, and the type of property they occupy. In addition, the Mayor supports boroughs setting high recycling or composting targets to move London towards 60 per cent recycling or composting by 2031. Although this poses a big challenge, the proposed targets match those set by the South London Waste Partnership and West London Waste Authority for their constituent boroughs. Together, they represent a third of London's municipal waste authorities.

The targets are also in line with Local Area Agreement household recycling or composting targets, in which two-thirds of London boroughs are aiming to achieve, on average, 36 per cent recycling by 2011.

Once reduction, reuse and recycling or composting activities at source have been exhausted, waste remaining (residual waste) should be treated to recover as much additional recyclable material as possible, particularly materials with high embodied carbon such as plastics, cans and textiles. This can be done using pre-treatment technologies such as autoclave, a steam sterilisation process that enables the different materials to be sorted more easily, and mechanical biological

treatment (MBT), where a combination of mechanical and biological treatments separate certain elements of the waste.

However generating energy from waste needs to be considered from a resource management perspective, not from a waste disposal

Box 1: Renewable Obligation (RO): The RO is the main government programme for delivering renewable electricity. Energy companies are required by law to generate a proportion of their electricity supply from renewable sources. Renewable obligation certificates (ROCs) are issued to show compliance. Generators can sell their ROCs to suppliers to receive a premium on top of income from electricity generated. As of April 2010 the RO only applies to generating installations of 5MW generating capacity or higher.

Such technologies are important if the best climate change mitigation benefits are to be achieved for London. Research⁵ undertaken for the GLA found that untreated mixed waste being used for energy generation had the greatest climate change impact after landfill as a waste treatment method. Recycling offered a much better environmental outcome in terms of CO₂eq savings. It also showed the importance of using pre-treatment technologies for producing solid recovered fuel (SRF) from remaining non-recyclable waste for energy generation. Producing SRF with a high biomass content achieves the greatest CO₂eq savings and opportunities for securing renewable obligation certificates (ROCs).

Treatment of unsorted waste through energy generation

The waste hierarchy dictates that once reduction, reuse and recycling options have been exhausted, non-recyclable waste left over should then be used to generate energy.

perspective. Preference should be given to using facilities where both heat and power are generated, to be used either on site, or exported off site, to achieve the greatest CO₂eq savings. This should be done using a process that is eligible for ROCs. Heat makes up two-thirds of energy generated, so capturing waste heat greatly improves the overall efficiency of energy generation facilities.

Preference should also be given to those technologies with the greatest electrical efficiencies and fuel flexibility. Significant opportunities exist for using advanced conversion technologies such as anaerobic digestion, gasification, and pyrolysis.

Some of these technologies are still gaining acceptability in the market and not all are commercially available at a large scale. However, increasingly greater take-up of these kinds of new technologies is essential as they can achieve high efficiencies and lower CO₂eq emissions

than incineration. The gas fuels produced by advanced conversion technologies can be burnt to produce steam, used as a fuel for gas engines or used in hydrogen fuel cells to generate renewable energy. There is also a developing opportunity to inject clean waste-derived gas into the gas grid network which, given London's extensive gas network, is a real opportunity. Incineration can only produce electricity through the production of steam at electrical efficiencies of around 25–28 per cent. Gas engines can produce electrical efficiencies in the region of 30 per cent or above, while fuel cells can be in excess of 50 per cent efficient. More information on energy generation technologies can be found in Policy 2.

Disposal of waste to landfill

This is the last and least desirable waste management option and one that is becoming increasingly unacceptable. Biodegradable waste sent to landfill produces methane, a greenhouse gas 21 times more potent than CO₂. Non biodegradable waste sent to landfill is removed from the resource chain and becomes a wasted commodity.

In the short to medium term, the Mayor expects landfill will continue to play a part in the management of certain types of waste, such as asbestos, where landfill is currently the most appropriate means of disposal.

Energy generation and pre-treatment processes, such as mechanical biological treatment and autoclave, also produce reject or inert residues (for example, rubble, and contaminated silt and glass) where landfill is currently the only suitable

treatment option. Material currently only suitable for landfill makes up about ten per cent of municipal waste. It is expected this fraction will decrease over time as technologies improve to be able to recover more value from this waste. However the focus now needs to shift from landfilling unsorted, untreated waste containing recyclables and organic waste to the disposal of reject and inert residues from recycling, energy generation and other treatment processes.

Generally, applying the waste hierarchy will achieve the greatest CO₂eq savings. However, there are certain circumstances where the waste hierarchy conflicts with achieving the greatest climate change benefits. For example, depending on the condition of wood, it may be better to generate energy using wood waste rather than to recycle it. In these cases, waste authorities should aim to take the approach that will deliver the greater climate change benefits.

In addition to making carbon savings, optimising the treatment of waste can also contribute significantly to a reduction in London's energy bill. Based on the wholesale cost of electricity and gas, London's municipal waste after maximising recycling could contribute £90 million of savings to London's £4.4 billion electricity bill and take £24 million off London's £2.5 billion gas bill⁶.

It is costing London too much

The second biggest driver for change is the increasing cost of managing our waste, mainly due to the rise in landfill tax.

The total cost to London of managing its municipal waste, including the collection, transport, treatment, and final disposal activities, is approximately £580 million every year⁷. When compared to London's total council tax bill of £2.98bn, this figure represents about 20 per cent of the total council tax bill. The average annual council tax bill in London is £1,212 and therefore waste management represents £242 for the average council tax payer.

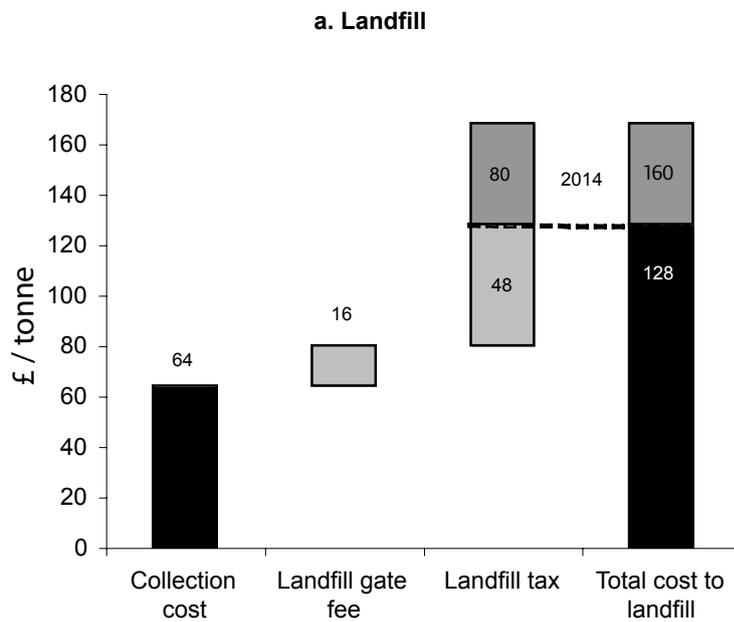
Waste authorities must pay fees to have waste collected (collection costs) and then pay for waste that is not reused, recycled or composted to be accepted at landfill sites or incinerators (landfill and incineration gate fees). A tax is then applied to waste disposed to landfill. These costs are shown in Figure 13.

The main effect the landfill tax has had over the past six years is to make the cost of recycling (including collection costs) cheaper than landfill – approximately £109 per tonne for recycling compared to £128 per tonne for landfill. Today landfill tax stands at £48 per tonne.

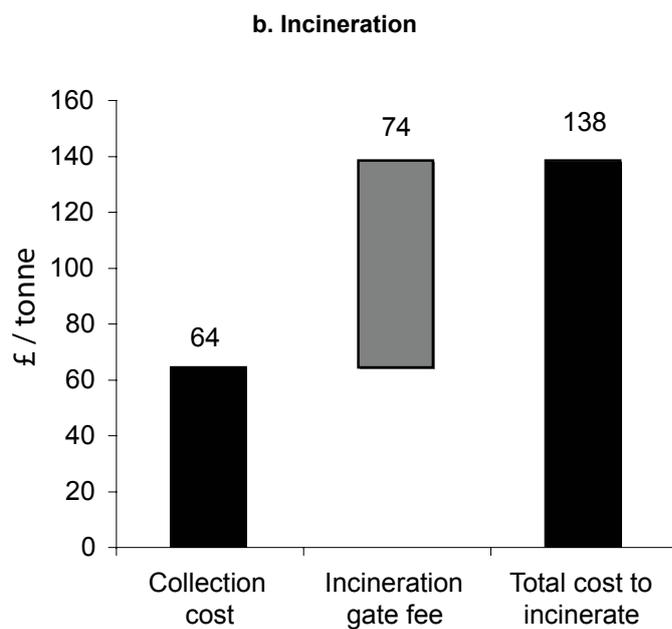
This will increase by £8 each year until at least 2014, when it will be £80 per tonne. This will raise London's current annual bill for sending municipal waste to landfill from about £250 million to roughly £310 million. Landfill tax has also made the cost of energy generation from waste more comparable to landfill, and in some cases more commercially attractive, depending on contractual arrangements.

In addition to the increase in landfill tax, Defra is revising the definition of municipal waste, which will include a lot more commercial waste, to ensure the UK is meeting landfill diversion targets under the European Landfill Directive. Implementing this new measure will put considerably more pressure on local authorities, communities and businesses to manage their municipal waste better to reduce costs. More information can be found at www.defra.gov.uk.

Figure 13: Collection costs and landfill and incineration gate fees



Note: Landfill tax at £48 per tonne in 2010, rising £8 / tonne per year to £80 by 2014



Source: Economic Modeling for the Mayor's Municipal Waste Management Strategy, 2010; London Borough Survey, GLA, 2009. Typical collection costs based on interviews with waste authorities. Individual waste authority costs will vary.

As with landfill and incineration, most waste authorities also incur collection costs and gate fees with the processing of recyclable materials. These costs will be lower for the small number of waste authorities that have a share in waste treatment facilities or have revenue-share entitlements worked into their

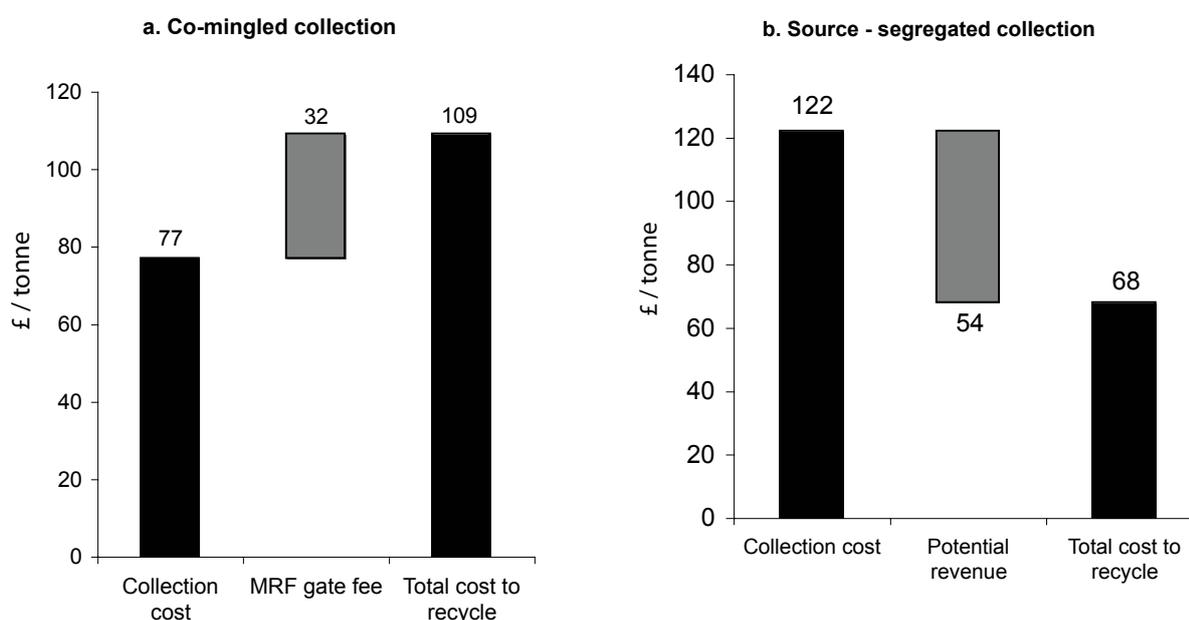
contracts. Typical recycling collection and gate fee costs and potential revenue are shown in Figure 14 overleaf. Table 3 sets out indicative prices for the most common recovered materials, indicating the significant revenue potential. It is difficult to express exact figures as prices are subject to market fluctuations.

Table 3: Average prices for common recyclable materials

Material	Price per tonne
Mixed paper	£55
Mixed card	£50
Mixed glass	£20
Plastic bottles	£110
Mixed cans	£142
Textiles	£200

Source: Economic Modelling for the Mayor's Municipal Waste Management Strategy, Appendices Table 22, GLA, August 2010.

Figure 14: Typical costs to recycle waste



Source: Economic Modeling for the Mayor's Municipal Waste Management Strategy, GLA, 2010; GLA Survey of Boroughs, 2009; WRAP Kerbside Recycling: Indicative costs and performance, 2008

Notes: Typical costs based on median values from WRAP. Individual waste authority costs will vary.

Figure (b) does not include sorting or bulking costs

Potential revenue is calculated using WRAP's recycled material prices and average waste composition analysis from Defra.

Mean revenue for source-segregated recycling is based on:

(1) The average composition and weight of materials (paper, glass, plastics, cans) in household waste arisings, see Economic Modeling for the Mayor's Municipal Waste Management Strategy, GLA, 2010.

(2) The average price for materials (paper, glass, plastics, cans), see Economic Modeling for the Mayor's Municipal Waste Management Strategy, GLA, 2010.

Recycling collection costs have traditionally been higher than residual waste collection costs because:

- volumes of recyclable materials per household have been lower than volumes of residual waste, so collection vehicles have to travel further to reach capacity
- collecting recyclable materials can require separate vehicles or multiple compartments within one vehicle to collect different materials
- compaction vehicles collecting recyclables compact less than those collecting residual waste and therefore carry less material by weight.

Waste contractual arrangements

To date the main focus of London's waste authorities has been to manage municipal waste as efficiently as possible and at minimal cost to the taxpayer. Traditionally this has been by adopting low-cost collection methods and outsourcing the treatment and disposal (usually sending it to landfill). One consequence of this 'least cost' approach is that sometimes waste authorities have not actively pursued the opportunity to generate income from their waste management activities. This approach will not be the most cost-effective approach for much longer. The cost of waste management in London has increased in recent years and will continue to rise for the foreseeable future, as changes in European and central government legislation are pushing up the cost of landfill. The decline of landfill space is exacerbating the problem.

Many waste authorities have not yet capitalised on the growing market for recycled materials, or on the demand for the energy that can be produced from waste because of this approach. Part of the problem lies in the fact that they have tended to enter into long-term inflexible contracts, where the emphasis has been on a stable pricing structure. These contracts have rarely been linked to the revenue generated by private contractors from selling on materials and generating energy from waste, partly due to legislation and partly due to a preference to outsource risk.

The Mayor believes that London is missing a huge proportion of the economic opportunity that municipal waste presents to the city. The data in figures 13 and 14 suggests there are significant savings to be made - in the region of £90 million⁸ per year - by managing municipal waste in the optimal way.

Waste authorities sharing the benefits

In most cases waste authorities do not own or have any share in waste sorting or reprocessing infrastructure, nor do they receive any revenue from recycled materials. There is an economic opportunity for waste authorities in getting hold of some or all of the potential revenue from recyclable material. Figure 14 (b) highlights potential revenue from recyclable waste of £54 per tonne for material collected separately at the kerbside, excluding any sorting or bulking costs (the costs of gathering material together). The precise level of revenue available to a waste authority will depend on whether they own and operate the sorting and bulking facilities or procure the services from a third party.

Organic waste collections

Based on initial analysis with some waste authorities, the cost of separately collecting and treating organic waste (food and green garden waste) stands at about £149 per tonne, which is broadly similar to collecting residual waste and sending it to landfill. Separate collections of organic waste, particularly food waste, which is particularly well suited to renewable

The need to manage more of our municipal waste locally

Achieving regional self-sufficiency

Increasingly there is a need to manage waste closer to its source and reduce reliance on landfill. The counties surrounding London no longer want to landfill London's waste in their countryside and therefore the Mayor has set a

Box 2: Feed in tariff (FIT)

The FIT is a financial support scheme to encourage the growth of renewable electricity capacity. The government requires that energy companies purchase electricity from renewable generators for a guaranteed price, which is significantly above the normal market rate. This gives micro-generation up to 50kW and renewable energy installations up to 5MW a guaranteed tariff for the electricity they generate and also for their electricity sales. The UK FIT came into force in April 2010.

Renewable heat incentive (RHI)

Both the RO and FIT only cover renewable electricity generation. Pending review by the coalition government, a new RHI would support growth in renewable heat. It is expected that the incentive would apply to the generation of renewable heat at all scales, whether it is in households, communities or at an industrial scale.

energy generation using anaerobic digestion, will become more commercially attractive as landfill taxes increase. At the same time, energy generation will bring additional income through ROCs, the heat feed-in-tariff (FIT), and the Renewable Heat Incentive (RHI) - government incentives to encourage the generation of power from renewable sources.

net self-sufficiency target for the management of London's waste of 100 per cent by 2031.

This strategy does not deal specifically with regional self-sufficiency or how it is to be achieved as it is a planning issue dealt with in the London Plan. The London Plan is currently under review and key policies and proposals have been set out in The London Plan – consultation draft replacement plan, October 2009.

This can be found at www.london.gov.uk/shaping-london/london-plan/docs/london-plan.pdf. The key waste policies in the London Plan include:

- working towards zero waste to landfill by 2031
- setting new recycling/composting targets
- promoting waste management activities that achieve the greatest possible climate change mitigation benefits
- managing as much of London's waste within London as practicable
- commissioning new, independent, borough-level projections of London's waste arisings. This arisings data will be used to update London borough waste apportionment, using existing waste apportionment methodology
- reviewing the definition of waste to be managed within London
- adopting a more flexible approach to self-sufficiency, so that the carbon outcome of the treatment method and transportation are given greater consideration.

Today, about 40 per cent of London's municipal waste is bulked up for treatment or landfill outside London and, along with it goes the economic value of recovered materials for recycling or energy generation. London needs to invest in new waste facilities to manage more of its waste and reduce its reliance on outer regions, and to retain the value of its waste through increased levels of reuse, recycling and energy generation within London.

The London Waste and Recycling Board was set up to help address this issue and attract private

investment to new waste infrastructure projects. The Board, chaired by a Mayoral appointee, has £73.4 million from both central government (£49.4 million⁹) and the GLA Group (£24 million) from 2008-2012. The objective of the board is to promote and encourage a reduction in waste and an increase in the proportion that is reused or recycled, as well as promoting methods of collection, treatment and disposal of waste that are more beneficial to the environment.

More information about the board, including its members and funding priorities, can be found at www.lwarb.gov.uk.

The board's remit covers municipal, and commercial and industrial waste, and construction, demolition and excavation waste. The GLA has worked with the board to identify "capacity gaps" between the Mayor's preferred approach for municipal waste and known projects in development for all waste in London. The resulting focus of the board is set out in Figure 15. It is estimated London needs an additional four million tonnes of municipal waste infrastructure capacity by 2031. This includes approximately 930,000 tonnes of municipal waste infrastructure the GLA is aware of that has been granted planning permission outside the board's involvement¹⁰. To develop that infrastructure, the board's funds alone will not be sufficient. Given the extent of the capacity gap and the capital cost associated with infrastructure development, the board's fund is only capable of supporting partial fulfilment of the "gap" requirements. The board will therefore take a targeted approach to the use of its funding to make sure the identified capacity

gaps are narrowed as much as possible.

It is estimated London needs the additional municipal waste infrastructure capacity in order to implement the Mayor's preferred approach for managing London's waste to 2031, and, in particular, to:

- achieve zero municipal waste to landfill by 2025.
- meet London's waste authorities' Landfill Allowance Trading Scheme (LATS) allowances by 2020
- achieve 60 per cent recycling or composting rates by 2031
- generate energy from as much organic and non-recyclable waste as possible, achieving the greatest environmental benefits.

It is estimated that the total infrastructure investment required for London's municipal waste could have capital costs in the region of £800 - 900 million¹¹ and annual operational costs of £60 - 70 million. Since the board asked for expressions of interest from industry in February 2009, 223 project sponsors have

applied for some form of support. Those asking for financial support have requested £664 million for projects that have total capital and revenue costs of £3.7 billion. The board's current portfolio of project bids for which it has approximately £36 million to fund represents about one million tonnes of waste infrastructure per year, of which at least 400,000 tonnes per year is expected to be available to treat municipal waste. More information on the board's portfolio of project bids is set out in Policy 5.

In addition to the 930,000 tonnes of infrastructure to manage some of London's municipal waste that has already been granted planning permission, the GLA is also aware of Private Finance Initiative (PFI) funding supporting waste infrastructure to manage 1.3 million tonnes of London municipal waste each year beginning 2014¹². Figure 15 shows the remaining infrastructure capacity gap of approximately 1.8 million tonnes by 2031.

Box 3: Private Finance Initiatives (PFI)

PFI's are arrangements typified by joint working between the public and private sector. In the broadest sense, PFI's can cover all types of collaboration across the interface between the public and private sectors to deliver policies, services and infrastructure. Where delivery of public services involves private sector investment in infrastructure, the most common form of Public-Private Partnership is the Private finance initiative. The Government's last PFI round from 2008-2011 for waste management infrastructure in the UK totaled £3.2 billion.

The funding for new infrastructure to fill the capacity gap will need to be met by a mixture of public and private investment. It is evident through the board's project portfolio that the waste industry is keen to help fill London's waste capacity gap, but significant additional investment is necessary from banks and other financial institutions to fill the market. It is essential the board continues to receive funding from the government beyond 2012 to develop

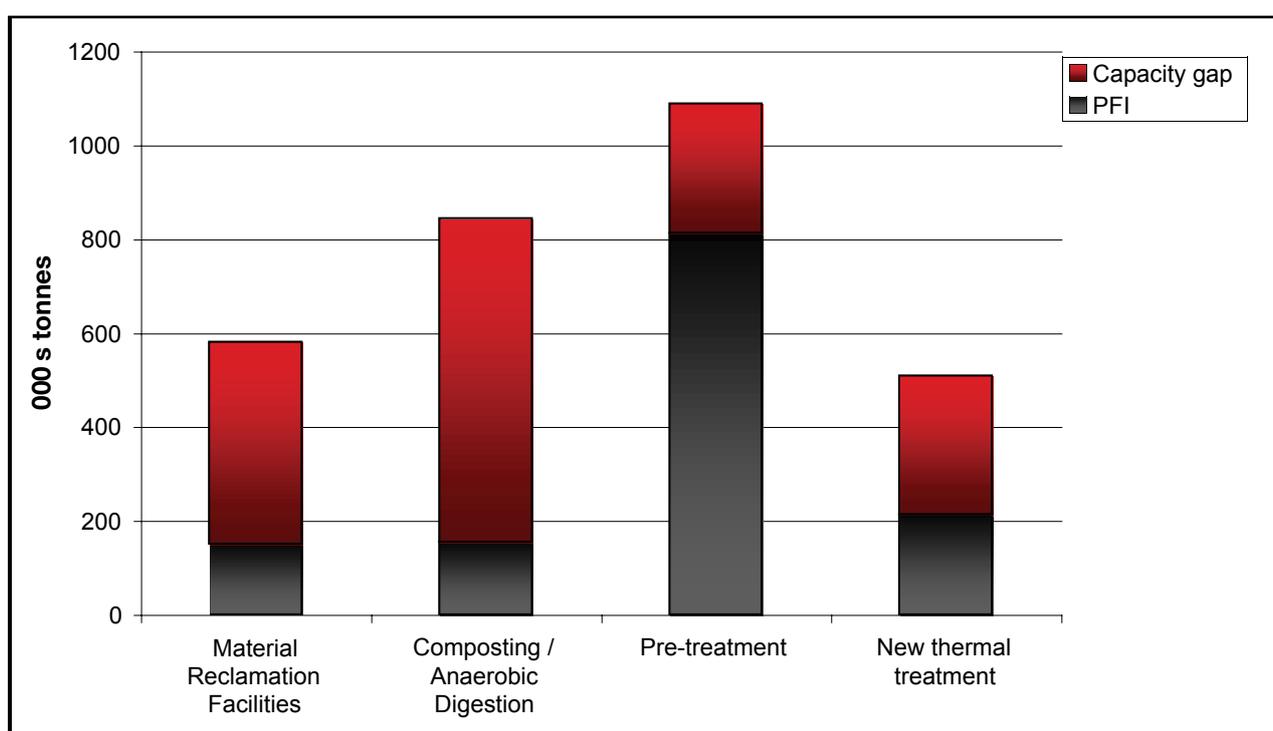
projects in its current pipeline, to give certainty to the market, and to leverage in additional funding for further projects to help fill the capacity gap. There are currently a number of funds to leverage investment that could contribute to developing waste management in London, including the London Green Fund (£114 million) and London's European Structural Fund (£517 million).

Box 4: The London Green Fund and London European Structural Fund

The London Green Fund is a financing framework for energy efficiency measures to cut carbon across London. The fund is likely to target building retrofit, decentralised energy and waste technology initiatives. The fund aims to leverage private investment to help enable the development of infrastructure required to meet the Mayor's 60 per cent carbon reduction target by 2025.

The European Structural Fund is the European Union's main instrument for supporting social and economic restructuring. It is used to tackle regional disparities and support regional development.

Figure 15: Estimated additional waste infrastructure capacity required to manage London's municipal waste



Source: GLA and London Waste and Recycling Board, August 2010
 "PFI" is Private Finance Initiative reference case funded projects.

The Mayor expects an additional 114,000 tonnes of reuse capacity will also be required by 2031 in order to meet his target for three per cent of London's municipal waste to be reused by 2031. The greatest opportunities are for reusing items direct from households (that is, donations), local authority bulky waste collections, and reuse and recycling centres.

With the exception of the Belvedere incinerator, expected to open in 2011, the modelling used for Figure 15 assumes there will be no more additional incinerators in London.

The modelling further assumes that the SELCHP (South East London Combined Heat and Power) incinerator will only operate until 2031¹³ and the Edmonton incinerator will close by 2021¹⁴.

The Mayor estimates that approximately 500,000 tonnes of new energy generation capacity will be required for municipal waste by 2031, and that this capacity will be met through new technologies producing both heat and power.

Finally, the modelling used for Figure 15 assumes that, as recycling and composting performance increases, the demand for material reclamation facilities will also increase. By contrast, it assumes the increase in recycling and composting will ultimately lead to a decline – from an initial significant period of increase – in the capacity needed for the pre-treatment of waste and its use for energy generation over the longer term.

Contributing towards decentralised energy generation

Decentralised energy will play an important part in helping London meet its 60 per cent CO₂ reduction target by 2025 by reducing the carbon intensity of the energy that London consumes. The Mayor has set a target for London to generate 25 per cent of its energy requirements from low-carbon decentralised energy by 2025.

Box 5: Decentralised energy generation

Decentralised energy generation is defined here as low carbon power and/or heat generated and delivered in London. London's non-recycled municipal waste, used as low carbon fuel, will play an important role in delivering the Mayor's decentralised energy targets. There are broadly four scales of decentralised energy system:

1. *Micro-generation*: Generation systems are often mounted on or next to a particular building, supplying energy to a single user who usually owns the generation equipment; typically, renewable energy systems of a capacity up to 50 kilowatts of electricity (kWe).
2. *Single development*: Energy is generated and sold to a single development that may include a number of buildings and customers (up to around 3,000 domestic customers). The plant may or may not be owned and operated by the energy users. This would include smaller communal heating schemes, such as BedZed in Sutton. It would also include larger onsite networks with CHP generation equipment in the order of three Megawatts of electricity (MWe) capacity and project capital cost in the region of £10 million. The Cranston Estate regeneration project in Hackney is a typical example.
3. *Multi-development (medium scale)*: These supply energy to more than one site, for which district heat networks are a necessary requirement. A wide range of customers and demand types may be involved, with a number of different generation systems connected totalling up to 40MWe in capacity. This scale could support up to 20,000 homes, public buildings and commercial sector consumers. It is very likely that the plant will be owned and operated by a third party. The system could cost up to £100 million. The Southwark Multi-Utility Services Company (MUSCo) is a typical example.
4. *Area wide (large scale)*: These are large infrastructure projects with a lifetime of at least 40 years. Such schemes typically involve several tens of kilometres of heat pipe supplying 100,000 customers or more and providing connection to multiple heat generators such as power stations. Capital costs of piping would exceed £100 million. It is likely that separate bodies will own and be responsible for different parts of the system. Such systems can take from five to ten years to deliver. The planned London Thames Gateway Heat Network is an example.

A number of factors are coming together to drive forward changes in how we use and supply our energy. There are rising concerns about the carbon intensity of our energy supply, energy security, long-term increases in fossil fuel prices and a growing awareness that global fossil fuel resources are finite. Today, virtually all our electricity is produced from large, fossil fuel-powered power stations outside the capital and these stations fail to capture and make use of the waste heat created during the production processes. This, in combination with transmission and distribution losses, means that conventional power stations have an efficiency of around 35 to 55 per cent. By contrast, locally produced combined heat and power generating facilities (CHP) are around 80 per cent efficient. Increasing decentralised CHP facilities using waste reduces CO₂ emissions by avoiding the need to generate heat from fossil fuels, gets rid of costly transmission losses, cleans up the source of power, and gives London more control over its own energy supply.

Today, only a quarter of London's municipal waste is used to generate energy, the large majority of which is mixed waste to incineration, generating electricity only at efficiencies of around 25 per cent. London's waste

is a resource and, once recyclable materials have been removed from the waste stream, the remaining materials in the waste stream can be used to produce renewable energy. This is estimated to be around 40 per cent of total municipal waste produced once the Mayor's recycling or composting targets have been achieved.

Achieving a high level of street cleanliness

The UK has been branded the dirty man of Europe for too long. The UK gained this reputation for two reasons: firstly, for the amount of waste we send to landfill as a nation and secondly, for a perception that the UK has a problem with litter. The latter may be somewhat hard to establish, as there is no comparable data for Europe and the wider world.

We can, however, compare London's performance alongside the other English regions. Table 4 sets out the Best Value Performance Indicator 199 regional benchmarks for 2007/08. This indicator (BV199) measures the percentage of land surveyed that is of a poor or unsatisfactory standard of cleanliness for litter, detritus, graffiti and fly-posting.

Table 4: National Indicator 195 regional averages 2009/10

NI 195 2009/10 Regional averages – The percentage of relevant land and highways that is assessed as having deposits of litter, detritus, fly-posting and graffiti that fall below an acceptable level.

Region	Litter NI 195a	Detritus NI 195b	Graffiti NI 195c	Fly-posting BV 199d
South West	4%	9%	1%	0%
South East	4%	9%	1%	0%
East of England	5%	12%	2%	1%
West Midlands	5%	12%	3%	0%
North East	5%	7%	2%	0%
East Midlands	6%	12%	2%	0%
Yorkshire & Humber	6%	13%	3%	0%
North West	7%	12%	3%	1%
London	8%	14%	6%	2%

Source; <http://www.pat.communities.gov.uk/pat/>
Detritus is defined as “non-living particulate organic matter”.

Table 4 shows that London is currently ranked ninth out of the nine English regions for cleanliness when it comes to litter, detritus, graffiti and fly-posting when comparing NI 195 scores represented as regional averages.

The cleanliness of London's streets also remains a key issue for Londoners. Results of a 2010 Annual Survey of Londoners¹⁵ showed that the most problematic issue affecting the quality of the environment in London is perceived to be litter and pollution from traffic equally (23 per cent of respondents each) with fly tipping coming third (17 per cent). When asked what the priorities for improving the environment in London are; pollution from traffic (mentioned by 22 per cent) was first, followed jointly by noise from traffic and fly tipping (21 per cent each) and then litter (20 per cent).

For visitors and commuters alike, the first impression of the cleanliness of London is its transport corridors and stations. London Councils has recently signed a Memorandum of Understanding with Network Rail on improving the cleanliness of land adjoining Network Rail land. The Mayor is keen to see if this joint approach will improve London's transport corridors. Trains and tube cars are another area for attention, especially following the increase in the number of free newspapers in circulation. Newspapers left on trains and in tube cars tend to attract other litter, such as coffee cups.

Year after year, Local Environmental Quality surveys identify the most prevalent type of litter on London's streets as cigarette ends and other smoking-related litter, found in around 95 per cent of survey samples.

Cigarette ends are not only unsightly but are often washed into London's watercourses during heavy rainfall, causing harm to fish and birds due to the leaching of toxic chemicals. The Clean Neighbourhoods and Environment Act 2005 amended the Environment Protection Act 1990, providing clarity that cigarette ends are to be considered as litter and it is therefore an offence to drop cigarette ends on the ground or into any body of water.

Chewing gum dropped on the street continues to be an unsightly and costly problem for London. We estimate that cleaning up chewing gum from London's streets costs between £5 million and £10 million, depending on the level cleaning undertaken. To put this in perspective, the last time Trafalgar Square was cleared of chewing gum, the bill came to £8,500. Chewing gum manufacturers are beginning to develop solutions to this problem with at least one degradable chewing gum product now on the market.

London Councils¹⁶ estimates that in the UK over 13 billion plastic bags are issued to shoppers

each year. That means the average person gets 220 plastic bags each per year. On this basis, Londoners as a whole are given almost 1.5 billion plastic bags per year. This is not only a waste of resources but also often a contributor to London's litter. Plastic bags are a particularly difficult form of litter as they are easily blown about, often end up in our watercourses, harm wildlife and look particularly unsightly when they are caught in trees. The public's view of plastic bags is changing and many retailers are leading the way by either charging for plastic bags, providing reusable bags or rewarding shoppers for using their own bags. However, still more can be done.

The Mayor intends to tackle the issue of litter through a programme of work, set out in Policy 6, which will encourage community action, work with producers of products that frequently end up as litter, improve the cleanliness of the transport network and make it easier for Londoners to report environmental crimes such as fly tipping and graffiti.

End notes

1. Based on food waste making up 26 per cent of London household waste to landfill. Taken from Greenhouse gas balances waste management scenarios, Appendix Four: Waste Composition, GLA, January 2008. London household waste arisings are taken from Defra 2007/08 household waste statistics.
2. Third sector reuse capacity in London, GLA 2007.
3. London Reuse Network submission to the London Waste and Recycling Board, LCRN June 2010.
4. Defra permits material from the anaerobic digestion of organic waste to be used as a soil improver providing it meets the PAS 110 standard. More details on PAS110 can be found at www.defra.gov.uk
5. Greenhouse gas balances of waste management scenarios, GLA, February 2008.

6. Potential energy contribution based on: Organics include the following (1) ROC subsidy of £90/MWh@0.151 MWh/tonne = £13.59/tonne. Refer: www.enviros.com/PDF/BN020RenewableObligation/pdf (2). Wholesale electricity price of 11p/Kwh@0.151 MWh/tonne = £16.61/tonne. Refer GLA LEGGE 2010. (3) Wholesale gas (heat) price of 3.25p/KWh@.259 MWh/tonne = £8.42/tonne. Refer GLA LEGGE 2010.
7. Economic Modelling of the Mayor's Municipal Waste Management Strategy, GLA, July 2010
8. Source: GLA modeling, 2010. Key assumptions:
 - Collection costs and gate fees figures taken from "Economic Modeling for the Mayor's Municipal Waste Management Strategy", GLA, 2010; GLA Survey of Boroughs, 2009
 - Wood waste going to biomass boilers with no gate fee. Source: GLA 2009
 - Paper, card, textiles, metals, glass, plastics going for recycling. Organic waste going to anaerobic digestion.
 - Remaining residual waste going for energy generation.
 - Landfill tax set at 2014 rate of £80 / tonne
9. Defra funding for the London Waste and Recycling Board currently under review
10. A full breakdown of existing and planned municipal waste management infrastructure funded through the PFI is set out in appendix 3.
11. Based on a range of capital and operational costs for waste infrastructure taken from Economic Modelling for the Mayor's Municipal Waste Management Strategy, GLA, August 2010
12. Defra PFI projects supporting municipal waste, see Appendix 3 for more details.
13. Veolia, 2009
14. London Waste Limited, 2009
15. <http://www.london.gov.uk/sites/default/files/Annual%20London%20Survey%202010%20toplines.pdf>
16. <http://www.londoncouncils.gov.uk/banthebag/Shoppingbagskeyfacts.htm>

5 Proposed policies and proposals

Policy 1: Inform producers and consumers of the value of reducing, reusing and recycling

Vision

Consumers understand and respond to the value of reducing, reusing and recycling municipal waste.

From vision to policy

The Mayor will work with local authorities, the third sector, businesses and the waste industry to promote the reduction, reuse and recycling of municipal waste, with the aim of decreasing the amount of municipal waste produced.

From policy to action - proposals

Proposal 1.1 Setting waste reduction and reuse targets

- The Mayor will set a Londonwide target to reduce household waste by 10 per cent per household, of 2008/09 levels, by 2020 and increasing to 20 per cent per household by 2031.
- The Mayor will set a target to increase the amount of London's municipal waste reused or repaired from about 6,000 tonnes (0.15 per cent of municipal waste) each year in 2008 to 40,000 tonnes (one per cent) a year in 2015 and 120,000 tonnes (three per cent) a year in 2031.

Proposal 1.2 Supporting Londonwide communications campaigns and initiatives that promote municipal waste reduction, reuse and recycling

- The Mayor will work with WRAP (Waste Resources Action Programme), London boroughs and the London Community Resource Network to deliver Recycle for London as a communications programme encouraging waste reduction, reuse and recycling among both consumers and producers. The London Waste and Recycling Board has awarded funds to the Recycle for London communications programme for the three year period 2010-2013.
- The Mayor, through Recycle for London, will promote Zero Waste Places projects in London as a means to showcase best practice and encourage London boroughs to participate in the scheme.
- The Mayor, through Recycle for London, will provide communications support to London boroughs that obtain funding from the London Waste and Recycling Board to improve recycling in flats (see Policy 4 for details of the programme to develop recycling in flats).
- The London Waste and Recycling Board has allocated funds to develop a Londonwide reuse network. The Mayor will work with London waste authorities, the London Waste and Recycling Board and the London Community Resource Network to develop the London Reuse Network, promoting waste reduction and reuse initiatives in the third sector, such as furniture reuse schemes, which can support and supplement existing local authority waste collection services.

Proposal 1.3 Reducing the amount of municipal waste entering the waste stream

- The Mayor will work with businesses to help them reduce waste and improve resource efficiency, using the Mayor's Green Procurement Code.
- The Mayor will identify leading businesses to work with the London Waste and Recycling Board as a network of mentors to small businesses wanting to improve resource efficiency and reduce waste.
- The Mayor will work with business to hold a packaging and product design competition aimed at "designing out" waste from the start.

Proposal 1.4 Tackling barriers to providing effective reuse services

- The Mayor will work with third sector organisations, the London Waste and Recycling Board and waste authorities to tackle barriers that make it hard for the third sector to deliver local authority reuse and recycling services by:
 - a) providing funding through the London Waste and Recycling Board to develop a reuse network that would allow reuse organisations to work together to share resources and bid more effectively for local authority reuse and recycling services.
 - b) working with waste authorities to link their bulky waste services, where practicable, with local reuse services, when developing municipal waste contracts.

What this will achieve

Overall these proposals will help reduce the amount of municipal waste generated by informing producers and consumers of the value of waste reduction, reuse and recycling.

The best option is to prevent waste from entering the waste stream in the first place. Using the Mayor's Green Procurement Code the Mayor will influence business and help them reduce this element of municipal waste at source.

Based on the GLA's projected increases in the number of households over the next two decades¹, the Mayor has set a waste reduction target of 10 per cent per household by 2020 increasing to 20 per cent per household by 2031 (based on 2008/09 household waste arisings). If achieved, the Mayor's household waste reduction targets will result in no overall increase in the total amount of household waste produced in London each year over the next 22 years, despite an increase in population. This means that in 2031, London will produce the same amount of household waste as in 2008/09, despite an additional 753,000 households.

Reduction and reuse of municipal waste will also deliver significant savings to London's waste authorities, which will avoid some treatment and disposal costs. We estimate that London waste authorities spend approximately £580 million a year managing London's waste. Every one per cent of London's municipal waste that is reduced or reused can save London as much as £5.8 million.

While the exact benefits of these policies can be difficult to quantify, the Mayor will put in place performance indicators and monitoring programmes to track the success of engagement and initiatives. As an example, Recycle for London has set a provisional target to divert roughly 100,000 tonnes of waste to recycling or composting by March 2013². Not sending this waste to landfill could save approximately 89,000 tonnes of CO₂eq emissions.

A well resourced, coordinated and publicised London Reuse Network could divert up to 1.7 million reusable household items from landfill each year, representing approximately 40,000 tonnes of waste. It could also cut £5 million off London's waste bill. Increased levels of reuse and repair could also have many social benefits, such as creating jobs, increasing training and development locally, and alleviating poverty.

There can be positive changes in behaviour when engagement and initiatives for reduction, reuse and recycling are well integrated, and targeted at producers and consumers. Engagement will play an important role in achieving the Mayor's target of 45 per cent municipal recycling or composting by 2015, 50 per cent by 2020 and 60 per cent by 2031.

Proposals

The Mayor believes promoting smarter, better-informed purchasing habits and less packaging in product design is the most effective way to cut down on London's unnecessary waste. The Mayor feels he can best influence waste reduction and increase awareness of the value of reuse and recycling in London in these areas by supporting local and regional communications and initiatives. The Mayor wants London to lead the way in waste reduction but believes waste reduction actions need to be taken nationally as well, to be truly effective. The Mayor will write to the government proposing a set of measures

that can be adopted to reduce waste generation and offering his assistance in promoting, trialling and enhancing these measures in London.

Proposal 1.1: Setting waste reduction and reuse targets

The Mayor wants to set a Londonwide target to reduce household waste by 10 per cent per household by 2020, increasing to 20 per cent per household by 2031, of 2008/09 levels. These targets are consistent with the decreasing levels of household waste in London in recent years, which have seen waste fall by one per cent per year on average since

2006. The Mayor's targets also reflect what he believes he can achieve by engaging with manufacturers and retailers, and by delivering Recycle for London, to reduce household waste. The Mayor welcomes London's waste authorities setting their own waste reduction targets to achieve the Londonwide target.

Proposal 1.2: Supporting Londonwide engagement to promote the reduce, reuse and recycle message

The London Waste and Recycling Board has allocated funds to the GLA to run Recycle for London in partnership with WRAP. Recycle for London's expanded remit will address waste prevention, reuse and recycling through communications, and will target priority materials such as plastics, textiles and food waste. Recycle for London will instigate a programme of communications of greater scope and complexity than before, incorporating a number of focused themes rather than a single recycling campaign. Communication from a central body helps to develop a consistent approach and alleviates confusion among Londoners. Recycle for London will co-ordinate its activities to synchronise with national and local activity.

Recycle for London will work with the London boroughs to ensure the delivery of coordinated and consistent communications across London that will lead to an increase in reduction, recycling and reuse rates and therefore a reduction in the volume of household waste sent to landfill and its associated CO₂eq emissions. Recycle for London will be delivered at the

Londonwide level with additional funding available for boroughs for localised activity. In addition, at least 35 per cent of the funding has been allocated to support borough services.

Reduction: Recycle for London's primary reduction focus will be to reduce unnecessary food (and drink) waste by raising awareness of the economic and environmental cost of food waste and then providing clear, practical guidance on how to reduce food waste. Waste authorities can apply to Recycle for London for funding, guidance and communication support for local waste minimisation campaigns, and for supporting waste reduction activities such as home composting and using real nappies.

The Mayor will promote the Zero Waste Place projects in London through Recycle for London, as a way of showcasing best practice and encouraging London boroughs to participate in the scheme.

Reuse: The two main challenges for a reuse programme are to increase the donations of items, by both individuals and businesses, to supply the reuse network, and to persuade customers to purchase or acquire used items as an alternative to buying new ones. Recycle for London will target its campaigns and use online tools to achieve both these objectives, as during the WEEE (Waste Electrical and Electronic Equipment) focused Give and Take events that ran during Recycle Week, 21st -27th June 2010. The campaigns will primarily emphasise reuse of furniture and textiles.

Recycling: A Recycle for London survey in March 2009 showed 87 per cent of Londoners believed they recycled ‘a lot’ or ‘everything’, yet the city’s municipal recycling rate stands at just 25 per cent. Targeted engagement will help consumers turn this claimed behaviour into real action, by showing that recycling is worthwhile (such as explaining it costs London boroughs less to recycle than it does to dispose of waste) and by providing the practical information that Londoners need to recycle more.

Evaluation: Specific performance indicators and monitoring systems will be put in place to track the progress of various activities.

Promoting London’s reuse and repair network

The London Waste and Recycling Board has allocated funds to the development of a Londonwide reuse network. The Mayor will work with London’s waste authorities, the London Waste and Recycling Board and the London Community Resource Network

Box 6: Zero Waste Places

Zero Waste Places is a Defra initiative, delivered by the BREW (Business Resource Efficiency and Waste) Centre for Local Authorities and supported by the University of Northampton. Zero waste seeks to prevent waste occurring, conserve resources and recover all value from materials. Zero Waste Places can range in size from a small street market, to a retail park, high street, village, town or a whole authority.

The objective of the initiative is to identify barriers and illustrate solutions that will help others to adopt the most effective approach to reducing their waste to zero. Defra made £140,000 of funding available to fund Zero Waste Places pilots. During 2008/09, six places were selected as Zero Waste Places projects, two of which were in London – Brent Green Zones (see Brent Case Study below) and Lewisham Green Street. These two received £25,000 in funding. A further six projects were selected in 2009/10, three of which were in London boroughs – Lambeth, Hackney and Newham.

As part of Defra’s Zero Waste Places pilot initiative, 11 streets in the London Borough of Brent are working towards becoming a Green Zone, with six of them meeting the criteria for Green Zone acknowledgement already. This criteria is:

- at least 65 per cent of residents:
 - regularly recycle
 - know they can, and regularly do, recycle at least five separate materials streams
 - use their organic waste bin regularly for at least two separate materials streams
- residents have at least three energy-efficient light bulbs used in their household
- over 70 per cent of residents use some water saving device (like a ‘Hippo’), and
- at least one alternative transport method to the car is used regularly by over 30 per cent of households.

The Green Zones scheme was highly commended at The Future Friendly Awards and commended at the Government Business Awards. As a result:

- sponsors of the awards – Waste Watch, the Energy Savings Trust and Water Wise – have offered their support to the Green Zones
- the profile of the scheme has been raised and more residents have subsequently wanted to take part
- they gained further media coverage, including an article in the national print media
- Brent was able to produce a film to put across its message for the Green Zones, with the funding of the Future Friendly Awards (<http://www.brent.gov.uk/streetcare2.nsf/Green%20Zones/LBB-306>)

(LCRN) to develop the London Reuse Network, as well as promoting waste reduction and reuse initiatives in the third sector, such as furniture reuse schemes, which can support and supplement existing local authority waste collection services. LCRN is forming a joint venture called London Reuse Ltd. (LRL) with its leading reuse member organisations. LRL will be the operating company of the London Reuse Network, which will become the platform for an unprecedented pan-London reuse and repair service. This service will be accessible through simple convenient one-stop contacts – one telephone number for reuse in London, one webportal linking all reuse services in London, serving London's business communities as well as householders and public sector organisations.

The integrated reuse service will be tailored to complement, and dovetail with, existing bulky waste collection services. Once infrastructure is developed, LRL will deliver these services to maximise and embed reuse within them. Leading waste and recycling contractors, and

the majority of London's local authorities, have asked, or indicated a willingness, to work with the network, which will also be an important platform for developing skills, employment and volunteering experiences for Londoners who want to join the booming low carbon economy.

The London Reuse Network will transform existing reuse services in London by extending their reach, capacity and viability. By investing in significant new warehouse space for reuse organisations to use as depots, hubs and outlets; introducing a quality standard and management system, and by coordinating their activities effectively, the London Reuse Network will increase the capacity of reuse organisations and services across London. With greater capacity, reuse organisations will be equipped to take on more of the bulky waste streams, making them more reliable and useful partners for local authorities.

The Mayor will work with the London Community Resource Network and other reuse and repair networks in London (including furniture reuse schemes, Freecycle, and Myskip) to develop a map of reuse facilities across the capital, which will then be promoted through the postcode locator on Recycle for London's website. This will help Londoners to access local reuse and repair opportunities more easily.

The Mayor believes a reuse target for London's municipal waste of around one per cent by 2012, increasing to three per cent by 2031, is challenging but achievable and seeks your views. The Mayor, working with London Community Resource Network, the London Waste and Recycling Board, waste authorities and Recycle for London will develop a programme of work to achieve an agreed target for municipal waste reuse for the lifetime of this strategy. More information on supporting waste infrastructure in London can be found in Policy 5.

Proposal 1.3: Reducing the amount of municipal waste entering the waste stream

The Mayor is also committed to working more closely with manufacturers and retailers to reduce packaging and he will develop a programme of action as part of his Business Waste Strategy. The programme will include:

- working with businesses to help them reduce waste and improve resource efficiency, using the Mayor's Green Procurement Code.
- identifying leading businesses to work with the London Waste and Recycling Board as a network of mentors to small businesses wanting to improve resource efficiency and reduce waste

- setting up a packaging and product design competition to encourage young talented designers to "design out" waste.

The Mayor's draft Business Waste Strategy will set out in more detail the programme of work outlined above. Feedback and suggestions are welcomed. The Mayor's draft Business Waste Strategy will be published for public consultation in October 2010.

Proposal 1.4 Tackling the barriers to providing effective reuse services

The Mayor values the contribution the third sector makes to waste management in London and will work with the London Waste and Recycling Board, London waste authorities and the London Community Resource Network to increase the third sector's involvement in London's waste and resource management. In addition to helping with the London Reuse Network, the Mayor will work with waste authorities and other third sector organisations to tackle barriers that make it hard for these groups to deliver local authority reuse and recycling services.

Developing an effective reuse service

The Mayor will work with the London Reuse Network to develop a service that meets the needs of local authority bulky waste collection services and uses local reuse and repair schemes to add value to existing local authority services.

The London Reuse Network will promote a London-wide approach, whereby groups of reuse organisations work together as business units in a “cluster” to deliver reuse to a waste disposal authority area or a group of London waste authorities.

This is considered to be the optimum use of resources in contrast to either very local, small-scale operations or completely centralised services, serving many boroughs from one warehouse.

Promoting reuse services through Recycle for London

Recycle for London has allocated funding to promote reuse and provide communications support to the London Reuse Network. Recycle for London will engage with Londoners, inform them of the value of donating for reuse and of reusing items, and direct them to the London Reuse Network to take action.

CASE STUDY 1 - WASTE REDUCTION

- What:** 'Less in your bin, more in your pocket' waste reduction campaign
- Date:** Launched Summer 2009
- Success:** Between 2008/09 and 2009/10 the amount of municipal waste produced in Wandsworth decreased by 3,842 tonnes (3.5%) to 106,162 tonnes. This has saved Wandsworth approximately £345,000 tonnes in disposal costs.
- Cost:** Approximately £40k plus staff costs for the campaign including signage, advertising space, campaign materials, and stickers on waste collection vehicles.

Wandsworth Council's "Less in the bin, more in your pocket" waste minimisation campaign was launched in summer 2009 following the introduction of differential weighbridge charging by Western Riverside Waste Authority. The outcome of this is that Wandsworth Council now receives the full benefit of any avoided or reduced waste disposal costs achieved through waste minimisation and/or increased recycling in addition to significant greenhouse gas savings.

Two key campaign messages were used: "Less in the bin, more in your pocket" and "1 kg less waste per household per week saves £500,000 a year". Residents were challenged to reduce the amount of rubbish they produced by one kilo per week, which would save the Council £500,000 per year in disposal costs. Whilst it is difficult to quantify the exact impact of the campaign, figures showed that the Wandsworth residents had gone a long way to achieving this target - waste collected for recycling, composting or disposal had fallen by almost four thousand tonnes between 2008/09 and 2009/10. Further cost savings are expected to be realised in the future as disposal costs continue to rise.

Waste compositional analysis conducted in Wandsworth during 2009/10 demonstrated that food and green garden waste were the most significant materials still present in high levels in the residual waste stream. It was for this reason that garden and food waste were specifically targeted in the communications campaign.

The new 'time banding' regulations also played a part in helping to prevent commercial waste from entering Wandsworth's domestic waste stream. It was believed that prior to the time-banding regulations, substantial quantities of commercial waste were being collected by the Council's nightly collection service for household waste as it was difficult for crews to distinguish one from the other.

CASE STUDY 2 - COMMUNITY COMPOSTING

What: Waste Prevention Implementation Plan

Date: 2008

Success: Benefits to the community including:

- Approximately four tonnes of organic waste entering the waste stream each year.
- Cost savings for the Residents Association as they no longer have to purchase compost.
- Carbon emissions avoided from waste collection and treatment
- Improved community cohesion on multi-occupancy properties and a stronger links with the council recycling team

Cost: £1,500 for three communal composting units

In 2008, Hackney set a target of four community composting projects across the borough by 2011 as part of its waste prevention implementation plan. By March 2010, three schemes were operational:

1. Warburton & Darcy (W&D) Estate in London Fields
2. Follingham Court, Hoxton, as part of the 'Zero Waste Places' initiative
3. Gibson Gardens, a Private block in Stoke Newington.

The Warburton & Darcy Estate project was launched in August 2009. This estate is managed by Hackney Homes, but the compost project is run entirely by its residents. This was set up in partnership with the London Community Resource Network. The success of this project has led to it being used as a best practice model.

Warburton & Darcy Estate is a high rise building comprising of 70 flats and includes a community garden. Residents choose to opt into the service and, to date, 30 caddies have been distributed with an approximate participation rate of 20%, diverting approximately four tonnes of kitchen waste per year to on-site composting.

This scheme uses a two stage composting process:

- The first stage is a ScotSpin tumbler that takes a mixture of food waste and woodchip.
- In the second stage, the compost from the tumbler is then stored in two Hotboxes with a 1,000 litre³ capacity, which are also enclosed to deter pests and the high temperatures generated means that compost is produced quickly. Each of the HotBoxes has a 1,000 cubic litre capacity. The total cost for these three units is £1,500 (2 hotboxes and 1 ScotSpin).

The next phase of the project is to promote the scheme and increase participation rates within the estate.

Box 7: FREecycle/FREEGLE

The Freecycle Network is a private, non-profit organisation which provides an online resources exchange scheme, where users exchange unwanted items using the online message board and email service. Membership is free, and everything posted must be free, legal and appropriate for all ages. Members wanting to 'offer' an item can send an email to their group or, if looking to acquire something, can post a 'wanted' message on the online information board. Once an exchange is completed members are encouraged to alert the group with a follow-up 'received' email.

The Freecycle concept has spread to over 85 countries. The first Freecycle group in London was set up in October 2003. There are now 39 active Freecycle groups in London, divided along local authority boundaries. There are currently over 320,000 members exchanging approximately half a million items each year. A UK Freecycle group, 'Freegle', was set up in August 2009. The scheme operates in the same way as Freecycle but was set up to give UK Freecycle groups more autonomy from the US-based Freecycle. Approximately half of London's local authorities now operate under the Freegal brand, with the remaining half using Freecycle.

End notes

1. The London Housing Strategy, Draft for public consultation, May 2009
2. Based on a provisional target set in the RfL Business Plan V2.0

Policy 2 – Setting a CO₂eq standard for municipal waste management activities to reduce their impact on climate change

Vision

The way London's municipal waste is managed can and should deliver the greatest possible CO₂eq savings, by reducing waste and increasing reuse, recycling and composting and generating low carbon energy.

From vision to policy

The Mayor will set a minimum lifecycle¹ CO₂eq emissions performance standard (EPS) for the management of London's municipal waste. This EPS will inform the way waste authorities perform their role in managing municipal waste, as they will need to make sure the collection, treatment, energy generation and final disposal of municipal waste collectively meets the EPS, or demonstrate that they have steps in place to meet it in the near future.

In addition to setting the EPS, the Mayor will set a minimum CO₂eq performance for energy generation from London's non-recycled (residual) municipal waste, such that energy is generated in a way that is no more polluting in carbon terms than the new base load energy generation it replaces. London waste authorities will need to make sure energy generated from their residual waste meets this minimum performance, or demonstrates that they have steps in place to meet it in the near future.

From policy to action - proposals

- **Proposal 2.1** The Mayor will work with waste authorities to apply the Mayor's waste hierarchy in delivering their municipal waste management functions in a way that achieves the greatest possible CO₂eq savings.
- **Proposal 2.2** Using Defra's Waste and Resources Assessment Tool for the Environment (WRATE), the Mayor will set a lifecycle CO₂eq EPS for the management of London's municipal waste. The EPS will be set to achieve the greatest climate change mitigation benefits from London's municipal waste at least cost. London's performance against the EPS will be monitored and reported annually.
- **Proposal 2.3** In addition to setting the EPS, the Mayor will set a minimum CO₂eq performance for energy generation from London's residual municipal waste. The minimum CO₂eq performance will ensure energy generated from this waste will be no more polluting than the new base load energy generation it replaces.

- **Proposal 2.4** The Mayor will work with the Environment Agency to develop a web-based “ready reckoner” tool that waste authorities can use to determine the CO₂eq performance of their municipal waste management activities easily, and compare them against the EPS and minimum CO₂eq performance for energy generation.
- **Proposal 2.5** The Mayor will work with the Environment Agency and waste authorities to ensure that achieving the EPS will not have any significant adverse impacts on other environmental considerations, such as air quality and biodiversity.
- **Proposal 2.6** The Mayor, through Transport for London (TfL), will work with waste authorities to maximise cost efficiencies and reduce the environmental impact of transporting municipal waste. The Mayor will encourage waste authorities to join TfL's Freight Operator Recognition Scheme (FORS) to help make the transport of waste safer, greener and more efficient.

What this will achieve

London will be the first city in the world to set an EPS for municipal waste, sending a clear message to London waste authorities and the waste industry to focus on waste management activities that achieve the greatest CO₂eq savings. London's municipal waste management activities today currently produce about 130,000 tonnes of CO₂eq emissions a year, a figure which includes the emissions- saving effect of recycling and composting activities. Achieving the proposed EPS could result in significant net annual CO₂eq emissions savings of approximately:

- 1.2 million tonnes by 2015
- 1.4 million tonnes by 2020
- 1.6 million tonnes by 2031.

Rather than produce CO₂eq emissions, the best waste management can make significant carbon savings. High levels of recycling and composting, and low-carbon energy generation offsetting emissions from sending waste to landfill and generating energy using fossil fuels, would achieve these savings.

In addition to achieving significant CO₂eq savings, a lifecycle CO₂eq EPS for the management of London's municipal waste will:

- ensure waste is considered as a resource
- ensure London's municipal waste management shifts from being a net contributor to climate change to an activity that plays an integral role in achieving significant climate change mitigation benefits
- encourage waste authorities to focus on the waste activities that make the greatest CO₂eq savings. This will help waste authorities to act in general conformity with the Mayor's Municipal Waste Management Strategy when undertaking their waste management functions
- encourages the rollout of the most efficient energy generating technologies
- help waste planning applications to be in general conformity with the London Plan.

Achieving a minimum CO₂eq performance for energy generated from London's residual waste will ensure this waste ceases to make a net contribution to climate change. This will be achieved by providing the energy market with solid recovered fuel from London's residual waste with a lower carbon intensity than fossil fuels like coal and gas. Providing low carbon fuel from waste for energy generation in London will help to secure a reliable energy supply for the capital, and help meet the Mayor's target for 25 per cent of London's energy needs to be met through low carbon decentralised energy systems.

Ultimately, the Mayor wants to achieve significant climate change mitigation benefits from the management of London's municipal waste, particularly for waste that currently goes to landfill or incineration. Rather than focusing on particular waste services or technologies, the Mayor will look at the outcomes of particular methods, based on their lifecycle CO₂eq emissions performance. This outcome-based approach establishes two key principles:

1. that the focus will be on recovering the materials and choosing the reprocessing routes which deliver the greatest CO₂eq savings
2. that there will be support for decentralised energy generation from residual municipal waste in a way that is no more polluting in carbon terms than the centralised energy generation it replaces.

An outcome-based approach, using lifecycle CO₂eq performance, will support waste activities and services that reduce the amount of waste produced, and capture the greatest number and highest quality of materials for reuse, recycling or composting. It will rule out energy generation using residual waste with high proportions of carbon-rich materials (like plastics and textiles) that produces electricity only. It will support energy generation using residual waste, particularly where both the heat and power generated are used. It will also drive increases in recycling and pre-treatment of waste to produce low-carbon solid recovered fuel (SRF) for renewable energy generation.

Proposals

Proposal 2.1: The Mayor will work with waste authorities to apply the Mayor's waste hierarchy in delivering their municipal waste management functions in a way that achieves the greatest possible CO₂eq savings.

Proposal 2.2: Using Defra's Waste and Resources Assessment Tool for the Environment (WRATE), the Mayor will set a lifecycle CO₂eq EPS for the management of London's municipal waste. The EPS will be set to achieve the greatest climate change mitigation benefits from London's municipal waste at least cost.

To implement this outcome-based approach, a baseline lifecycle CO₂eq performance for London's municipal waste needs to be established. It is then possible to set an appropriate CO₂eq EPS for London to work towards. The EPS concept is an increasingly popular way for regional and national authorities to manage carbon emissions in the industrial, manufacturing and power generation sectors. The Department of Energy and Climate Change (DECC) is considering developing an EPS for all new thermal power stations, which might be achieved by either coal-fired or combined cycle gas turbine (CCGT) power stations through fitting of carbon capture and storage infrastructure.

A steering group comprising representatives from some London waste authorities, London Councils, the London Waste and Recycling Board and the Environment Agency has contributed to establishing a lifecycle

CO₂eq baseline performance for London and contributed to the development of an EPS. This group also contributed to the development of a minimum CO₂eq performance for energy generated from London's residual waste (discussed in Proposal 2.3).

Drawing upon London waste authorities' 2008/09 data from the WasteDataFlow system and feeding it into WRATE the GLA has developed the baseline performance. WasteDataFlow is Defra's tool for reporting on the waste management performance of every UK waste authority.

Box 8: WRATE AND WasteDataFlow

WRATE, already used by a number of London's waste authorities, is the Environment Agency's tool for calculating a lifecycle assessment of the resources used and the operation of a whole range of waste management processes, looking at their environmental costs and benefits.

WasteDataFlow is a web based system for UK local authorities to report their waste data to government.

More information on WRATE and WasteDataFlow can be found at www.environment-agency.gov.uk and www.wastedataflow.org respectively.

The results of this modelling exercise showed that the net CO₂eq emissions from London's municipal waste management activities in 2008/09 was around 130,000 tonnes. These activities and their associated emissions are

set out in Table 5, which shows how emission savings achieved from recycling or composting activities offset emissions from pre-treating waste, incinerating waste, and sending waste to landfill.

Table 5: Baseline lifecycle CO₂eq performance of London's municipal waste activities expressed in kilo tonnes of CO₂eq (kt CO₂eq) 2008/09

Waste management activity	Waste managed (kt) ¹	Associated emissions (ktCO ₂ eq)
Residual waste		
Landfill	1,830	466.77
MBT	278	1.31
Incineration	838	8.88
Organic waste		
Anaerobic digestion	4	-0.37
In-vessel composting	124	-5.81
Open air windrow composting	143	1.40
Materials Recycling / Reprocessing		
Paper / card	385	-115.18
Glass	62	-10.51
Metals (ferrous)	49	-135.00
Metals (non-ferrous)	13	-28.86
Plastics	24	-52.63
Textiles	12	0.03
Wood	33	0
TOTAL	3,797	130.05

Notes:

1. Excluded from this analysis are six ktpa of waste which were sent for reuse, and a further 178ktpa which represent rejects streams from Material Recovery Facilities (MRFs) and Mechanical Biological Treatment (MBT) facilities, along with incinerator bottom ash. These have not been included in the modeling as their composition, and thus impact in landfill, cannot be modeled accurately in WRATE. If these streams were included, total waste managed in London would be 3,975ktpa, which is consistent with related Defra figures.

The basis for developing an EPS for London's municipal waste

Setting an EPS for London's municipal waste needs to take into account the financial modelling of different waste scenarios to ensure solutions are cost-effective, technologically robust and practically achievable.

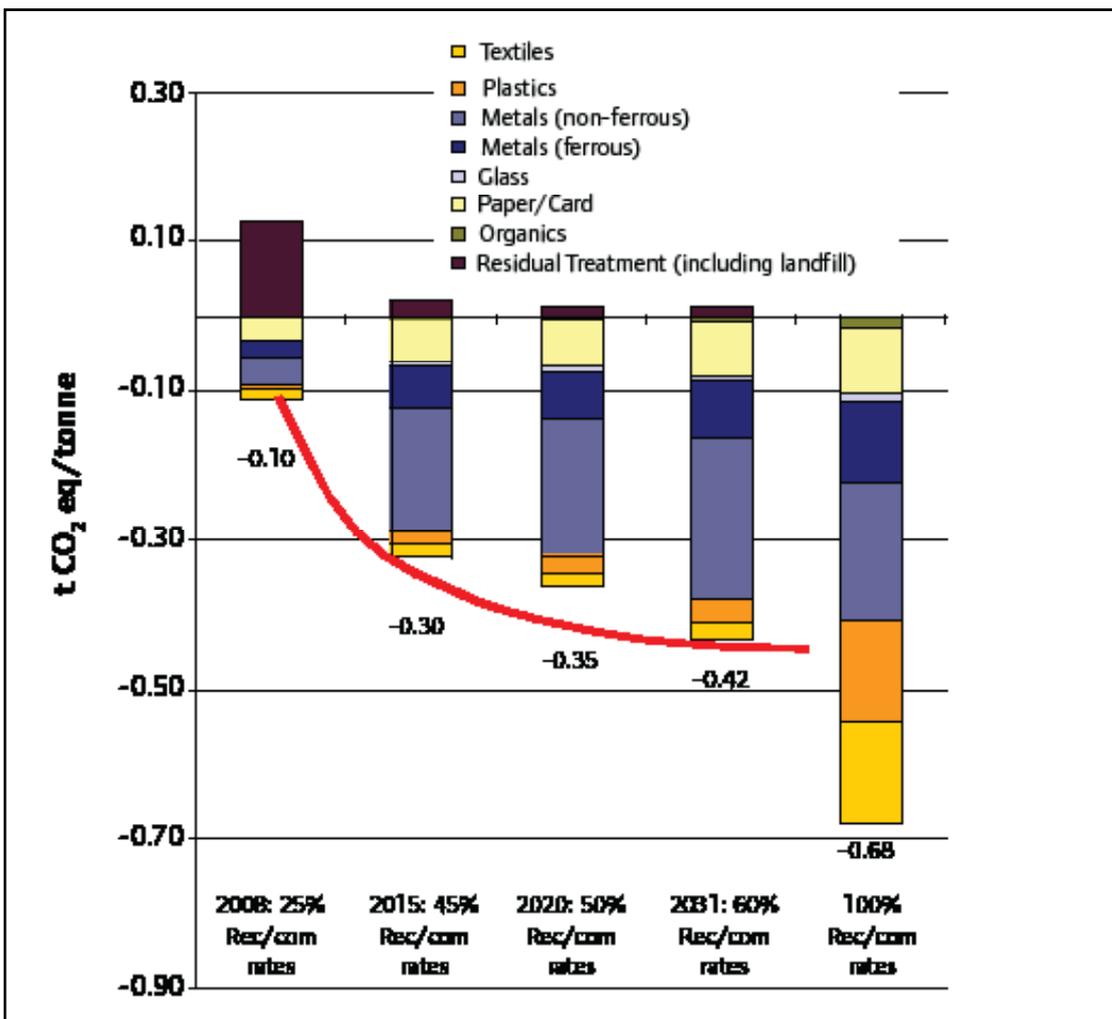
As set out in Chapter 3, in preparing this draft strategy ten different scenarios, incorporating a range of waste management activities and mix of technologies, were modelled on their economic performance. Six of the waste management scenarios modelled would meet the Mayor's proposed recycling and composting targets in 2015, 2020, and 2031. These six scenarios have been used as the basis for modelling and setting the EPS. More information on all the scenarios modelled in preparing this strategy can be found in Appendix 4a.

Figure 16 sets out how the EPS varies for the target years for recycling (2015, 2020 and 2031). For each year, the emissions (or emissions saved) are broken down to show

emissions from recycling various materials, treatment and energy generation of separately collected organic waste and residual waste and landfill. Figure 16 shows how recycling plays the most significant role in achieving the EPS, and breaks down the relative contribution recycling each material type makes towards meeting the EPS for each year. The final bar shows what would happen if 100 per cent of each recyclable material were recycled, showing the potential maximum emissions savings that might be delivered by the recovery of each different material.

Figure 16 shows that the EPS becomes more challenging over time to 2031. The metric for setting the EPS is expressed in 'tonnes of CO₂eq emitted per tonne of waste managed' (tCO₂eq/t waste managed). All assumptions relating to capture rates of materials from different recycling activities and the modelled roll-out (and performance) of different waste treatment technologies have been developed using information published by WRAP².

Figure 16: Setting the EPS for London's municipal waste (2008-2031)



Notes: Residual treatment is mostly made up of pre-treatment and energy generation activities, with decreasing amounts of waste going to landfill over time in line with achieving the Mayor's target of zero waste direct to landfill by 2025. The proportions of these activities are too small to be easily identified in this chart. The full contribution for all waste activities informing this chart can be found in Appendix 4b.

Generally, achieving high rates of recycling and composting aligns with achieving the EPS. However, a key characteristic of the EPS is that it allows flexibility, so that waste authorities can look across the whole waste system to find the greatest CO₂eq savings, depending on their specific circumstances. For example, waste authorities covering areas where there are a lot of flats may find it difficult to collect high volumes of recyclables and may instead focus attention on the recovery of certain materials that deliver greater CO₂eq benefits.

This approach supports the aim to achieve the greatest possible environmental benefits in the most cost effective way. More detail on how the Mayor will help waste authorities to determine their municipal waste performance against the EPS using WRATE is set out in Proposal 2.4 in this Chapter.

Emissions from transport, including collection from the kerbside and onward movement of waste have been excluded from the modelling of the EPS on the basis that:

1. They are extremely challenging to model with any degree of accuracy. This is because information on transport movements is not reported by waste authorities into Defra's WasteDataFlow tool.
2. Waste authorities are often not fully aware of the final destination of materials collected for recycling and reprocessing.
3. Emissions from transport usually contribute a relatively small proportion of total emissions from waste management activities (approximately 5-10 per cent).

The Mayor believes that National Indicator 185³ provides sufficient incentive for waste authorities to reduce emissions from their transport operations. Furthermore, TFL has developed a Freight Operation Recognition Scheme (FORS)⁴ to help boroughs reduce emissions from their vehicle fleets. FORS is discussed in more detail later in this Chapter.

The EPS does not include any CO₂eq savings that might be achieved by reducing the amount of waste produced more than is necessary to meet the Mayor's waste reduction targets. This is because it is difficult to determine accurately which waste materials will be reduced and the rate of waste reduction over time. Nor does the EPS include any CO₂eq savings from reusing waste. This is because there is great uncertainty over the appropriate emissions factors to ascribe to different reuse routes, and consequently such factors are not included in WRATE. The EPS has been developed, however, to be flexible over time, so that it can accommodate any reduction in waste beyond the Mayor's targets, and can accommodate the CO₂ benefits of reuse activities when future versions of WRATE include such factors.

Proposal 2.3: In addition to setting the EPS, the Mayor will set a minimum CO₂eq performance for energy generation from London's residual municipal waste. The minimum CO₂eq performance will ensure energy generated from this waste will be no more polluting than the new base load energy generation it replaces.

Energy generation, as a way of treating residual municipal waste, needs to work with other elements of municipal waste management to help meet the whole waste system's EPS. However, it must also support the Mayor's principle of providing support for low-carbon decentralised energy as set out in his Mayor's Climate Change Mitigation and Energy Strategy (CCMES). In particular, London's municipal food, green garden and wood waste can be used to provide decentralised renewable energy, helping the Mayor to achieve the target of a 60 per cent reduction in London's CO₂ emissions (on 1990 levels) by 2025, as set out in The London Plan (consultation draft replacement plan, October 2009). To support the shift towards low carbon energy, the energy generation from residual municipal waste must meet an additional minimum CO₂eq performance.

In aligning this strategy and the CCMES, the Mayor proposes that all London's residual municipal waste used for energy generation should have a carbon intensity less than, or equal to, the source of energy generation it replaces (otherwise known as the 'marginal source' of generation).

Based on Defra guidance for studies of this nature, the marginal source of generation which is considered to be displaced for the purposes of setting the minimum CO₂eq performance is the combined cycle gas turbine (CCGT) plant⁵. Such facilities are assumed to generate electricity at a carbon intensity of 387gCO₂ per kilowatt hour (kWh) of electricity

generated. Therefore facilities generating energy from London's residual municipal waste must perform at a level equal to or below this CO₂eq performance. Performance will be expressed in terms of kgCO₂/kWh of electricity generated.

The ability to meet the minimum CO₂eq performance from energy generated from municipal residual waste will be affected by three key variables:

- the efficiency of technology employed, for example, the efficiency of incineration or gasification
- the amount of biomass in the waste that is supplied to the facility, as higher levels of biomass make it easier to meet the carbon intensity standards
- the carbon intensity of the energy source being displaced

Ultimately, pre-treatment technologies such as mechanical-biological treatment (MBT) or autoclaving can be used to produce SRF, which contains sufficient levels of biomass to meet the minimum CO₂eq performance. Table 6 shows indicative requirements, in terms of biomass content by its calorific value, for meeting the minimum CO₂eq performance under a range of different technology scenarios, for both untreated and treated wastes. Table 6 can be used as reference points for waste authorities when considering the options for generating energy from their residual waste.

Table 6: Indicative requirements for achieving the minimum CO₂eq performance

Technology	Mode of operation	Assumed generation efficiency (%) ¹		Calorific value CV from biomass ³	
		Electricity	Heat ²	Untreated waste	Treated waste (SRF)
Incineration	Electricity only	28%	n/a	71%	68%
	Electricity only	21%	n/a	80%	78%
	CHP	19%	30%	58%	55%
Gasification (steam turbine)	Electricity only	25%	n/a	79%	76%
	CHP	17%	27%	64%	61%
Gasification (gas engine)	Electricity only	33%	n/a	65%	63%
	CHP	33%	24%	43%	41%

Notes:

1. Generation efficiencies for gasification take into account the losses that occur during the conversion of the energy contained within the waste to produce syngas that is used to generate energy.
2. Generation efficiencies for heat assume a load factor (the proportion of heat generated used) of 60 per cent.
3. Values for SRF are calculated in WRATE on a dry matter basis, whereas those for untreated wastes are calculated on a fresh matter basis (that is, including the impact of the moisture content).

Table 7 shows the potential percentage biomass of residual waste following upfront recycling of varying levels of 25 per cent, 45 per cent, 50 per cent and 60 per cent⁶. These results can be compared with the data in Table 6 to assess the degree to which pre-treatment (MBT or autoclaving) technologies must refine the input waste to increase the level of biomass of the output SRF to meet the minimum CO₂eq performance. This comparison shows that, with a 45 per cent recycling rate, for example, if energy is subsequently generated via gasification (with a steam turbine) or by incineration, the biomass content must be increased by 16 per cent and 8 per cent respectively. However if untreated waste was sent to an incinerator with CHP, no further pre-treatment would be required to meet the energy minimum CO₂eq performance. None of London's incinerators operate in CHP mode, although some ideas are now being explored to install heat distribution networks from the SELCHP incinerator in Lewisham to provide heat to neighbouring residential and commercial developments. The

Mayor will work with London's incinerator operators to explore opportunities to introduce heat-use infrastructure and improve the incinerators' overall efficiency (and thus their lifecycle CO₂eq performance). More detail on the Mayor's proposals to work with London's incinerator operators is set out in Policy 5. The Mayor is also keen to work with waste authorities and the waste industry to better understand the costs and opportunities for configuring pre-treatment facilities to produce high biomass SRF that sufficiently meets the minimum CO₂eq performance for energy generation. Table 7 shows that higher recycling or composting rates might result in lower amounts of biomass waste within residual waste as more biomass materials like paper, card and organic waste is captured for recycling or composting. This reinforces the need for waste authorities to focus on targeting higher CO₂eq impact materials such as plastic and textiles in their recycling collection systems to reduce the non-biomass content of residual waste for energy generation. A further consideration is how anaerobic

Table 7: Biomass content potentially within residual waste streams

Assumed Recycling / Composting Rate ¹	CV from Biomass of Residual Waste (%) ^{2 3}
25%	62%
45%	60%
50%	53%
60%	49%

Notes:

1. All assumptions for capture rates of different materials are based on information published by WRAP (2009). A maximum of 15% of the total recycling / composting rate is derived from food waste collection
2. It should be noted that these levels of biomass are indicative only. Waste authorities might focus on different materials to achieve the same levels of recycling, which would result in different levels of biomass in the residual composition
3. The composition of the residual waste modelled under each recycling / composting rate is provided in Appendix 4b.

digestion of organic (i.e. food or green wastes) wastes might interface with the CO₂eq performance for energy generation. As anaerobic digestion does not generate any energy from fossil fuels (i.e. plastics), operated in isolation, such facilities will always meet the CO₂eq performance for energy generation. The Mayor supports the use of anaerobic digestion for generating renewable energy. Waste authorities sending organic waste for anaerobic digestion will be able to offset its CO₂eq performance against meeting the CO₂eq performance for energy generated from residual municipal waste.

Working with waste authorities to achieve the EPS and the minimum CO₂eq performance for energy generated from residual waste.

Proposal 2.4: The Mayor will work with the Environment Agency and WRAP to develop a web-based 'ready reckoner' tool that waste authorities can use to determine the CO₂eq performance of their municipal waste management activities easily, and compare them against the EPS and minimum CO₂eq performance for energy generation.

The Environment Agency and WRAP are already developing a basic web-based CO₂eq performance ready reckoner tool for UK waste authorities to use, due to be released in 2010. In consulting on this strategy, the Mayor will

work the Environment Agency and WRAP to develop the ready reckoner tool that easily allows London waste authorities to determine the performance of their waste management activities against his EPS and against the minimum CO₂eq performance for energy generated from residual waste. This will include work to modify the ready reckoner tool to recognise the contribution waste reduction and reuse makes. The GLA will hold workshops with waste authorities to fully understand how to use the ready reckoner tool.

The Mayor expects waste authorities to use the ready reckoner tool in the development of contracts and when considering the introduction of new services within existing waste contracts. The purpose of using the ready reckoner is to give an indicative performance against the EPS and minimum energy generation CO₂eq performance, and to identify what measures can be put in place to improve performance. Waste authorities may choose to undertake a full WRATE analysis of waste management options should the ready reckoner tool be too limited in what waste activities it can model. Consideration will also need to be given to wider environmental considerations such as air quality and biodiversity.

Proposal 2.5: The Mayor will work with the Environment Agency and waste authorities to ensure that achieving the EPS and minimum energy generation CO₂eq performance will not have any significant adverse impacts on other environmental considerations, including air quality and biodiversity.

Whilst there is significant focus within this strategy on reducing CO₂eq emissions in response to climate change, waste authorities must take into account any adverse impact on human health their activities might have, such as on local air quality. Primarily, these impacts relate to oxides of nitrogen (NO_x) and particulates (PM₁₀ and PM_{2.5}), for which in London there are elevated concentration levels estimated to exceed targets set for London⁷. These pollutants are of considerable concern in London because of their potential impacts on human health.

The potential air quality impacts from all new developments (not just waste-related) in London are considered on a case by case basis through the local and strategic planning process. The development of new residual waste facilities might result in exceeding concentrations of both NO_x and PM₁₀ in specific locations, particularly in those areas where concentrations are already elevated. Consideration needs to be given to the location of facilities near existing sensitive receptors (e.g. residential areas, schools, hospitals) in order to reduce or minimise exposure to pollutants. Waste treatment facilities, if managed and operating as designed, located in appropriate locations and using best

available abatement and mitigation technology, are unlikely to have a significant effect on meeting air quality objectives.

Greenhouse gas emissions and other pollutants from waste treatment activities can also affect biodiversity. Long term exposure to pollution can restrict the growth and development of plants and trees. Increased nitrogen deposition is known to reduce plant diversity in natural and semi natural ecosystems. Effects of pollution are seen through visible symptoms of tree decline, discolouring and susceptibility to diseases. This is a particular risk at designated Special Areas of Conservation (SACs) within London, such as Epping Forest and Wimbledon Common, though other sites could also be at risk. Reductions in greenhouse gas emissions and other pollutants would therefore contribute to the protection of these habitats and help to achieve the objectives of the Mayor's Biodiversity Strategy.

The Mayor expects proposals for new waste facilities within London to be sited where the impact on air quality and biodiversity is minimal. The Mayor expects that all new waste management facilities will make use of the best available emissions abatement technologies, and will work with the Environment Agency to monitor air quality and biodiversity impacts of waste activities.

Box 9: Waste and air quality

Nitrogen oxides (NO_x), which contribute to nitrogen dioxide (NO₂), and fine particulate matter (PM₁₀) are the two main emissions from waste management processes potentially affecting human health. For example, PM₁₀ aggravates respiratory and cardiovascular conditions. At high levels, NO₂ causes inflammation of the airways, while long-term exposure can affect lung function and respiratory symptoms. The EU has set limits on these emissions, aimed at significantly reducing the health impacts of poor air quality. The Mayor's draft Air Quality Strategy sets out how the Mayor will protect the health of Londoners and increase their quality of life by improving the quality of air they breathe.

Reducing emissions from waste transport

Proposal 2.6: The Mayor will encourage waste authorities to join TfL's Freight Operator Recognition Scheme (FORS) to help make the transport of waste safer, greener and more efficient.

FORS is a unique, industry-led membership scheme, in which over 55,000 vehicles from around 430 companies are registered as members. Twenty London boroughs are currently members. Membership is free and open to any company operating vans or lorries in London. Developed in partnership with key industry bodies, FORS aims to help operators of all kinds of vehicles become safer, more efficient and more environmentally friendly and provides a quality benchmark for the industry. By passing a formal assessment and meeting the FORS standard, operators can demonstrate their quality to customers.

Membership allows access to a range of benefits including workshops, toolkits and online driver training, which cover fuel efficiency, safety and Penalty Charge Notices.

By encouraging operators to minimise fuel consumption, for example, and providing them with tools and guidance on how to do so, FORS aims to reduce emissions across London at the same time as helping companies to lower costs. FORS members can also participate in the FORS online benchmarking system. Benchmarking members can benefit from better fuel management, with some seeing their fuel consumption performance improve by around one mile per gallon over a year. Others have found that the improved understanding of their operation afforded by benchmarking has enabled them to justify procurement of more suitable vehicles, in one case resulting in a reduction in fuel consumption of around 30 per cent, with obvious associated environmental benefits. Benchmarking also allows operators to anonymously compare performance with their competitors and identify areas of strength or potential improvement. As they improve fuel performance, operators can also indirectly help local authorities in meeting their NI 185 targets. Appendix 6 sets out the City of London Corporation's positive experience with FORS.

The Mayor also wants to promote greater use of rail and water for transporting London's municipal waste, and wants to support the development of more waste infrastructure at railheads and wharves. More information on this is set out in Policy 5.

End notes

1. 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. The environmental costs and benefits in this case would be expressed in CO₂eq emissions.
2. Analysis of kerbside dry recycling performance in England 2007/08, WRAP (2009), available at: http://www.wrap.org.uk/local_authorities/research_guidance/collections_recycling/benchmarking.html
3. See explanation in Chapter 1: Legislation and policy context.
4. More information on FORS can be found at <http://www.tfl.gov.uk/microsites/fors/>.
5. Defra (2006) Greenhouse Gas Policy Evaluation and Appraisal in Government Departments, April 2006
6. It should be noted that these levels of biomass are indicative only. Waste authorities might focus on different materials to achieve the same levels of recycling, which would result in different levels of biomass in the residual composition
7. GLA (2010) Clearing the Air: The Mayor's draft air quality strategy for public consultation, March 2010

Policy 3: Capture the economic benefits of municipal waste management

Vision

The approach to managing London's municipal waste changes from 'a problem to be disposed of' to 'an opportunity to be exploited'.

From vision to policy

The Mayor will work with waste authorities and third sector organisations to ensure that London is taking steps to maximise the economic benefits to London from its waste management.

From policy to action – proposals

The Mayor will, through the London Waste and Recycling Board:

- **Proposal 3.1** Identify and implement efficiencies in municipal waste management in London. This will include, but not be limited to, working with London Councils and waste authorities to explore the opportunities to establish joint waste authority procurement contracts that would bring about economies of scale.
- **Proposal 3.2** Establish a framework of waste collection contracts from which waste collection authorities can draw down services.
- **Proposal 3.3** Work with London Councils and Capital Ambition to develop model municipal waste contracts for waste authorities to use.
- **Proposal 3.4** Seek to provide investment to help waste authorities and the private sector establish waste management facilities that achieve the greatest reductions in greenhouse gas emissions including facilities for reuse, upcycling¹ and closed loop recycling.
- **Proposal 3.5** Help waste authorities that are interested in building and operating their own waste facilities to develop those facilities, particularly where they are able to work in partnership with other waste authorities.

What this will achieve

In order for municipal waste to become a greater source of economic benefit to London, one consideration is that the quality of the recyclable material needs to be of a high standard. Managing London's municipal waste as a resource will improve its quality, making it a commodity that is more desirable to the re-manufacturing sector.

Establishing a market for materials and energy that have come from municipal waste, and giving them a value to businesses in this sector, could save London up to £90 million.

Preparing London to manage its municipal waste in the most carbon efficient and economically beneficial way could generate approximately 350 green-collared jobs and contribute £13 million of direct Gross Value Added (GVA) to the economy each year to 2025.

London's municipal waste, after maximising recycling, could contribute £90 million of savings to London's £4.4 billion electricity bill and take £24 million off London's £2.5 billion gas bill.

Developing model municipal contracts and a contract framework tailored to London's municipal waste governance arrangements and infrastructure requirements will:

- speed up procurement, by avoiding the need to develop waste contracts from scratch
- reduce the cost of procurement by cutting down on the need to negotiate on issues common to all waste transactions (such as minimum levels of service, complying with OJEU requirements, and acting in accordance with local targets and national legislation)
- improve the skills and capacity of waste authority procurement teams to successfully procure waste management projects
- help deliver more consistent waste and recycling services across London, regardless of which borough or housing type people live in
- encourage bidders with high quality bids, as by providing guidance and standardisation, they can avoid excessive bidding costs.

Waste authorities using the London Waste and Recycling Board's contract framework or jointly procuring waste services and infrastructure will:

- achieve economies of scale to get a better deal than if they were acting alone
- appeal more to suppliers interested in securing a larger market share by contracting with more than one waste authority at a time
- help deliver more consistent household waste and recycling services across London boroughs, to reduce confusion and instil confidence in the public.

The Mayor believes that London is missing a huge proportion of the economic opportunity that municipal waste presents to the city. The GLA Act 2007 allows the London Waste and Recycling Board to do anything that it thinks will facilitate achieving its objectives, and it is well placed to identify and implement efficiency savings for London's municipal waste. The Mayor wants to work with London's waste authorities through the board to help them realise efficiency savings and capture the economic benefits from their waste, using various mechanisms and interventions, as set out below.

Proposals

Proposal 3.1 The Mayor, through the London Waste and Recycling Board, will identify and implement efficiencies in municipal waste management in London. This will include, but not be limited to, working with London Councils and waste authorities to explore the opportunities to establish joint waste authority procurement contracts that would bring about economies of scale.

The Mayor supports those waste authorities already working together to develop cross-boundary contracts and service agreements and wants to work with other waste authorities to explore this area. The Mayor believes neighbouring waste authorities could achieve significant financial and operational efficiencies by sharing services on some activities. For example, neighbouring waste authorities with similar housing stock might jointly procure a recycling service for flats. Any other

opportunities identified will be evaluated and the business case for a shared service will be evaluated and presented to the waste authorities for consideration.

The board will work with organisations involved in helping waste authorities deliver efficiencies to develop a four-year programme from 2011-2015 looking at how to make significant savings in waste management operations in London. The board's Business Plan for 2011/12, will provide information on this programme, its key performance indicators and the services it will offer. The Mayor would like to see the board make procurement of capital equipment and services easier, and more affordable. The board should also undertake a dialogue with waste authorities as to how to introduce a more consistent waste service to Londoners through a programme of shared waste management services, delivered locally, but procured strategically.

In addition to pursuing cost savings, waste authorities should also (and some already are) look at the opportunities to realise the full value of waste materials through revenue-sharing, joint venture or similar contractual arrangements.

Proposal 3.2 Establish a framework of waste collection contracts from which waste collection authorities can draw down services.

Working with waste authorities, the board will draw up a framework of waste collection contracts that cover the full range of primary

collection services, including doorstep refuse collections, near-entry collection systems, doorstep recycling and near-entry recycling. Waste collection authorities will be able to select service contracts from a menu, enabling them to access a range of service contracts, at a competitive price, to meet the needs of their local built environment. Waste authorities could select as many contracts as they like that provide the optimal service to their varied housing type whilst retaining a competitive contract rate.

The board would negotiate the price of the services during the establishment of the framework and would monitor the overall contracts, while waste collection authorities would manage the day-to-day implementation of the contracts. The board's Business Plan for 2011/12, will provide information on this programme

Proposal 3.3 The Mayor, through the board, will work with London Councils and Capital Ambition to develop model municipal waste contracts for waste authorities to use.

The London Waste and Recycling Board will develop some best practice tools and templates that can be used across London to streamline municipal contracting and help waste authorities determine an acceptable level of risk. The board will work with London Councils, Capital Ambition

and London's waste authorities to identify good examples of revenue-sharing and joint venture arrangements that achieve cost-efficiency savings and encourage the use of more environmentally beneficial waste management solutions.

Proposal 3.4 The Mayor will, through the London Waste and Recycling Board, seek to provide investment to help waste authorities and the private sector establish waste management facilities that achieve the greatest reductions in greenhouse gas emissions including facilities for reuse, upcycling and closed loop recycling.

Closed loop recycling, in which materials are recycled back into their original products, offers both the greatest greenhouse gas savings and the greatest economic opportunities from recycling. The board will identify at least one closed loop recycling facility to support over the next few years. Plastics reprocessing lends itself well to closed loop recycling in London, as it involves relatively light industrial processes and the cost of transporting recyclable plastic long distances is relatively expensive (plastic is light and therefore yields a high transportation cost per tonne). London currently has a closed loop plastics recycling plant for plastic bottles but the Mayor is keen for London to have a closed loop recycling plant for mixed plastics in London.

Proposal 3.5 The Mayor will, through the London Waste and Recycling Board, help waste authorities that are interested in building and operating their own waste facilities to develop those facilities, particularly where they are able to work in partnership with other waste authorities.

Until 2005, waste authorities were prevented from operating their own facilities by legislation.

The Clean Neighbourhoods and Environment Act 2005 has now amended the Environmental Protection Act 1990 allowing waste authorities, or consortia of authorities, to design, build and operate their own facilities. The Mayor wants to support any waste authorities that are prepared to consider owning and operating treatment facilities for municipal waste to help them retain the revenue from the sale of recyclables and energy, and to offset collection costs. It is envisaged waste authorities could invest in relatively low-tech facilities, such as Materials Reclamation Facilities (MRFs) and in-vessel composting facilities. Such facilities typically have less associated risk and may therefore be more suitable for waste authorities to procure compared with sophisticated and expensive pre-treatment and thermal treatment facilities.

CASE STUDY 3 - REVENUE SHARE CONTRACTS

Westminster City Council

What: Waste Collection, Recycling, Street Cleansing and Ancillary Services Contract

Date: 2010

Success: The contract represents an innovative arrangement for both the borough and the contractor as there is a built in level of flexibility in service focus and both the risks and the profits are shared

- 50/50 share of avoided waste disposal costs
- 50/50 share of excess profits above the agreed margin

Cost: The contract is £36 million p.a. (£252 million over 7 years).

In 2010 Westminster City Council let its high profile waste collection, recycling, street cleansing and ancillary services contract to Veolia. The contract was let using the Competitive Dialogue process for a term of seven years with an option to extend up to another seven years.

The Competitive Dialogue process, the first time this approach was used in Westminster, provided an opportunity to discuss the wider economic, social and technical changes that will take place in Westminster during the contract term. Additional discussions also took place on a range of key issues such as fleet procurement options, indexation and fuel prices, managing major special events including the Olympics, sharing information systems and developing a performance framework that incentivises positive outcomes for both parties.

The key elements of the contract include:

1. A Partnership Board setting annual Key Performance Indicators against which a percentage of the supplier's margin rests
2. Incentives to increase the City Council's commercial waste portfolio
3. An efficient, lower emissions, and operational reliable fleet that reduces emissions of CO₂ by 20 per cent.

From its inception the contract documentation was developed to allow flexibility in service focus, encourage innovative solutions, improve customer experience and continually deliver efficient and effective services. At the heart of this approach is that the fortunes of both parties are entwined – for better or worse!

CASE STUDY 4 - SUPPORTING WASTE AUTHORITY INVESTMENT IN WASTE INFRASTRUCTURE

What: In-Vessel Composting Facility (IVC)

Date: 2004

Success: The facility was the first in the country to be certified as producing PAS100 quality compost. The IVC facility treats 30,000 tonnes of organic waste each year, saving £2.4 million on landfill disposal costs. Composting this organic waste instead of sending it to landfill avoids approximately 8,500 tonnes of CO₂eq emissions each year.

Cost: £5.2 million for a new 30,000 tonne capacity IVC.

In 2004 the North London Waste Authority (NLWA) led a project comprising 'master composter' support for home and community composting by the London Community Resource Network, new organic waste collection services by its constituent borough councils and a new in-vessel composting facility by its contractor, LondonWaste Ltd, for which it was awarded £4 million by the former London Recycling Fund (LRF) to make it all affordable.

The first organic wastes were delivered in September 2005, and the first loads of finished compost were delivered to borough parks and allotments in February 2006.

The borough organic waste collection services have proved to be very successful, with the full IVC capacity being used in the first year, and third-party merchant capacity being used since then for the extra organic wastes.

The LondonWaste facility compost continues to be in great demand by north London allotment sites, parks and community projects as well as LondonWaste's farming, landscaping and educational customers. In 2008/09 over a third of the compost was used within North London.

CASE STUDY 5 - REVENUE SHARE CONTRACTS

What: MRF (Materials Reclamation Facilities) Services Contract

Date: October 2009

Success: The contract, including income sharing, delivered a saving of some £763,000 FYE at the rates of income indicated in the tenders.

Cost: N/A

In 2009 the North London Waste Authority (NLWA) let a MRF services contract for the comingled dry recyclables arising in five of its constituent boroughs (Camden, Hackney, Haringey, Islington and Waltham Forest). The contract was for 'lots' of merchant capacity (facilities built to treat municipal waste) ahead of NLWA's long-term procurement for significant new waste infrastructure.

As the contract was let at a time when the value of sorted recyclable wastes was very low, the NLWA decided to structure their contract with a basic gate fee to cover MRF contractors' direct operational costs alongside an income sharing arrangement under which the NLWA receives 50 per cent of the contractors' relevant income (and a higher percentage if the income more than doubles).

This contract structure gives the contractor's confidence of an income sufficient to cover their essential costs and an incentive to minimise process losses, and it gives the NLWA budget certainty at competitive prices along with improved recycling rates. NLWA is also using EPA s.52A(2) powers to contribute towards the same five boroughs' additional collections costs, having regard to the income it receives under the MRF services contracts, such that the net financial impact on local council tax payers has been brought to the lowest levels ever locally.

CASE STUDY 6 - REVENUE SHARE CONTRACTS

- What:** Household recycling and organic waste collection service
- Date:** N/A
- Success:** Achieving 51 per cent recycling performance in 2010. Annual income of £650,000, saving Bexley residents £44 per tonne of waste recycled compared to sending this waste to landfill. Bexley's household recycling and organic waste services have reduced residual waste by 1,805 tonnes from 2008/09 to 2009/10.
- Cost:** Including income from recycling, the total cost to collect and recycle Bexley's waste is about £65 per tonne of waste recycled. This can be compared to £109 per tonne if this material was collected and sent to landfill.

Recycling

The London Borough of Bexley has a recycling scheme which is offered to 97 per cent of households. Houses separate out materials for recycling into four containers:

- a green 55 litre kerbside box for paper/cardboard
- a red 55 litre box for plastic bottles, cans and foil
- a black 55 litre box for glass bottles and jars and
- a 140 litre brown bin for mixed food and garden waste.

Flats have a similar scheme but have wheelie bins or euro bins for their dry recycling. Only a limited number of small blocks of flats have a food waste collection scheme.

Refuse

Houses have a fortnightly collection of refuse in 180 litre refuse bins. Flats that do not have a food waste collection still have a weekly collection of refuse.

Set out and capture rates

Bexley has good set out rates for paper/card and plastic bottles (73 per cent and 67 per cent) but lower for glass and food/garden waste (30 per cent and 51 per cent). The capture rates are high for paper (91 per cent), glass (94 per cent) and garden waste (98 per cent). The lowest capture rate is for food waste at 69 per cent, the other materials are between 79 per cent and 86 per cent.

Cost saving/benefits

The collection costs for using a kerbside sort scheme is higher than a comingled collection, however Bexley gets an income from its material of approximately £650,000 a year.

Key contributing factors

The introduction of a limited capacity fortnightly refuse collection (in 2008) was key to increasing the recycling rate. It helped to persuade some residents who previously did not recycle to start.

Bexley has always educated rather than enforced recycling. This includes running communications campaigns and having recycling advisors to visit residents. The recycling advisors look after certain areas of the borough and deal with issues such as residents who are struggling to understand the recycling scheme or cannot fit all their refuse in the bin. This has helped to minimise the waste in Bexley.

The School's Waste Action Club (SWAC) visits primary schools and secondary schools in the borough. SWAC takes assemblies and runs activities in these schools to educate the children about waste. The aim is to reduce the school's waste and for the children to take home the message and reduce their waste at home.

End notes

1. Upcycling – turning waste into materials or products of equal or greater quality.

Policy 4 – Achieving high municipal waste recycling and composting rates

Vision

Recycling or composting in London will be a straightforward part of Londoners' lives, to achieve high rates of municipal waste recycling and composting.

From vision to policy

The Mayor will work with London's waste authorities, the London Waste and Recycling Board, and the private sector, to provide municipal waste recycling and composting collection services that are accessible and as consistent as possible across London, and provide an incentive for households and businesses to utilise these services.

From policy to action – proposals

- **Proposal 4.1** The Mayor will set recycling and composting (including anaerobic digestion¹) targets for London's municipal waste of 45 per cent by 2015, 50 per cent by 2020 and 60 per cent by 2031
- **Proposal 4.2** The Mayor, through the London Waste and Recycling Board's best-practice co-ordinator service, will work with waste authorities to develop cost-effective and easily accessible recycling and composting services to all London households. The aim is to showcase good practice and identify opportunities to deliver high quality, consistent and cost-effective collection services, achieving high rates of recycling and composting.
- **Proposal 4.3** The Mayor will work with waste authorities and the London Waste and Recycling Board to help waste authorities provide recycling and composting collections for small businesses, comparable with those services provided for households.
- **Proposal 4.4** The Mayor, through the London Waste and Recycling Board, has allocated £5 million to fund infrastructure measures to increase recycling or composting rates from flats, particularly those offering social housing.
- **Proposal 4.5** The Mayor will work with waste authorities to increase recycling and composting at local Reuse and Recycling Centres.
- **Proposal 4.6** The Mayor will work with waste authorities to provide incentives for Londoners to recycle and compost.
- **Proposal 4.7** The Mayor will work with waste authorities, TfL and the private sector to provide "on-the-go" recycling bins across London.

- **Proposal 4.8** The Mayor, through the London Waste and Recycling Board's best practice co-ordinator service, will fund Capital Waste Facts, which collates municipal waste collection services and information across all London boroughs.
- **Proposal 4.9** The Mayor will ask government to consider implementing a national deposit system for cans and bottles.

What this will achieve

Recycling or composting 60 per cent of London's municipal waste could save 1.5 million tonnes of CO₂eq emissions² and about £60 million in waste collection and landfill disposal costs each year³.

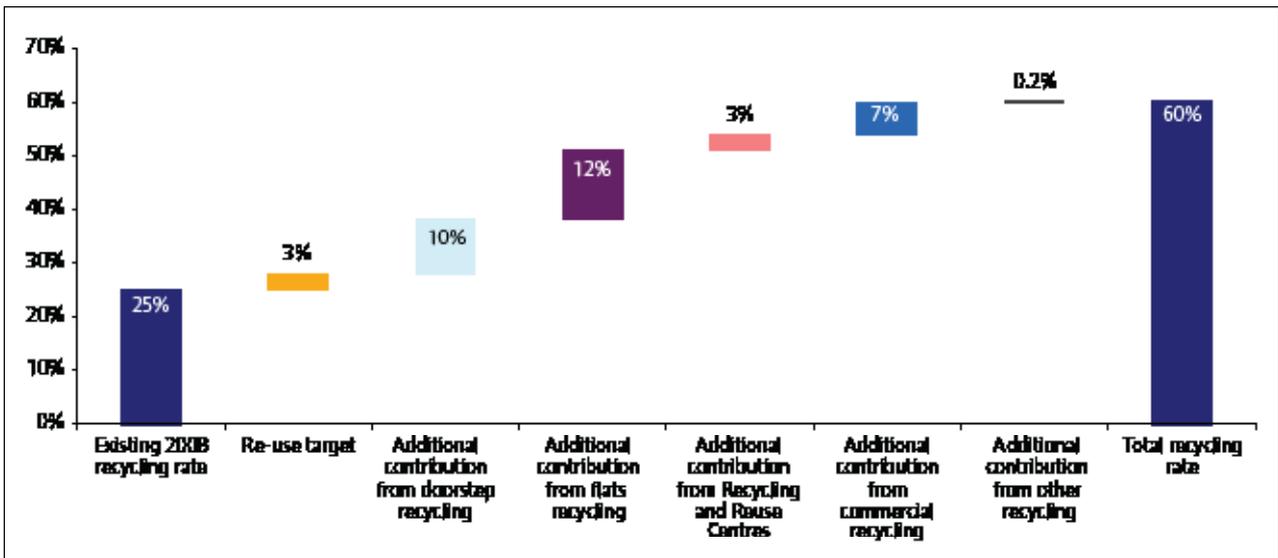
The provision and promotion of accessible, consistent and cost-effective recycling and composting collection services across London, that provide an incentive for Londoners to use them, will help meet the Mayor's municipal recycling and composting targets. Furthermore, it will be essential to recycle more if we are to avoid high landfill costs in the future.

Achieving high recycling rates will also help to generate jobs in the recycling and reprocessing sector. Where recyclables are processed in London the opportunity to encourage manufacturing industries to locate nearby also exists, providing further employment and economic opportunities for London.

In order to achieve the Mayor's recycling or composting targets, boroughs need to provide cost-effective, high quality and easily accessible recycling and composting services. These services need to be supported by sufficient infrastructure to treat and process the materials into saleable products. The Mayor believes the best opportunities for improving London's recycling or composting performance are in services to flats and small businesses, which

today only recycle or compost about 5-10 per cent of the waste they generate. Figure 18 overleaf provides a breakdown of the main services and their contribution to London's current recycling or composting performance. Figure 18 also shows what improvements are likely to be necessary for London to achieve the Mayor's 60 per cent recycling or composting target by 2031.

Figure 18: How London can achieve 60 per cent recycling by 2031



Sources:

Appendix 4a: “Economic modelling of the Mayor’s municipal waste management strategy”, GLA, August 2010;
 Appendix 4b: The Performance of London’s Municipal Recycling Collection Services, GLA, 2010,;
 Recycling collection schemes from flats – Performance . Summary Table; WRAP, 2009,
 Analysis of dry recycling performance 2007/08, WRAP, 2009

Notes:

Figures based on potential yields obtained from best performing recycling services based on WRAP research and scenario modelling in Appendix 4a to this strategy.

Assumes flats comprise 50% of housing stock and residual waste arising from flats are similar to other housing types.

“Other recycling” includes bring bank recycling, recycling street litter and composting green waste from municipal parks.

Recycling and composting services provided to properties with doorstep collections will continue to play an important role in boosting London’s recycling or composting performance. Although many of these services are already reasonably well developed across London, improvements can still be made and these services are typically the most cost-effective way for obtaining the highest yield of materials. The Mayor expects pre-treatment of residual waste to recover materials for recycling will be necessary to improve London’s recycling performance, particularly in areas where it is

difficult to provide cost effective recycling collection services, such as flats.

Table 8 shows indicative recycling or composting rates expressed as percentages for the main services. In addition to household and business waste services, there is significant potential for improving recycling and composting rates from Reuse and Recycling Centres, increasing from the 45 per cent levels achieved today to about 60 per cent in 2020 and 80 per cent by 2031. Materials recovered from other activities such as street litter for recycling and municipal

park green waste for composting and from recycling bring banks are expected to make increasing contributions to London's recycling and composting performance. More information on the role of new waste infrastructure for improving London's municipal recycling or composting rate is set out in Policy 5.

Table 8: Indicative recycling or composting rates by collection service required to achieve the Mayor's recycling or composting targets

Indicative recycling or composting rates	2008	2008	2020	2031
Household collection services - doorstep	40%	40%	50%	55%
Household collection services – flats	10%	10%	35%	40%
Business collection services	10%	10%	35%	40%
Reuse and Recycling Centres	45%	45%	70%	80%
Other activities*	30%	30%	34%	36%
Reuse	<1%	<1%	2%	3%
Total	25%	25%	50%	60%

Notes: 2008 figures are calculated from 2008/09 wastedataflow figures and from survey work with London boroughs on recycling performance in flats and business.

*Includes recycling bring banks and recycling or composting of street litter and park green waste.

Proposals

Proposal 4.1: The Mayor will set recycling and composting (including anaerobic digestion) targets for London's municipal waste of 45 per cent by 2015, 50 per cent by 2020 and 60 per cent by 2031

The Mayor believes that setting high recycling and composting targets for London will ensure that recycling and composting is always considered before energy generation, where recycling and composting delivers the best economic and environmental outcomes. In most cases recycling and composting does perform best in economic and environmental terms however where energy generation performs better in environmental terms (achieves greater CO₂eq savings) than recycling, cost should be the deciding factor.

Proposal 4.2: The Mayor, through the London Waste and Recycling Board's best-practice co-ordinator service, will work with waste authorities to develop cost-effective and easily accessible recycling and composting services to all London households and small businesses. The aim is to showcase good practice and identify opportunities to deliver high quality, consistent and cost-effective collection services achieving high rates of recycling and composting.

In early 2010, the GLA undertook research⁴ on London's recycling and composting performance, looking at how performance related to different collection methods and building types, to help identify areas for improvement and keep

collection costs to a minimum. The research was guided by a steering group made up of London borough representatives, and supported by the economic modelling used to inform the Mayor's preferred approach for managing London's municipal waste. The key findings of the research were:

- Collecting at least six materials gave rise to higher yields. Consistency in the materials collected, regardless of the housing type, was found to increase performance, as it provided a consistent message.
- For flats with near-entry collection, the provision of reusable sacks or similar containers to carry recyclables to communal areas resulted in higher yields.
- High profile and continuous communication about recycling and composting services, typically through signage on the street and on collection vehicles, leaflet drops, advertisements in local newspapers and information in council publications, was linked to better participation and higher performance rates.
- In boroughs where operating contracts were linked to revenue-share agreements and performance incentives, there were generally better recycling or composting rates.
- Due to expensive collection costs and typically low yields from flats, boroughs with a high proportions of flats should consider investing in residual waste treatment facilities, including "dirty MRFs", to recover recyclables and material for energy generation.

- Recycling services for small businesses that collected a wide range of materials produced higher participation rates, and in some cases were more cost-effective than those collecting only one or two materials.

Most of the data on costs used to inform the research is based on national surveys and incomplete data from only a handful of boroughs. As a result it is difficult to present an accurate assessment of London borough collection costs and opportunities for improved performance.

The London Waste and Recycling Board will develop a best practice service with partner organisations to collate and communicate accurate information on London's waste position and share best practice with waste authorities. The board does not have the resources to deliver this alone and will aim to work with other organisations including Capital Ambition, waste authorities and London Councils to achieve this. One option is to work with London Councils to bring back a twinning and mentoring programme that would provide a forum where London's waste authorities could share information and experiences on local waste management

Ideally, recycling collections should accept as many materials as possible, in order to achieve the best CO₂e_q savings. However, in developing their services, the Mayor expects boroughs to focus first on collecting those materials that achieve the greatest CO₂e_q savings by being diverted from landfill or energy generation. These include organic waste, mixed plastics, metals, paper and card, textiles, and glass

containers, which make up approximately 90 per cent of the municipal waste stream.

The Mayor recognises infrastructure is necessary to develop the reuse, recycling, composting and treatment capacity in London. To warrant the investment in high quality services, and to ensure that the economic benefits of recycling and efficient energy generation stay in London, Policy 5 will set out what the Mayor proposes to do to develop waste infrastructure in London.

Proposal 4.3: The Mayor will work with boroughs and the London Waste and Recycling Board to help boroughs provide recycling and composting collection services for small businesses, comparable with those services provided for households.

The Mayor encourages boroughs to work with small and medium-sized businesses to realise the economic and environmental benefits of recycling. Lower disposal costs for recyclables and potential revenue from the materials collected for the boroughs can go hand-in-hand with lower collection charges to businesses, so that both sides benefit. The Royal Borough of Kensington and Chelsea currently provides a commercial waste recycling service, similar to the service provided to households, to around 3,800 commercial premises, see case study 7 at the end of this chapter.

The Mayor is keen to work with the London Waste and Recycling Board to help waste authorities provide cost-effective business waste recycling or composting services, equal to services offered to households. Support could come in the form of the board providing funding for recycling collection vehicles, where they are linked to the development of new waste facilities, to help offset collection costs. Recycling or composting more non-household municipal waste will become an increasingly important issue for waste authorities following the government's recent announcement that it would change the way municipal waste is counted to include more commercial waste.

Proposal 4.4 The Mayor, through the London Waste and Recycling Board, has allocated £5 million to fund infrastructure measures to increase recycling or composting rates from flats, particularly those offering social housing.

In June 2010 the board launched a £5m Flats Recycling Programme to support local authority improvements in flats recycling or composting performance. The funding will be allocated on a competitive basis and will be split over two rounds (Round 1 September 2010 and Round 2 December 2010). Funding is available for waste authorities in London wanting to:-

- introduce a new flats recycling service
- expand an existing flats service
- improve the performance of an existing flats service.

The board will consider funding the following projects:

- recycling collection infrastructure, including the purchase of containers and liners, vehicle costs, staffing or other service delivery costs to include:
 - o dry recycling infrastructure e.g. underground containers, chutes or organic recycling infrastructure e.g. food waste container housing.
 - o recycling site improvement works e.g. new and improvements to signage, fencing, lighting etc.
- incentive schemes – e.g. vehicle weighing equipment.

The Mayor particularly wants to work with boroughs, housing associations, and Arms Length Management Organisations (ALMOs) to target London's social housing as a way to boost London's recycling and composting performance. Social housing makes up a large proportion of flats and estates in London, and thanks to its close association with the boroughs, this sector presents an excellent opportunity for working in partnership to improve local recycling and composting.

Any retrofit schemes funded by the board should be integrated with other housing retrofit programmes, and supported by education programmes and revenue from boroughs. More information on the board's Flat's Recycling Programme can be found at www.lwarb.gov.uk.

Proposal 4.5: The Mayor will work with waste authorities to increase recycling and composting at local Reuse and Recycling Centres (RRCs).

The Mayor wants to work with London's waste authorities to maximise recycling and composting at RRCs through good design and site layout. In November 2008, the GLA published a Recycling Rate Predictor Toolkit alongside a Best Practice Design report, which allows waste authorities to predict likely recycling rate increases at RRCs and estimate the costs and savings of implementing new improvements. Such improvements include better signage, increasing the number of recycling banks, or re-orientating sites to maximise recycling and composting opportunities. The Mayor encourages boroughs and waste disposal authorities to use the Predictor Toolkit and Best Practice Design report to improve local recycling and composting performance. More information can be found at <http://www.london.gov.uk/publication/draft-waste-strategy>.

Opportunities should also be investigated for re-orientating and intensifying RRCs that support the development of treatment facilities, for example, or materials reclamation facilities (MRFs), and small-scale food waste and/or green garden waste composting.

Proposal 4.6: The Mayor will work with waste authorities to provide incentives for Londoners to recycle and compost.

The Mayor supports rewarding households who regularly recycle instead of imposing charges on households who do not recycle, or who produce large quantities of waste. The Mayor is keen to see boroughs adopt incentive-based schemes, such as RecycleBank. RecycleBank is a scheme in which householders receive money-off vouchers for chains and local stores, or can choose to donate money to charity, when they recycle a certain amount. The scheme can deliver a sustained increase in recycled municipal waste by giving households more incentive to recycle. The typical financial benefit to households in London could be about £14 a month, assuming an additional 100-200 kilograms of recycling a year. The Mayor is keen to see a RecycleBank trial in London during 2011.

Proposal 4.7: The Mayor will work with waste authorities, TfL and the private sector to provide "on-the-go" recycling bins across London.

A number of boroughs provide recycling bins on streets in strategic locations, such as outside bus stops and train stations and in town centres, so that Londoners can recycle "on the go" during their daily commute. Recycling bins are most commonly available for paper, although some boroughs provide on-the-go recycling bins for plastic bottles, glass, and cans. However, on the whole in London, there is still a tremendous missed opportunity to recycle waste generated outside the home. The Mayor is therefore keen to promote on-the-go recycling across London. Research⁵ undertaken for the London Assembly

showed more than 260 tonnes of waste is produced at lunchtime in London every day, illustrating the need to capture the proportion of that waste that can be recycled.

The Mayor believes improving on-the-go recycling provision in London can be best achieved through a combination of public funding and private sponsorship. The Mayor will be working with the GLA group overall, and in particular with TfL, to improve on-the-go recycling significantly on the GLA's own estate. He also wants to explore funding opportunities with businesses and land owners for providing more recycling bins along main streets across London, integrated where practicable with local authority recycling services, to allow Londoners to recycle as they go.

The Mayor is working with partners to trial six reverse vending machines in central London for six months. If successful the Mayor will investigate the possibility of rolling out the machines across London. The reverse vending machines will accept plastic bottle and soft drink cans and on deposit of a can or bottle, provide the depositor with a money-off voucher for a similar product. All the plastic bottles collected will be recycled in London.

Proposal 4.8: The Mayor, through the London Waste and Recycling Board's best practice co-ordinator service, will fund Capital Waste Facts, which collates municipal waste collection services and information across all London boroughs.

The London Waste and Recycling Board is working to improve the accessibility and presentation of local authority waste services information and data on the collection, reuse, recycling, treatment and disposal of municipal waste within London. The board will fund Capital Waste Facts to mine London waste authority data from the government's data capture system, WasteDataFlow, and will analyse, manipulate and present the data to aid interpretation of London's waste data and identify trends.

Capital Waste Facts is used by waste authorities, policy makers, academics, the waste industry and the public to better understand how London's waste flows through the waste management system and identify where the opportunities for improvement can be realised. The Board will work with project partners London Remade Solutions to improve the collection, accessibility and presentation of this information. More information on Capital Waste Facts can be found at www.capitalwastefacts.com.

Proposal 4.9: The Mayor will ask government to consider implementing a national deposit system for cans and bottles.

Up until the early 1980s the UK had bottle deposit schemes for glass bottles that financially rewarded people for recycling their glass bottles. This deposit scheme gradually faded out as the drink industry began to move away from glass bottles to plastic bottles, with no deposit system as very little plastic was recycled.

A number of European countries and US States operate successful deposit schemes on single use beverage containers in particular aluminium cans and plastic bottles.

Germany, Denmark and Norway have been operating such schemes for almost 10 years and Sweden, Finland and the Netherlands have recently followed suit. In 2005 the Norwegian system captured 93 per cent of recyclable bottles and 80 percent of all drinks cans. Schemes vary in what they include and how they function but deposits on average are 25 Euro cents.

A number of US States have been successfully operating deposit schemes since the early 1970's such as Vermont and Oregon and currently eleven US States run a scheme with the average deposit being 5 Cents. The US States that do have deposit schemes generally capture around 80 per cent of beverage containers compared to an average of 23 per cent in those states that do not operate such schemes.

The Mayor believes that beverage container deposit schemes can significantly increase the number of bottles that are captured for recycling if implemented effectively. The Mayor also believes that it is not possible to implement such schemes at a regional level as this could place London businesses at a commercial disadvantage and require disproportionate investment in requisite infrastructure. The Mayor will therefore ask Government to consider implementing a single use beverage container deposit scheme nationwide.

CASE STUDY 7 - COMMERCIAL WASTE RECYCLING

What: Commercial Waste and Recycling Collection Services

When: Since 2005

Success: The amount of businesses that are using the borough's recycling collection service has risen from 11 per cent in 2005 to 35 per cent in 2010.

Cost: A 240 litre wheelie bin costs £4.79 per lift plus £1.60 per week hire on each bin for general waste compared to only £1.66 per lift and no hire charge for recycling.

The Royal Borough of Kensington and Chelsea deliver an innovative commercial waste collection service with a strong recycling focus. The materials collected for recycling include paper, card, glass bottles/jars, plastic bottles, tins/cans, and food & drink cartons (tetra packs). The service operates seven days a week with three collections a day for recycling customers.

There has been a 24 per cent increase in the number of businesses using the recycling service since 2005. This can be attributed to a strong marketing campaign to encourage businesses to recycle that includes regular articles in the borough publications and a sales team actively promoting the service and educating businesses. This alongside a competitive pricing structure and a contamination monitoring programme has led to a 625,000 increase in the number of recycling sacks sold, from 250,000 in 2005 to 875,000 in 2010.

Royal Borough of Kensington and Chelsea currently have around 3,800 customers that use their recycling service - representing a 65 per cent market share.

CASE STUDY 8 - IMPROVING RECYCLING AND COMPOSTING RATES IN BOROUGHS WITH A HIGH DENSITY OF FLATS

- What:** Dramatically improved recycling rates/ Recycling Improvement Plan
Date: 2007/08 - present
Success: Doubled household recycling rates from 13 per cent in 2007/08 to 26 per cent in 2009/10.
Cost: Approximate cost of Recycling Improvement Plan was £1.6 million. Savings in 2008/09 on disposal costs was £156,000

Tower Hamlets poor recycling performance in 2007/08 (13 per cent) attracted Ministerial attention and a requirement to secure a recycling performance of 19 per cent by the end of 2008/09. To address this Tower Hamlets put in place a Recycling Improvement Plan and set themselves even more challenging target of 26 per cent for 2009/10 and 32 per cent for 2010/11.

Tower Hamlets faces some unique challenges; it has one the highest and most ethnically diverse population densities in inner London and 76 per cent of properties are purpose-built flats, there are also a large number of private landlords and housing associations that own and manage properties within the borough.

Since flats form the majority of properties in the borough they have formed a key element of the Recycling Improvement Plan. Approximately half the flats in the borough (40,000) now have a bring scheme for dry recycling with the remainder having a weekly collection from their doorstep. In addition a food waste collection service was introduced to 6000 flats.

The key initiatives that are being undertaken to improve recycling operations for flats include:

- Working to adopt a customer-oriented view of the borough where public and private land are maintained to the same standard.
- The launch of a forum called the 'Public Realm Subgroup' that acts as a mechanism for the Council and managing organisations to work jointly to improve services for residents.
- Developing closer working relationship with Tower Hamlets Homes (a major managing organisations) including the development of a partnership estates recycling and cleansing project which is due to be launched 2010/11. *continued overleaf*

- In 2010/11 the Council will trial a new style of recycling bring bank, which will reduce levels of contamination.

Across the borough there has been a concentrated communications programme to raise awareness of recycling and get residents to recycle more, initiatives included:

- A new high profile campaign launched in October 2008 called 'Together We Can Recycle More'. This campaign had an immediate and visible impact on increasing the tonnage collected for recycling and used local residents as champions to foster community spirit and engage groups of people that didn't previously recycle.
- Launch of a new recycling champions programme in Spring 2010 with recruitment of 30 resident champions.
- Development of new pictorial based communication materials to overcome literacy and language barriers.
- Development of new ways of communicating with residents such as, stickers to go on refuse chute doors to reminding residents to recycle.
- Weekly messages and articles about waste prevention and recycling in local press

CASE STUDY 9 - ACHIEVING HIGH RECYCLING RATES AT REUSE AND RECYCLING CENTRE

What: Management of Household Reuse & Recycling Centres

Date: September 2008

Success: Achieving average recycling performance of 79 per cent in 2008/09 compared to 50 per cent in 2007/08 across seven Reuse and Recycling Centres in South West London reducing the amount of residual waste sent to landfill from 34,000 tonnes in 2007/2008 to 12,100 tonnes in 2009/2010. This represents an overall reduction of 64 per cent during this period

Cost: Reducing the amount of residual waste sent to landfill between 2007/2008 and 2009/2010 has saved the Partnership £876,000 on landfill tax costs at the 2009 landfill tax rate of £40 per tonne,

The South London Waste Partnership consists of the three London Boroughs of Croydon, Merton, Sutton and the Royal Borough of Kingston upon Thames.

As part of the Partnership's waste procurement strategy the contract for the management of seven Household Reuse and Recycling Centres (HRRCS) across the Partnership was procured as a separate contract as part of the suite of contracts awarded during 2008.

The Partnership awarded the contract for a 14 year period with a further option to extend by up to five years, to a Liverpool based Company known as Environmental Waste Controls (EWC), and they started providing the management services of the Partnership's HRRC's from 1 September 2008.

The Partnership through their contract documentation set stretched yearly recycling performance targets for each of the seven HRRC's, and a service failure mechanism was in place were EWC not to achieve the recycling levels.

It was evident within a couple of months of the start of the contract that by the introduction of EWC's business culture that the levels of recycling at each of the HRRCS exceeded both the targets, and expectations of the Partnership.

The change in performance has been down to a number of factors including;

- Culture of EWC focussing on diversion of waste from landfill bins for recycling and reuse.
- Bonus payment for EWC to reward achieving high levels of recycling.
- Introduction of new concise customer information signage.
- Regular contract performance meetings with Partnership officers.
- Introduction of compactors for high volume recycling materials.
- Extending the range of recyclables recovered at each of the seven HRRC's.
- EWC's staff educate customers on how to maximise recycling, and minimise waste for land fill.
- Flexibility of EWC to adapt services to ensure that they are fit for purpose at each of the seven different HRRC's.

The Partnership acknowledges that the provision of a single provider to manage their HRRC's has ensured that consistency and high landfill diversion rates is being achieved across the Partnership.

End notes

1. Where products from the anaerobic digestion process can be “used as a soil improver, as an ingredient in growing media or blended to produce a top soil that will meet British Standard BS 3882”. Refer to National Indicator 192: Household waste recycled and composted.
2. Assumes 60 per cent recycling or composting rates across material streams, with paper and card, metals, plastics, organic waste, textiles, and glass making up approximately 85 per cent of municipal waste. The actual CO₂ eq savings will depend on the materials recycled or composted.
3. a) Residual waste costs based on collection and disposal costs of £160 per tonne for waste sent to landfill. This comprises of collection costs of £64 per tonne, and landfill fee of £96 per tonne (including the 2014 landfill tax of £80 per tonne). Source: Economic Modelling for the Mayor's Municipal Waste Management Strategy, GLA, 2010; WRAP Gates Fees Report, 2010.
b) Dry recycling costs based on recycling collection and gate fee costs of £86 per tonne. Source: WRAP Kerbside Recycling: Indicative costs and performance report, 2008.
c) Assumes organic waste is collected separately for treatment via anaerobic digestion at £126 per tonne. Source: GLA borough survey, March 2009.
4. The Performance of London's municipal recycling collection services, GLA, September 2010.
5. “On the go recycling”, Report for the London Assembly Environment Committee, May 2009.

Policy 5 - Catalysing municipal waste infrastructure in London, particularly low-carbon

Vision

London manages the bulk of its municipal waste within the Greater London area by investing in appropriate waste infrastructure.

From vision to policy

The Mayor, through the London Waste and Recycling Board, will work with waste authorities, businesses and other stakeholders to develop municipal waste infrastructure in London.

From policy to action - proposals

Proposal 5.1 The Mayor, through the London Waste and Recycling Board, will secure investment in London's waste infrastructure:

- The Mayor and the boroughs, through the board's funds, will provide financial assistance for facilities for the collection, treatment or disposal of waste produced in London.
- The Mayor and the boroughs, through the board's brokerage service, will seek to involve external partners who are able to make financial and in-kind investments to increase the value of the board's fund. This will be achieved through a number of mechanisms, including the formation of joint ventures, and participation in other funding schemes, such as EU match funding.
- The Mayor will work with the boroughs to demonstrate the case for continued funding for the board beyond 2012, when current funding is scheduled to cease.

Proposal 5.2 The Mayor, through the London Waste and Recycling Board, will catalyse waste infrastructure in London, particularly those using low-carbon technologies:

- The Mayor will, through the board, work with waste authorities and the private sector to develop new facilities and improve existing facilities for reuse, recycling, composting and renewable energy in London.
- The Mayor will work with the board, the GLA Group and waste authorities to generate as much energy as possible from London's organic waste and non-recyclable waste to achieve the greatest environmental benefits. This will be done through a combination of introducing new technologies and using London's existing incinerators to generate heat and power.
- The Mayor will, through the Mayor's Food to Fuel Alliance, aim to catalyse at least five exemplar food waste projects in London. The Food to Fuel Alliance will support food waste projects that generate renewable heat and power (including transport fuel), and compost material for local use.

- The Mayor will work with London's incinerator operators to look at making London's incinerators carbon neutral by using heat from the incineration process that is currently being wasted.
- The Mayor, through the GLA Group's Decentralised Energy Programme, has the opportunity to work with Southwark, Lewisham, the SELCHP operator and other stakeholders to develop a heat infrastructure to supply affordable low-carbon heat to local housing estates and public and private sector buildings in Southwark and Lewisham.

Proposal 5.3 The Mayor will work with waste authorities to manage as much of London's waste as possible within London to achieve regional self-sufficiency targets as set out in the London Plan:

- The Mayor, when reviewing municipal waste contracts and waste strategies, will work with waste authorities to intensify and re-orientate waste sites in their control, so that more of London's waste can be treated in London wherever possible. He will also consider all aspects of the development of new or planned sites, including good design, and the development of new technologies for energy recovery.
- The Mayor, through the London Waste and Recycling Board, will work with waste authorities, landowners and other stakeholders to develop a waste site framework, which would set out opportunities for developing new waste infrastructure, looking at the most suitable sites and surrounding land uses; and linking where appropriate to the GLA Group's heat map network and www.londonbrownfieldsites.org.
- The Mayor will hold an open dialogue with local authority leaders to identify where the opportunities are for developing waste infrastructure in London. The Mayor will also actively explore opportunities to use land owned by the GLA Group for managing municipal waste.

Proposal 5.4 The Mayor through TfL, will encourage the movement of waste via sustainable modes of transport.

- The Mayor, through TfL, will promote sustainable forms of transport for waste, maximising the potential of rail and water transport
- The Mayor, through TfL, will work with waste authorities to make better use of London's wharves and canals for developing the city's waste infrastructure.

What this will achieve

The board is managing a £73.4 million fund from 2009–2011 (or 2012 for the GLA Group element) to support the development of waste infrastructure in London. This has been supplemented by a further £18 million in match funding from the European Regional Development Fund, through the JESSICA scheme. Other funding opportunities include the London Green Fund (£114 million) and London's European Structural Fund (£517 million).

Building new, cleaner waste facilities in London will help keep the value of London's waste within London. London will strive to be the beacon of good practice, leading the way on innovation for next-generation waste facilities that provide real benefits to local communities in the form of new products, employment and low-carbon energy. New waste infrastructure will be essential to London achieving zero municipal waste to landfill by 2025.

Providing more waste treatment facilities through the board, on a commercial basis, will mean that London's boroughs will be able to select waste treatment options from a market of facilities. This will reduce costs, and allow boroughs to enter into simpler and more flexible contractual arrangements.

Generating more energy from London's organic and non-recyclable waste will make an important contribution to achieving London's decentralised energy goal. If all municipal waste, after maximising recycling and composting, were used for energy generation, it could provide power for up to 210,000 homes and heat for up to 105,000 homes¹.

Particular opportunities exist for generating renewable energy using London's municipal food waste. Each year around 480,000 tonnes of municipal food waste is sent to landfill. This waste, which produces methane as it decomposes in landfill sites, could instead be used to generate renewable, carbon-neutral energy using anaerobic digestion, potentially providing enough electricity for about 14,000 homes and heat for 6,000 homes.

The first phase of the GLA Group's potential programme to supply heat from SELCHP to local housing estates in Southwark and Lewisham could save approximately 8,000 tonnes of CO₂ eq per year. These savings would be a result of avoiding emission from running gas boilers.

A live and interactive site map will, for the first time, allow the public and private sector to identify waste management solutions that can be linked with London's wider land-use planning needs, and in particular, the city's energy generation and transport infrastructure. It will enable businesses, waste authorities and investors to make informed investment decisions on the suitability of sites without risking significant development costs.

London must manage as much of its municipal waste as practicable within London. This chapter sets out how the Mayor will work with the London Waste and Recycling Board and other partners to develop new waste infrastructure to keep the value of London's municipal waste in the capital and achieve greater regional self-sufficiency.

Proposals

Proposal 5.1: The Mayor, through the London Waste and Recycling Board, will secure investment for waste infrastructure in London

As set out in Chapter 4, the London Waste and Recycling Board's funding alone will not be sufficient to fill London's municipal waste

infrastructure capacity gap. The Mayor, through the board's brokerage service, will seek to involve external strategic partners who are able to make financial and in-kind investments to increase the value of the board's fund. This will be achieved using a number of mechanisms including:

- the formation of joint ventures, where investors provide extra funding
- the commitment of long-term budgets to support projects initiated by the fund (particularly in the case of local authorities who are less likely to be able to raise capital funding)
- participation in other funding schemes, such as EU match funding.

Box 10: EU match funding - JESSICA scheme

The Joint European Support for Sustainable Investment in City Areas (JESSICA) scheme is an initiative managed by the European Investment Bank to promote sustainable investment and growth in jobs in Europe's urban regeneration areas. In addition to the funds directly managed by the London Waste and Recycling Board, the board has contributed £18m of funds to JESSICA (locally branded as London Green Fund) which has been matched by £18m of funds from the European Development Fund. This £36m of public sector funding is to be independently managed by a private sector fund manager with a target of bringing similar private sector match funding. As such a total waste fund of circa £70m will be available to invest in waste infrastructure projects in London over the period to 31 December 2015. Whilst the broad strategy for this fund is in line with the board's strategy the fund is independent of the board and may support the same or different projects as determined by its own evaluation process. The London Green Fund and board fund are complimentary funds working towards the same goal.

Through the board, the Mayor will also explore funding opportunities such as London's European Structural Fund, to ensure that funding is obtained for London.

The Mayor expects that the London Waste and Recycling Board will continue supporting waste infrastructure in London and lever in additional funds. The board has applied to central government (via Defra) for a second round of funding. The result of this application should be known in October 2010.

Proposal 5.2: The Mayor, through the London Waste and Recycling Board, will catalyse waste infrastructure in London, particularly those using low-carbon technologies.

In partnership with the waste industry, the waste authorities and the board, the Mayor will help develop new facilities and improve existing ones, to offer the best environmental performance and economic benefits for London. This work will cover:

- reprocessing facilities
 - composting facilities
 - pre-treatment facilities to recover high quality recyclable material from residual waste.
 - advanced conversion technologies such as anaerobic digestion, gasification and pyrolysis to generate renewable heat and power (including transport fuel).
- The Mayor estimates that an additional 8.5 million tonnes of waste management capacity will be required by 2031, over and above that which is already in the planning or procurement pipeline, to manage London's waste more effectively. Some 1.8 million tonnes of this gap relates to municipal waste. The board has a pipeline of waste infrastructure projects and is developing an infrastructure pool, from which new projects will be selected for funding, from a pot of approximately £36 million². The board in its revised 2010/11 Business Plan has identified the types and number of projects it wants to fund to help fill the identified capacity gap. These projects, set out in table 9, represent a capacity of about one million tonnes of waste infrastructure per year, of which approximately 400,000 tonnes per year is estimated to be available to treat municipal waste from 2012.
- reuse centres
 - recycling sorting facilities (such as material reclamation facilities) that maximise the recovery of high quality materials

Table 9: Waste project types identified by the London Waste and Recycling Board for financial support

Project type	Number of facilities	Average capacity per facility ('000 tonnes)	Total capacity delivered ('000 tonnes)	Total cost (£000)	Board funding (£000)
MRF/recycling	2	150	300	40,000	8,000
AD/composting	2	50	100	30,000	6,500
Thermal treatment	2	150	300	160,000	16,000
MBT	2	150	300	60,000	5,000
TOTAL	8		1,000	290,000	£35,500

In September 2010 the board announced the first projects shortlisted for funding from its infrastructure pool. These projects are set out

in table 10. More information can be found in the board's revised 2010/11 Business Plan at www.lwarb.gov.uk.

Table 10: London Waste and Recycling Board 2010 infrastructure pool of projects

Project Sponsor	Project types	Capacity (tonnes per year)	Location
Biossence	Thermal treatment	100,000	East London
Green Tech	Plastics processing	25,000	Enfield
Bywaters	Materials reclamation facility	140,000	Newham
Powerday	Materials recovery and fuel preparation	750,000	Hillingdon
Greenwich Council	Anaerobic digestion	25,000	Greenwich
TEG Group	Anaerobic digestion	30,000	Barking and Dagenham
South London Waste Partnership	Anaerobic digestion	30,000	Sutton
Coronation Nursey	Anaerobic digestion	15,000	Essex
Keltbray Hunts Heat & Power Ltd	Thermal (biomass)	30,00	Barking and Dagenham
Advanced Recycling Tech. Ltd	MBT	360,000	Newham
TOTAL		1,555,000	

In most cases, the board's money will be used to invest in projects on commercial terms. The board aims to 'recycle' its funds, as the investment is recouped, into new projects over five-year periods. With a leverage target of around 4:1, four investment periods will deliver a 16:1 leverage of private investment. As this money is recycled, the board will also have the potential to reduce the capacity gap by around 35 per cent with its current funding. Should government provide a second round of funding for the board, it could provide a constantly recyclable fund that, providing its investments were successful, could reduce the capacity gap for all London's waste by about 50 per cent.

The introduction of new infrastructure will enable waste authorities to establish contracts in a completely new way in the waste sector. Rather than engaging in long (typically 25-30 year) contracts, waste authorities in London will be able to take advantage of the supply of a functioning market place for waste treatment, with a variety of solutions on offer. They will be able to enter into contract lengths to suit their needs, as the service providers will not be aiming to recoup their infrastructure capital costs in the gate fees over a fixed long term contract.

The Mayor, through the board's brokerage service, will help develop partnerships for new waste projects, particularly those that aim to deliver facilities using new technologies.

The board has launched a web-based service that allows projects sponsors, financiers, technology providers, landowners and waste producers to contact each other and form viable projects.

More information on the board's web-based service can be found at <http://www.lwarb.gov.uk/brokerage/login.php>.

A key element of the brokerage service will be building and maintaining relationships with stakeholders and delivery partners, and, where possible, integrating municipal and non-municipal waste projects. The board is required to produce an annual business plan setting out its priorities for the year ahead and report on its funding allocations. The board will include in its annual plan progress on developing municipal waste infrastructure to address the 'capacity gap', the state of its investments and the progress towards making new investments. The Mayor requires the board to report on the following key performance indicators: waste diverted from landfill, CO₂ eq avoided, and jobs created.

The role of London's municipal waste for decentralised energy generation

For waste that cannot be reduced, reused or recycled, the Mayor believes that energy should be generated from that material in a manner that maximises the efficiency of that energy generation and minimises the lifecycle CO₂eq emissions. Waste lends itself well to decentralised

energy systems, due to the flexibility of the fuel that can be produced from it. Waste-derived gases from technologies such as anaerobic digestion and gasification, once cleaned, can be piped to local energy centres and used directly in gas engines, producing electricity and heat where it is required.

The Mayor will work with the GLA Group, the London Waste and Recycling Board and waste authorities to generate as much energy as possible from London's organic waste and non-recyclable waste as a way to achieve the greatest environmental benefits. This will be done through a combination of introducing new technologies and using London's existing incinerators to generate heat and power. The Mayor expects London's non-organic waste to play a declining role for energy generation as recycling and composting performance increases.

Turning London's food waste into an opportunity

The Mayor will work with the board, TfL, the GLA Group and the private sector to develop an infrastructure for dealing with food waste in London. To this end, the Mayor has established the Food to Fuel Alliance, which will aim to catalyse at least five exemplar food waste projects in London that deliver one or more of the following:

- decentralised renewable heat and power
- renewable transport fuel (bio-fuel) or fuel for use in electric vehicles
- demonstrable links to hydrogen fuel cells
- compost material for local use, linked to the Mayor's Capital Growth programme.

The Food to Fuel Alliance includes representatives from the GLA, the London Waste and Recycling Board, the GLA Group and Capital Growth.

The alliance will bring together local authorities, developers, landowners, finance providers, technology providers, energy companies and food waste producing companies (such as supermarkets, restaurants and markets) to develop food waste projects, particularly anaerobic digestion projects, which are well suited to treating food waste. The Mayor's aim is for the alliance to develop at least one exemplar project in London by 2012.

The Food to Fuel Alliance will also work with the London Food Board to ensure that London's food businesses deal with their food waste streams more effectively. The London Food Board is made up of representatives from London's food sector including caterers, wholesale markets, and retail supermarkets. The London Food Board will work with its members and use their areas of influence to develop the necessary supply chains of food waste feedstock for treatment in anaerobic digestion facilities. More information on the London Food Board can be found at <http://www.london.gov.uk/londonfood/>

Using London's existing energy-from-waste facilities more efficiently

Although there is a need for new waste infrastructure in London, the Mayor also wants to work with waste facility operators to enhance the existing infrastructure, making it more efficient and improving its environmental performance. The greatest opportunity is in using the vast amounts of heat generated but not currently captured for use by London's incinerators in

Lewisham (SELCHP) and Enfield (Edmonton). Nor are there currently any plans to use the heat from London's third incinerator at Belvedere, in Bexley, which is expected to open in 2011.

Research³ commissioned by the GLA showed that incinerators generating energy from untreated waste, and operating in combined heat and power mode (CHP), can be carbon neutral in that they create only as much carbon dioxide through the combustion process as they avoid through energy generation. However, retrofitting heat networks that can utilise usable heat can be expensive and can have commercial risks. The Mayor wishes to understand, on a case-by-case basis, what the costs are, and whether there is a case for directing funds from the GLA Group, or London Green Fund, to help. The Mayor expects new energy generation facilities in London to operate in CHP mode where practicable, and through board's brokerage service, will work with waste facility operators to ensure CHP opportunities are fully explored.

The GLA Group has the opportunity to work with Southwark, Lewisham and SELCHP to develop heat infrastructure to supply affordable low carbon heat from SELCHP to local housing estates and public and private sector buildings in Southwark and Lewisham. The first phase of work could involve providing heat to five estates in Southwark. A second phase has the potential to extend the heat network to Canada Water. Veolia (who operate and part own SELCHP) have been granted planning permission to build an integrated waste facility on the Old Kent

Road in Southwark. This facility will comprise a materials recovery facility and mechanical biological treatment of the remaining non-recycleable waste to produce a solid fuel.

As part of the planning approval Veolia agreed under a S106 agreement to supply low carbon heat from SELCHP to neighbouring estates (approximately 2,700 homes) in Southwark. Significant additional heat load would improve the economics of the scheme and this has been identified as Convoys Wharf in Lewisham in addition to the phase one and two work in Southwark. Existing and proposed heat requirements along this route could also add to the opportunity and diversity of heat loads. The identified opportunities in Southwark (phases one and two) have a combined peak demand which is equivalent to a peak winter heat load of 40 MW. This is enough energy to heat approximately 3000 homes.

SELCHP is potentially capable of supplying a continuous heat load up to around 40 MW at the expense of some loss of electricity generation and additional boiler plant would be required to meet the total heat load peak heat demand. The GLA Group will work with SELCHP and Lewisham to explore opportunities for expanding SELCHP's heat infrastructure to the Deptford/New Cross area in Lewisham which includes 50 per cent of the borough's housing growth.

The arrangements for ownership and management of the heat network have not been specified. The GLA Group would like to explore the potential for a public interest special purpose vehicle, which could include private sector involvement, to possibly own and operate manage the network. Ideally the network would commence operation by 2012 and continue to expand for many years there after.

With regards to the existing landfill sites, the Mayor supports the conversion of landfill gas for energy generation. This energy generation could include the production of a transport fuel, which would offer lower CO₂ emissions and less pollution when compared to conventional fuels (petrol and diesel).

Achieving greater regional self-sufficiency

London currently has 41 Reuse and Recycling Centres and approximately 800 other waste sites, most of which are privately owned⁴. The large majority of these sites are used to separate and bulk up waste materials for recycling and composting off site, or to send to landfill sites, mostly outside London, or incinerators.

The possibilities for re-orienting and increasing capacity on existing sites are significant although new sites will also be required. Existing sites could be redeveloped to accommodate composting facilities, material reclamation facilities, pre-treatment facilities, reprocessing plants or energy recovery facilities. The Mayor wants London's waste sites to move up the value chain so that more of the economic value of London's waste

stays in London. New waste facilities should be well designed and provide positive benefits to local communities in the form of new products, employment, and heat and power. They must not be bad neighbours and should be developed and designed in consultation with local communities, taking account of health and safety within the facility, the site, and adjoining neighbourhoods.

Proposal 5.3: The Mayor will work with waste authorities to manage as much of London's municipal waste as possible within London to achieve regional self-sufficiency targets as set out in the London Plan.

The greatest opportunity for managing more of London's waste within its boundaries is through the protection and development of London's existing and planned waste management sites. By working with the boroughs and waste disposal authorities, the Mayor is keen to ensure we use these sites to tackle London's waste challenge and help boroughs achieve their apportionment targets. Ensuring good design of these sites will help to maximise reuse and recycling opportunities, and it will be important to explore opportunities for developing material reclamation facilities, reprocessing facilities, pre-treatment facilities, and energy generation facilities.

The board will work with the GLA Group, TfL and waste authorities to develop a Londonwide geographic information system (GIS) map of London's waste management infrastructure, which could map both opportunities and constraints, and identify those areas that are most promising for future development. Information that could be

mapped in this way includes:

- waste arisings
- existing waste sites (or other industrial sites)
- heat networks
- transport networks
- planning boundaries
- the planning status of sites.

The maps could also cover such constraints as:

- environmental issues, such as Sites of Special Scientific Interest (SSSI)
- conservation issues, such as listed buildings
- people – the proximity of sites to dwellings
- ground stability and flood risk.

More information on the GIS map can be found at www.londonwastemap.org

The Mayor is keen to see this joined-up approach help overcome planning constraints by linking to other developments within the urban fabric.

A GIS map of London's waste infrastructure will, for the first time, enable all the key players in London to identify the opportunities for mapping waste with energy and heat use in neighbouring developments, linking with the London heat map developed by the GLA Group.

The GIS map will be integrated with the London heat map and London's brownfield sites to identify sites that are suitable for redevelopment or reuse. The London brownfield site tool can be found at www.londonbrownfieldsites.org.

Box 11: London Heat Map

The GLA Group London heat map is an interactive online tool that allows users to identify opportunities for decentralised energy projects in London. The heat map provides spatial intelligence on factors relevant to the identification and development of decentralised energy opportunities, such as major energy consumers, fuel consumption and CO₂ emissions, energy supply plants, community heating networks and heat density. It can be found at: www.londonheatmap.org.uk.

The GIS map will also be linked to development plan documents identifying potential waste sites produced by waste authorities.

As well as safeguarding and upgrading existing municipal waste sites, the Mayor will work with stakeholders to help identify additional sites in London where feasible. The Mayor will hold an open dialogue with waste authorities to identify where there are opportunities to develop waste infrastructure in London. The Mayor will also actively explore opportunities to use land owned by the GLA Group, where appropriate, for managing municipal waste.

Proposal 5. 4: The Mayor, through TfL, will encourage the movement of waste via sustainable modes of transport.

In 2008/09, water and rail carried 447,000 and 560,000 tonnes of waste respectively, transporting 11 and 14 per cent of London's municipal waste, mainly to landfills outside London. Over the last six years, the volume carried by rail and water has been declining as increasing levels of waste are recycled. Very little use is made of these sustainable modes of transport by recycling operations, yet there is the potential for this sector to make greater use of rail and water in future, such as by sending paper to Kent processing mills this way or exporting material via the Thames' ports. The Mayor will, when reviewing municipal waste management contracts, work with TfL and waste authorities to promote the most sustainable forms of transporting waste, maximising the potential use of rail and water transport.

The cost-effective use of rail and water relies on access to the necessary modal infrastructure such as rail-heads and wharves. Locating waste transfer stations and waste processing facilities near safeguarded wharves and rail heads, such as those at Smugglers Way, Wandsworth and Transport Avenue, Brentford, are critical in delivering a viable and sustainable transport solution.

The Mayor, through TfL, will work with waste authorities to make better use of London's wharves and canals for developing the city's waste infrastructure. London's waste authorities currently use five safeguarded wharves on the River Thames, though this will increase to six when the Belvedere incineration facility becomes operational in 2011. TfL is currently working with the North London Waste Authority to investigate the potential of using the River Lee for the movement of material to and from the proposed Edmonton waste facility and will explore with the other waste authorities the potential for maximising water transport in their existing contracts. The Mayor will, when reviewing waste contracts, work with TfL and waste authorities to investigate the potential for developing waste infrastructure along London's wharves, canals and railheads.

Where appropriate, TfL will also promote the use of multi-modal refuse collection vehicle (MMRCV) technology in collection fleets, to make better use of sustainable transport modes in collection and transfer to waste sites.

End notes

1. Based on the average home using 4,000kWh of electricity per year and 16,000kWh of gas for heat. Assumes organic waste is sent to anaerobic digestion plants, mixed waste to gasification, and wood waste goes for incineration (biomass boilers).
2. Subject to final funding commitments.
3. "Greenhouse gas balance of waste management scenarios", GLA, January 2008.
4. "Recycling and Recovery facilities: site investigation in London", GLA 2005.

Policy 6: Achieving a high level of street cleanliness

Vision

Londoners should enjoy a consistently high standard of street cleanliness regardless of where they are living, working or visiting in London.

From vision to policy

The Mayor will work with London boroughs, businesses and public transport providers to develop and implement a programme of work to make London a clean and pleasant city to live in and visit.

From policy to action – proposals

The Mayor will:

- **Proposal 6.1** Work with London Councils and the London boroughs to develop a mobile and online reporting and recording system for litter and fly-tipping.
- **Proposal 6.2** Work with local authorities to improve enforcement of environmental crimes, including litter and graffiti.
- **Proposal 6.3** Encourage boroughs to recycle or compost their street cleaning waste where practicable.
- **Proposal 6.4** Work with a range of partners, including London boroughs and the private sector, to provide on-street recycling opportunities and to recycle waste from London's events.
- **Proposal 6.5** Work with the London Organising Committee of the Olympic Games, the Capital Clean-Up campaign, Thames 21 and other voluntary organisations to undertake the biggest clean up ever, in advance of the Olympic and Paralympic Games.
- **Proposal 6.6** Work with London Councils and the London boroughs to develop a road map towards a plastic-bag-free London.
- **Proposal 6.7** Work with gum manufacturers and London boroughs to reduce the blight of chewing gum on London's streets by piloting non-stick and degradable gum in London.
- **Proposal 6.8** Work with London boroughs, tobacco companies and tobacco retailers to develop a London wide smoking-related litter reduction programme.

- **Proposal 6.9** Apply to the Chewing Gum Action Group for funding for a behaviour change communications programme on litter and chewing gum litter for London in the years leading up to 2012.
- **Proposal 6.10** Work with Transport for London and London Underground to empower Londoners and visitors to be more responsible with their rubbish while on London's transport network.

What this will achieve

Targeted London wide behaviour change campaigns for prevalent forms of litter and chewing gum will contribute towards a reduction in the presence of litter and chewing gum and help to reduce chewing gum staining ahead of the 2012 Olympic and Paralympic Games. Promoting and encouraging the development of non stick, low stick and degradable gum bases will not only improve the appearance of London's streets but also save significant amounts of public money spent removing affixed gum and associated staining.

Littering will become increasingly unacceptable in London, as the public is empowered to dispose of their litter responsibly, through the provision of 'on-the-go' recycling bins, and become more aware of products such as personal/portable ashtrays. London's transport network will become considerably cleaner as more litter and recycling bins are rolled out across the network and on-street cigarette butt bins are provided outside all suitable stations and interchanges.

Clean up campaigns, such as those arranged through the Capital Clean-up campaign, will enable volunteers, community groups and local residents to reclaim areas of land for recreational or functional uses, such as planting vegetables. These campaigns not only clean up local areas, but also instil a sense of ownership and responsibility for plots of land that were otherwise blighted, abandoned and ignored.

Accessible and interactive reporting systems will enable Londoners not only to inform areas of abuse and blight from flytipping and graffiti but will also enable Londoners to share the good work they are undertaking in their own neighbourhood. Once embedded such systems can also save London boroughs money by reducing the number of reporting channels and reducing back office costs.

Proposals

With the spotlight on London in 2012, London's streets need to be among the cleanest in England. To achieve this, London will need to take a unified approach, with the GLA and London boroughs engaging with communities, landowners, transport providers, charity organisations and many other stakeholders, to ensure a consistent and coherent approach over the next few years.

The public's perception of the success of the 2012 Games is likely to be influenced by street cleanliness and access to recycling. If the 2012 Games are to achieve their goals for waste, then a co-ordinated approach to cleaning and on-street recycling is required for the whole of London. The Mayor will work with boroughs to continue to drive up cleansing standards. He also wants to see campaigns such as Capital Clean-up gather momentum and support in the run up to 2012, to help deliver a high level of cleanliness both during and after the Games.

High standards of cleanliness cannot be achieved simply by more cleaning before, during and after the Games. There also needs to be an element of behaviour change in the way Londoners and visitors behave with regard to litter. The Mayor will develop a programme of work with London Councils, London boroughs and Keep Britain Tidy that will aim to change people's behaviour towards litter and restore some civic pride.

Businesses need to take responsibility for litter that is generated as a result of their activities. Retail and take-away food outlets, for example, need to work with their local authority, neighbouring businesses or Business Improvement District to take action. Local authorities have legislative support¹ to work with businesses, to ensure they can reach an agreement.

Proposal 6.1: The Mayor will work with London Councils and the London boroughs to develop a mobile and online reporting and recording system for litter and fly-tipping.

The Mayor wants Londoners to be informed and empowered when it comes to quality of life and the quality of the local environment. He is keen to establish greater access to information for Londoners and to improve the processes for reporting environmental crime. The Mayor is working with London boroughs and London Councils to agree the Londonwide roll-out of a mobile and online reporting and recording tool.

The tool being considered is based on the London Borough of Lewisham's Love Clean Streets programme and will allow Londoners and council workers to photograph and upload an image such as a fly tip or graffiti either via a mobile phone or directly on to the website.

The report will then be sent to a central portal to be directed to the appropriate London boroughs for recording and action. The public can then request an update as to when the issue has been resolved. The tool also enables the public to upload images of areas or incidents they have cleared or cleaned themselves, promoting social responsibility and community spirit.

The tool will enable local authorities to target their workload more effectively with the public becoming their eyes on the ground. Further savings can be realised by integrating the tool into back office services and through reducing the number of reports being received through more costly channels such as the telephone.

GLA staff have met with a number of Environment Directors and Heads of Service and the Mayor will now write to all London borough leaders and encourage them to support him in the London-wide roll out of this reporting system.

Proposal 6.2: The Mayor will work with local authorities to improve enforcement of environmental crimes, including litter and graffiti.

Education and enforcement has a role to play in changing people's behaviour. There is a raft of legislation available to local authorities to tackle street cleanliness and environmental crimes, but the degree to which it is used varies greatly across London. The Mayor will encourage London boroughs to adopt enforcement strategies that clearly set out how and when

they will use the legislation. The Mayor will encourage consistency across boroughs in their enforcement strategies by promoting partnerships and the sharing of best practice.

The Mayor will investigate the opportunity to establish a service level agreement for the enforcement of environmental crimes in London that will set a minimum level of enforcement to be expected across London. A service level agreement would assure Londoners that wherever they live, individuals that are caught littering and fly-tipping etc will be guaranteed to receive a minimum level of recourse.

Proposal 6.3: The Mayor will encourage boroughs to recycle or compost their street cleaning waste where practicable.

Policy 4 sets out how London will meet the Mayor's recycling targets of 45 percent by 2015, 50 per cent by 2020 and 60 per cent by 2031. Recycling and composting of street waste will, albeit minimally, contribute towards the achievement of these targets. When reviewing street cleansing services, London boroughs should consider the opportunities available to them to recycle and compost their street cleansing waste.

Proposal 6.4: The Mayor will work with a range of partners, including London boroughs and the private sector, to provide on-the-go recycling opportunities and to recycle waste from London's events.

On-the-go recycling is the next great recycling opportunity for London. As recycling becomes normalised behaviour, people expect to be able to recycle wherever they are. The Mayor is currently working with partners with the aim of piloting six reverse vending machines (discussed in detail in Policy 4) but is keen to work with London boroughs and other businesses to roll out more on-the-go recycling opportunities. As part of the consultation process on this strategy, the Mayor is looking for expressions of interest from businesses to work with him and the London boroughs to roll out on-the-go recycling opportunities across London.

London hosts some of the world's largest and best-known events such as the London Marathon and Notting Hill Carnival. The level of recycling achieved at these events varies dramatically however the Mayor wants London's events to perform to the same standard. The Mayor will explore the possibility of developing a minimum standard for events recycling, so that come the 2012 Games Londoners and visitors know what is expected of them and know what to expect.

Proposal 6.5: The Mayor will work with the London Organising Committee of the Olympic Games, Capital Clean-Up campaign, Thames 21 and other voluntary organisations to undertake the biggest clean up ever.

The Mayor has long supported the work of Capital Clean-up, Thames 21, Cleanup UK and other voluntary organisations in their challenge to engage with and encourage as many Londoners as possible to take it upon themselves to rid areas of litter, shopping trolleys, overgrown vegetation and fly tips, and make London's neglected and ignored open spaces great places to enjoy.

In the run up to the 2012 Games the Mayor wants to put his weight behind these organisations and help coordinate the biggest clean-up ever. From now until spring 2011 the Mayor will bring together as many organisations as possible to join him in encouraging as many Londoners as possible to clean up London on a particular day. This day of activity will not only have an immediate impact on London's neglected spaces but will provide Londoners with access to other volunteering opportunities that exist in London through his London volunteering programme.

Proposal 6.6: The Mayor will work with London Councils and the London boroughs to develop a road map towards a plastic-bag-free London.

The Mayor would like London to become a plastic-bag-free city and will work with London Councils to determine the best way to achieve this goal. The Mayor is a strong supporter of local campaigns such Greener upon Thames and encourages communities across London to establish plastic bag free zones similar to the one established in Kingston. Many of the larger retailers have embraced the voluntary reduction scheme but the smaller and independent retailers have not necessarily received the support and guidance they need to drive the level of change still required.

The Mayor is keen to work with London Councils, retailers, the British Retail Consortium and the Federation of Small Businesses to further reduce London's reliance on plastic bags.

Proposal 6.7: The Mayor will work with gum manufacturers and London boroughs to reduce the blight of chewing gum on London's streets by piloting degradable gum in London.

Manufacturers need to be pro-active in reducing the blight of chewing gum. The Mayor is keen to work with gum manufacturers to invest in an educational campaign in London to encourage proper disposal of gum and develop non-stick or degradable gum alternatives.

In July 2010, the Mayor invited chewing gum manufactures, innovators, cleansing technology suppliers and cleansing practitioners to a good practice and information sharing event at City Hall. One of the highlights of the event was hearing from a company called GumDrop that is providing containers for the collection of spent chewing gum and recycling the latex gum base to produce usable latex based products. The event was well attended and the Mayor will continue to work with the attendees of this group to deliver his aspiration of gum-litter-free London.

The Mayor is particularly interested in the products that have been produced by Peppersmith, a Putney based company that uses natural ingredients to produce a gum that is both non stick and degradable and the product produced by Revolymer that uses a new stick polymer. Revolymer's non-stick product has recently gone on sale in the US and the company hopes to launch the product in the UK in 2011.

Proposal 6.8: The Mayor will work with the London boroughs, tobacco companies and tobacco retailers to develop a Londonwide smoking-related litter reduction programme.

Similarly the tobacco industry needs to take some responsibility for the prevalence of cigarette ends on our streets and in our watercourses. Innovations have been forthcoming with personal/portable ashtrays being available for purchase for some years now and often purchased by local authorities

to distribute when enforcing litter offences. However they are sold in relatively few shops in London and most Londoners are not aware they can buy them. The Mayor is keen to work with the tobacco industry and retailers to increase awareness of the offence of dropping cigarette ends, and offering the concept of portable ashtrays as a solution to the problem.

The Mayor is keen to engage with tobacco manufacturers and retailers to develop a pan London programme that both educates smokers that dropping cigarette butts and other spent tobacco products is littering and that alternatives such as personal ash trays and on-street cigarette butt bins are available and should be utilised. As part of the programme the Mayor is keen to increase the provision of on street cigarette butt bins outside London's tube stations and transport interchanges as these areas are particularly blighted.

Proposal 6.9: The Mayor will apply to the Chewing Gum Action Group for funding for a behaviour change programme on chewing gum litter for London in the years leading up to 2012.

The Chewing Gum Action Group is made up of chewing gum manufacturers, Defra, Keep Britain Tidy and the Food and Drink Federation. Each year the group provides up to £1 million to local authorities to run behaviour change campaigns aimed at stopping people dropping chewing gum on the streets. Given that the world's eyes are on London in 2012, the Mayor

believes London should be the sole recipient of the 2011/12 campaign money and will, in partnership with London Councils and the London boroughs, apply for sufficient funding to run a Londonwide behavior change campaign on chewing gum litter.

Proposal 6.10: The Mayor will work with Transport for London and London Underground to empower Londoners and visitors to be more responsible with their rubbish while on London's transport network.

The Mayor is currently working with Transport for London, London Underground, Network Rail and the train operators to explore all opportunities for improving the cleanliness of our transport network and to investigate how customers can be empowered to do the right thing with their litter, particularly by improving the provision of recycling and litter-bins inside the stations and on platforms.

London Underground has recently developed a litter strategy that will see a 25 per cent increase in the number of litter bins that are available across the London Underground network by 2011. London Underground's strategy also includes an aim to recycle at least 75 per cent of litter that is captured on the network. The Mayor now wishes to work with Transport for London, Network Rail, Rail Track and the train operators to role out similar programmes across the whole of London's transport network.

End notes

1. Clean Neighbourhoods and Environment Act 2005

Other formats and languages

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Chinese

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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.

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.

Turkish

Bu belgeyi size kendi dilinize yazuların a bir nüshasını edilmek için, lütfen aşağıdaki telefon numaramızı arayınız veya adrese yazınız.

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿੱਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ ਲਿਖੇ ਪਤੇ 'ਤੇ ਲਿਖਾਓ।

Hindi

यदि आप इस दस्तावेज़ की प्रति अपनी भाषा में चाहते हैं, तो कृपया निम्नलिखित नंबर पर फ़ोन करें अथवा नीचे दिए गये पते पर लिखें।

Bengali

অপনি যদি আপনার ভাষায় এই পত্রিকার প্রতিলিপি (কপি) চান, তা হলে নিচের ফোন নম্বরে বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Urdu

اگر آپ اس دستاویز کی نقل اپنی زبان میں چاہتے ہیں، تو براہ کرم نیچے دیے گئے نمبر پر فون کریں یا دینے گئے پتے پر رابطہ کریں۔

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى الاتصال برقم الهاتف أو عن لثة العنوان
 أفضاه

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ਆਪਣੀ ਭਾਸ਼ਾ ਵਿੱਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਕ੍ਰਿਪਾ ਕਰੀ ਆਪੇਕ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਅਥਵਾ ਨੀਚੇਨਾ ਸਰਨਾਮੇ ਸੰਪਰਕ ਸਾਥੋ।

